THE DEVELOPMENT AND USE OF THE BEDWETTING ALARM FOR NOCTURNAL ENURESIS

by

UTE HEDWIG TEPPER

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DECLARATION

"I declare that THE DEVELOPMENT AND USE OF THE BEDWETTING ALARM FOR NOCTURNAL ENURESIS is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references."

U. Tepper .....

Ute Tepper
December 1997

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By: Ute Hedwig Tepper
Degree: Master Educationis
Department: Educational Psychology
University: University of South-Africa
Supervisor: Prof. L.J. Jacobs

SUMMARY

Since 1904 bedwetting alarms have been developed and scientifically described for the treatment of nocturnal enuresis, also known as bedwetting. Currently, several bedwetting alarms of various designs are available on the overseas market. These can be imported to South Africa at great cost. As affordable alarms were not readily available in South Africa, there was a need to develop and evaluate a new unit.

In order to improve the efficacy of this new device, it was accompanied by detailed user guidelines and instructions. The use of this alarm was tested and the observations of thirteen bedwetting children recorded. Additionally, a programme was developed to counsel enuretic children with accompanying problems, and to assist the parents in dealing with their child's bedwetting problem. The observations and findings will be useful in practice and future research.

KEY WORDS

Nocturnal enuresis; bedwetting alarm; holistic; counselling; development of bedwetting alarms; treatment programme.

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CHAPTER 2 : DEFINITION AND ETIOLOGY OF NOCTURNAL ENURESIS

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CHAPTER I

INTRODUCTION, CONCEPT DEFINITION, ORIENTATION, AWARENESS OF THE PROBLEM, PROBLEM ANALYSIS, STATEMENT OF THE PROBLEM, AIM AND METHOD OF THIS STUDY, PROGRAMME OF THIS RESEARCH.

1.1 INTRODUCTION

Bedwetting (or enuresis) is quite a complex and frustrating problem to solve, especially for an uninformed parent. Under normal circumstances a parent gradually becomes more and more concerned as a child reaches the age when it is expected to have gained bladder control. The problem is accentuated by the child having control during day, but not at night. Common sense tells the parent that a child of four or five years of age should have at least some "dry" nights.

The parents may show and express their feelings of concern openly. They may try various methods to stop the child from bedwetting, e.g. waking the child at night, restricting fluids before bedtime as well as trying various forms of encouragement, like stars for dry nights, if and when a dry night occurs. As concern about the bedwetting grows, the parents may openly start to express their frustration and irritation about the consequences of the child's constant bedwetting.

In parallel to the parental concern, the child also becomes aware that the bedwetting is no longer acceptable any longer at her[1] age. Having to

[1] The female term is used throughout, but it also applies to the opposite sex.

wake up in a wet bed, or having to wear nappies at a disappropriate age and facing the parental reaction to it will undoubtedly affect any child, even if the child seems to show no overt signs of its anxiety.

As the problem becomes more embarrassing to both parent and child, the anxiety and secrecy about it escalates. The bedwetting secret remains in the family, until the consequences of the problem drive the parents to obtain professional advice. The treatment of bedwetting, or nocturnal enuresis, can be as varied as the causes.

1.2 CONCEPT DEFINITION

Nocturnal enuresis reflects the complexity of this problem when, broadly it defines it as "persistent wetting of the bed during the night in the absence of neurologic or urologic pathology" (Campbell, 1970). As fewer than 10% of all bedwetters have any organic complications, most are called ***functional*** enuretic, ***primary*** or ***secondary***:

Functional, nocturnal enuresis (primary or secondary) is divided by the DSM III (Diagnostic and Statistical Manual of Mental Disorders, 3rd Edition) into two subtypes :-

1.2.1 ***primary functional*** enuresis as a disorder in which the child (person) has never attained urinary continence within a one year period;

1.2.2 ***secondary functional*** enuresis refers to cases in which there has been at least a one year period of continence.

The fourth edition of the DSM IV (1994: 29) defines *Enuresis* as follows: "Children with this disorder repeatedly urinate into their beds or clothes. The behaviour occurs twice a week for 3 consecutive months, or produces clinically significant distress or impairment. The child must be at least 5 years of age".

Considering the above mentioned and widely applied, accepted definitions of enuresis, it can lead to the assumption that nocturnal enuresis could have a psychological origin (Van den Aardweg & Van den Aardweg 1988:85).

1.3 ORIENTATION

Enuresis (or bedwetting) has over centuries been a general problem which has frustrated, inconvenienced and irritated many parents, child minders and children alike. According to Djuurhuus, Norgaard, Hjalmas & Wille (1992:7), the problem of enuresis has been researched and documented over decades and still remains a common occurrence and problem. This is also confirmed by Gustafson (1993: 923) who estimates that 20% of all children aged 5 and 10% of all children aged 8 wet their beds regularly. According to him some children never gain control over nocturnal micturition (primary enuresis) whereas some wet their beds again after an initial dry period. He claims that there is no satisfactory explanation as to why some children never learn to become dry.

Theories and methods of treatment have been many and contradictory (Djurhuus et al.1992:7; Houts et al. 1994:737; Gustafson 1993:923).

The selection of one mode of treatment is generally based on the clinician's theoretical viewpoint and approach (Doleys 1977:30).

A wide range of viewpoints has been presented in the debate as to what the cause of enuresis is. Some of the better-known are the following :

- The Psychodynamic viewpoint: bedwetting is an overt symptom of an underlying disturbance.
- The Psychiatric viewpoint: bedwetting is an accompaniment of an emotional disturbance.
- A Developmental point of view: wetting the bed is the result of stress during a sensitive developmental period.
- The Psychosomatic theory: bedwetting results from high levels of anxiety resulting in ineffective bladder control.
- A Personal Construct Notion: the child wets because the world is most meaningful to him within this stance.
- The Behavioural Theories: bedwetting is a failure to learn appropriate bladder control. Within the behaviourist framework views include:
    - poor learning
    - unlearning
    - inappropriate learning and
    - interference of learning.

Most have accepted the development of dryness as a maturational process which include the following developmental aspects:

- The voiding reflex, which is very strong in the infant, is necessary for infant survival.
- As the child grows, the higher nervous centres develop. This involves the development of the inhibiting factors which control voluntary voiding.
- Cortical control is a very highly skilled function with considerable complexity which involves cortical conditioning, the discrimination of internal cues [bladder distension] and external cues [presence of the toilet, parental signals, etc.] (Butler 1987:35).

The most commonly researched and used methods or interventions are grouped into two main groups which are as follows:

1.3.1 Intervention from the medical / pharmacological point of view (pharmacotherapy);

The medical approach conceives enuresis as part of a physiological syndrome whereby surgical or pharmacological intervention is thus initiated (Doleys 1977:30). According to Walker (1989) in Mishne (1993:481), medication is one of the most popular treatments for enuresis by doctors and patients. The reason for this is that it is easy to administer (Mark & Frank 1995:75). They add that three agents are commonly used:

- therapy to increase bladder capacity and reduce unstable bladder contractions (oxybutynin: see 3.3.2.1b).

- therapy to reduce urine output
  (anti-diuretic hormone ADH : see 3.3.2.1c).

- agents that work on the underlying personality disturbances and anxieties. This drug functions as an anti-depressant, of which the mechanism is not fully understood (tricyclic antidepressants : see 3.3.2.1a).

1.3.2 Intervention from the psychological point of view as implemented by parents, educationalists and psychologists.

The psychological theories can be grouped into two main categories:

1.3.2.1 The psycho-dynamic approach

This approach believes that enuresis is an "overt symptom of an underlying personality disturbance" which causes the bedwetting problem (Doleys 1977:30; Gustafson 1993:923; Butler 1987:28). Therapists supporting this view believe that the suppression of symptoms will only aggravate the problem and new symptoms might develop (symptom substitution).

Enuresis can be grouped as:

- a substitute form of gratification of repressed sexuality. The bedwetting of the older child who regresses back to this form of infantile satisfaction, is seen as a substitute of suppressed masturbation. Therefore bedwetting is a conversion symptom;

- a direct manifestation of deep-seated anxieties, stresses and fears;
- a disguised form of hostility towards the parents;
- a way of persisting in the freedom and safety of babyhood, whereby bedwetting brings back the presumed security of infancy. Bedwetting is thus a regressive symptom;
- an emotional conflict between mother and child, whereby the insecure child demands love by way of 'weeping through the bladder'. It is even suggested that this type if behaviour could lead to later psycho-sexual problems in adulthood (Lovibond 1964:10; Butler 1987:29).

Mishne (1993:474) reports of views that enuresis is regarded as a symptom of neurosis, perversion or impulse disorder, linked with aggression, poor impulse control or destructiveness, often in response to separation and parental rejection. Therefore these symptoms of enuresis are psychologically determined.

In treating enuresis, the psycho-dynamic theory focuses on the underlying disturbance. Therapists supporting this view claim that symptomatic treatment (treatment focused on bedwetting itself) is futile, as the underlying symptoms are not addressed. Even after the conditioning treatment of the behavioural approach has proved to be 70-80% successful, the psycho-dynamic theories propose that if symptomatic treatment were to be successful, the symptoms of

bedwetting would be displaced only to erupt in other harmful behavioural manifestations. It is argued by the behaviourists, that most children who become dry after treatment show beneficial changes such as increased self-esteem, sense of freedom, improved familial and social relationships and venturing into new activities. In fact, most authors now believe that the symptom substitution hypothesis is not holding water (Butler 1987:31).

1.3.2.2 The behavioural approach

According to the behavioural psychologists, enuresis is not a symptom of an underlying problem, but has an external cause. Enuresis is viewed as "a product of deficient learning" in the majority of cases (Wagner 1987:262), thus an isolated habit deficiency. It is thus believed that enuresis is behavioural and keeping dry is simply a habit that can be learned and acquired, but this learning theory as a method of treatment has been criticised to be outmoded and invalid. Therefore critics may argue that success in behaviour therapy could only be attributed to other aspects of treatment, such as the therapist's enthusiasm, frequency of therapist client-interaction and the demands implicit in a "scientific" treatment intervention.

Behaviour therapy is particularly successful when conditioning methods are applied. The principle of deconditioning and conditioning derived from the learning theory have yielded positive results. Success is obtained mainly by way of mechanical devices. Such mechanical devices are usually electronic alarms that go off as soon as they get wet.

The aim in treating enuresis is to decondition bedwetting by initiating a response from the child after the stimulus is initiated. The child will thereby be conditioned to wake up by associating the alarm with the full bladder. Eventually the bedwetter will wake by herself sensing the stimulus of a full bladder. Therapists of a more behaviourist orientation consider the most important single factor in conditioning treatment to be the stimulus-response and/or avoidance relationships which are forced by the training procedure through instrumental punishment training, classical conditioning or instrumental avoidance conditioning (Peterson et al. 1968:351; Lovibond 1969:141;). Lovibond pointed out that the alarm bell is an aversive stimulus which conditions the child to stop micturition before the bell goes off (Lovibond 1963:17).

Success and improvement with behaviour therapy can also be accurately assessed and measured. The point of symptomatic relief is also attainable and well defined (Baker 1969:42). See also 3.3.3 for full information on behavioural methods of treatment.

1.3.3 Treatment outcomes of the three approaches:

1.3.3.1 Despite continued research, professional consensus about treatment is still lacking (Houts et al.1994:737). Controlled studies have shown that the **medical / pharmacological** approach to deal with the bedwetting problem is not always effective enough (Mishne 1993:483; Finley & Wansley 1976:24;). According to the latter, the success rate was poor in 25% to 80% of cases. These findings were underlined by Gustafson (1993:923; Wagner & Matthews 1985:22) who claim that

medical and psycho-pharmacological treatments, like imipramine, ephinedrine and dexedrine have been successful for roughly 35-40% of all treated cases. Most children become dry while on imipramine, but the relapse rate is also very high when the drug is withdrawn (Regensberg (1988:31) Mishne 1993:480; Wagner 1987:262). It must furthermore be kept in mind that only 10% of all cases of enuresis have medical causes, such as malformities or infections (Gustafson 1993:923; Houts et al. 1994:737).

After extensive research, Houts et al. (1994:741) found that children treated with a urine alarm have outcomes superior both to children receiving desmopressin and children undergoing any of the other treatments. This is confirmed by Mark and Frank (1995:75) in which they point out that although pharmaco-therapy proves to be most preferred, the results are less durable than with appropriate behaviour modification.

Furthermore, some of these medications, such as the tricyclic antidepressants, have several side effects, most of them minimal. These include symptoms such as restlessness, sleep disturbance, headaches, concentration difficulties, constipation and loss of weight (Alon 1995: 98).

Additionally, studies of sleep, bladder and sphincter control and diseases like polyuria[2] have brought more insight into this problem, but without improved treatment procedures (Djurhuus et al. 1992:11).

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[2] excessive excretion of urine

To conclude, research findings indicate that intervention by means of medical methods alone has thus proven to be only partially successful.

1.3.3.2 An equally dissatisfying result has been achieved by the **Psycho-dynamic** approach.

Contrary to the behavioural approach where the symptom is treated and bedwetting eliminated, the psycho-dynamic treatment focuses on the discovery and eradication of the underlying disturbances rather than attacking the symptom (Doleys 1977:30). According to Wagner (1987:262) there is, however, not enough empirical support to verify its success, despite the appeal of individual psychotherapy.

Studies indicated poor results, because the underlying problems do not seem to be directly responsible for enuresis. These findings are supported by and verified by Gustafson (1993:923) and (Wagner 1987:262). Furthermore, variables like motivation and enthusiasm, as applied by psychologists, do not always work (see Chapter 5).

1.3.3.3 Treatment according to the **behavioural approach** simply states that bedwetting can be stopped by acquiring a habit with little or no assistance from the parents at all, by arranging a suitable training setting (Gustafson 1993:924; Lovibond 1964:12). The child can be trained to be dry. This concept is derived from the learning theory. As the first attempt to "toilet train" failed, the child should be conditioned to stay dry at night.

After extensive research, Monda and Husman (1995:745) state that bedwetting alarm systems by way of conditioning are the most effective method of treating mono-symptomatic primary nocturnal enuresis (Lovibond 1969:34; Meadow 1977:173; Taylor & Turner 1974:290; Finley et al. 1973:289 & Schaefer 1979:112).

Mowrer and Mowrer (1938: 42) constructed the first techniques based on conditioning principles. They designed an apparatus that can condition the child to become dry at night, a method that is effective without new symptoms developing. In fact, the advantage was that all the other symptoms, like lack of self-confidence, shyness, anxiety, embarrassment, anger and aggression also disappeared. This indicates that bedwetting in itself often causes new problems (Gustafson 1993: 924).

The enuresis alarm works well in 70% to 90% of children (Wagner 1987:262). Due to this high percentage, it is recommended that this alarm should be considered at the outset. Any kind of intervention must carry no risk and minimal side effects (Djurhuus et al. 1992:23).

Although alarm treatment is effective, relapses do occur due to non-compliance from parent and child due to motivational reasons (Smeets & Striefel 1988:693). The rate of premature termination is rated to be as high as 48% by Wagner and Johnson (1988:114). Reasons mentioned by the same authors were parental intolerance of enuresis, lack of effort and patience, as well as ongoing support to the child. However, the children and parents must be highly motivated to follow through with

this form of treatment (Anderson et al. 1993:28), as it needs consistency and many disturbed nights until results are achieved.

The higher relapse rate is also attributed to external reasons or apparatus malfunctioning, yet this form of treatment remains more popular than most other approaches in Australia, Europe and America (Finley et al. 1973:289; Young & Morgan 1972:411).

1.4 AWARENESS OF THE PROBLEM

Assuming that enuresis has a psychological origin, parents are quite justified in asking why encouragement, rewarding, praise for the occasional "dry night", punishment or other educational methods fail to work.

The researcher was faced with the same questions when both her daughters who suffered from primary nocturnal enuresis (but not her son) did not respond to the typical methods and "tricks" that parents normally apply to discourage their children from bedwetting. Not having researched the problem of bedwetting at that stage, the normal procedures and common sense methods that parents normally apply, as listed below, were put into use and tried. These were:

- the child was taken to visit the toilet before going to bed;
- protective bed sheets were put on the bed, but when these became unreliable, they were replaced with disposable nappies at high cost;

- by the age of five, both daughters were encouraged to get up during the night when the need arose;
- the wetting was deliberately ignored for a long period so as to "avoid" or "reduce" any possible underlying anxiety that could have an aggravating effect on the bedwetting, but no difference was noticed;
- towards the end each child was told that the consequences of bedwetting were becoming very unpleasant for both parents and certainly not appropriate any longer. This had no visible effect;
- two commonly used prescribed drugs, Tofranil and Ditropan, were used and when no effect was noticed, the dosages were varied by the prescribing doctors, all to no avail;
- successes were praised and an expectation created that the problem will eventually be solved.

Actions that were avoided were:

- waking the children at night to go to the toilet (the researcher believed that lifting the child does not enable and in many ways denies the child the chance to develop her own bladder control);
- punishing or blaming the child for wetting the bed;
- criticising or humiliating the child;
- having the child change her own bedding;
- acting overly concerned about this problem.

Without any prior in depth knowledge as to why children would suffer from nocturnal enuresis, the researcher was left with questions as to why children suffering from nocturnal enuresis were dry during the day, but unable to control the bladder at night.

One assumption was that anxiety could be an underlying problem. Any known events that could cause increased anxiety in the daily life of the second child were dealt with. Yet the bedwetting problem remained.

As a counter-argument one could say that every person, particularly children, suffers from some form of anxiety daily. Why then, do some wet the bed and others do not? Could it mean that some children have learnt the ability and developed inner resources to cope with anxiety while others are slow to acquire these skills? Or is anxiety a relevant factor at all?

The other possibility of failure to learn nocturnal bladder control led the researcher to believe that conditioning the child to wake and void in the toilet could have a positive effect on its bedwetting. In Butler (1987:61) it was mentioned that over 60% of mothers rated the lack of nocturnal bladder controls as the major cause of bedwetting. This was consistent with the behavioural definition of enuresis where night-time continence is considered to be learned through discrimination of the physiological cues, such as bladder distension, and associating this sensation with the response of awakening and holding.

It was with this same assumption which led the researcher to apply conditioning by way of using a urine alarm. The use of such an alarm was

also recommended by medical a doctor, as he believed it to be highly successful.

Since such an alarm was not available commercially, a buzzer and mattress pad alarm were fabricated and used by the researcher on the first daughter.

A new prototype was built and applied to the second daughter, who was seven years old, wore diapers and had been receiving Tofranil and Ditropan for quite some time. She was introduced to the urine pad alarm in conjunction with the discontinuance of the diapers. For the first two nights, the child was slow in responding to the alarm, which resulted in her wetting the bed. Thereafter she reacted fast enough to stop voiding, with only the pad and panty becoming wet. Within two weeks the bedwetting stopped completely, although the urine pad alarm was still worn for one week thereafter. She experienced only two separate relapses thereafter. The alarm was not reintroduced.

The following effects were noticed during the two week period immediately following the introduction of the alarm:

- Initially the alarm went off twice a night, mostly before three o'clock in the morning. Exact recording of the times was not done, since the parents had no reason to do so at the time. More or less a week later the bedwetting improved to only once a night and then abruptly stopped.

- Both parents and the child experienced great relief. The child in particular, felt very relieved and her self-confidence and sense of freedom improved dramatically. She knew that she was now able to invite friends to sleep over without the embarrassment of having to wear a diaper.

1.5 PROBLEM ANALYSIS

As a conditioning treatment the bedwetting alarm, has proved to be particularly effective. Due to the fact that so many parents are plagued by the same problems the researcher experienced with enuresis, the latter realized that there was a great need for bedwetting alarms which are relatively inexpensive and easy to use.

During literature research it became apparent that many alarms were problematic to use. Butler (1987:144) listed some general reasons for alarm failure:

- failure of the alarm to sound after bedwetting had occurred;
- failure of the child to wake to the alarm;
- false alarms due to perspiration;
- sabotage by the child by not switching on the alarm;
- occurrence of buzzer ulcers.

Not only did problems arise with alarm failure, but also with the question of providing a treatment programme provided. Additionally, using the

alarm on its own and hoping that the problem will be sorted out, will not work in all cases. Butler (1987:137) claimed that the bedwetting alarm and the treatment package was unlikely to succeed if additional professional help was not provided. One of the reasons he listed was that each case is unique and that it requires individual care.

1.6 STATING THE PROBLEM

The problem has two main components:

1.6.1 Availability of the bedwetting alarm.

As the availability of bedwetting alarms was clearly a problem in South Africa, the focus of this research aimed on the design of such a device, together with the development of user guidelines and support to both parents and child. The researcher had already decided to use the method of alarm treatment as nothing else worked. A locally made alarm would have the advantage of being relatively inexpensive and easily obtainable. Imported alarms were generally too expensive when available. To the researcher's knowledge, the average price for a bedwetting alarm in America is about $US 80, which with current exchange rates would result in a purchase price of about R 365 (October 1996) before postage and import charges are added.

In response to enquiries one major pharmaceutical company stated they were only prepared to import the alarms in bulk (to reduce costs), but that this would depend on demand or orders placed for the alarms. Their attitude was clearly very unhelpful.

The few imported bedwetting alarms that were known to have been available in South Africa before or at the time of this research, were imported, expensive and not functionally sound. It was found that these deficiencies could be corrected or improved upon with a newly designed product, which could be locally manufactured.

1.6.2 The value of the pharmaco-medical and psychodynamic approaches in treating enuresis with the focus on alarm treatment.

Given the fact that alarm treatment is quite successful in treating enuresis, there are a number of bedwetting children with underlying emotional or behavioural problems. As anxiety, fear, child abuse or a number of other factors could lead to bedwetting, these can best be addressed by psychotherapy.

Alarm treatment should **not be considered the first method of treatment in cases of bladder infections, diabetes and other related medical conditions.**

Would the ideal be a combination of all methods of treatment in which the problem with multiple causes could be treated more effectively? Literature and applied research in the following chapters will provide the answer.

1.7 THE AIM OF THE STUDY

The aim of this study is to design an effective, simple and available method of treatment with minimal costs and minimal professional counselling involvement while not disregarding the value that the other

approaches have. This treatment programme will include a refined bedwetting alarm, as well as user instructions and parental guidelines to assist in the treatment of bedwetting.

The goal is :

a) to apply the conditioning principles by way of building an affordable and effective, electronic device in conjunction with simple instructions for a lay person to use without time-consuming and costly professional involvement;

b) to test the efficacy of this device and user package in case studies and to record the results;

c) to integrate all three approaches in treating enuresis with the alarm treatment as focal point for improved results.

1.8 METHOD OF RESEARCH

The method of research will be descriptive and idiographic . Indeviduals who use the alarm will be observed. The effect of the alarm, the clarity of instructions, the difficulties and positive aspects regarding the use of the alarm will be observed.

The referred cases with behavioural and emotional problems who then use the alarm will be observed. Counselling will

be provided as needed and when necessary. The aim is parental guidance to control own problems and circumstances as far as possible.

The object of the treatment programme (Chapter 6), is to eliminate the detailed recording of events and to develop a simple procedure since parents have had enough of this problem of bedwetting by the time they resort to the alarm. It is more important at this stage to understand the use (functioning) and effectiveness of the alarm and the program.

1.9 PROGRAMME OF THIS RESEARCH

Chapter 1: introduction, orientation, awareness of the problem, problem analysis, statement of the problem, aim and method of this research

Chapter 2: definition and etiology of enuresis

Chapter 3: treatment approaches: the range of intervention by parents and professionals

Chapter 4: the development and use of existing bedwetting alarms

Chapter 5: the development, improvement and use of a South African manufactured bedwetting alarm

Chapter 6: the empirical research design

Chapter 7: the application and use of the alarm and programme

Chapter 8: results and recommendations emanating from this research.

CHAPTER 2

DEFINITION AND ETIOLOGY OF PRIMARY NOCTURNAL ENURESIS.

2.1 DEFINITION

Enuresis is a word derived from the Greek word "enourein" , meaning "in urine", or " inability to control urination".

Enuresis is generally defined as the involuntary discharge of urine during the day **(diurnal)** or night **(nocturnal)** after 3 or 4 years of age (Lovibond, 1964:97). This condition can occur either continuously or intermittently (Wiggelinkhuizen 1989:551). Verhulst, Van der Lee, Akkerhuis, Sanders-Woudstra, Timmer & Donkhorst (1985:989) define **enuresis** as the "involuntary voiding of urine at least twice a month for children between the ages of five and six and once a month for older children".

The National Enuresis Society [NES] (Internet 1) describes enuresis as the "involuntary discharge of urine beyond the age when a child is old enough to be able to control urination".

In most cases there is an "absence of demonstrable organic pathology or acquired defects of the urinary tract" (Mark & Frank 1995:427).

Wille (1994:772) defines enuresis as a "disorder of the unknown, probably of multi-factorial origin".

There are several types of enuresis:

- ***Diurnal Enuresis***, which is wetting during waking hours;
- ***Nocturnal Enuresis***, which is wetting at night during sleep;
- ***Primary Nocturnal Enuresis (PNE)***, which is defined as a lack of bladder control during sleep;
- ***Secondary Nocturnal Enuresis***, the loss of bladder control after the child has been dry for a long time [3-6 months] (NES Internet 1).

2.2 ENURESIS: NOCTURNAL AND / OR DIURNAL

2.2.1 Nocturnal enuresis, commonly known as bedwetting, is defined as a *persistent* or *nightly* incontinence during sleep since birth. By definition, the person will have normal micturition during the day.

True nocturnal enuresis is mono-symptomatic, meaning that there are no day-time symptoms (Monda & Husman 1995:745); (Djurhuus et al 1992:8). In only 1-2% of cases a medical disorder may be present.

Children with nocturnal enuresis fail to wake when their bladders are full and they wet their beds in any sleep stage (Wille 1994:772; Djurhuus et al. 1992:11). This is the reason why Finley & Wansley (1976:24) call it a "sleep disorder of childhood".

The Tri-state Incontinent Support Group [TIS](Internet 3) claim that bedwetting (or childhood incontinence) is the most common childhood bladder control problem. According to them, the term "bedwetting" is

not accurate enough, as wetting occurs during sleep and the bed gets wet only if night-time diapering is discontinued.

According to them the term "sleep wetting" makes more sense, as the child wets herself during sleep. Bedwetting is thus a laundry problem, whereas sleep-wetting is a problem encountered during child development.

Nocturnal enuresis occurs in 60-80% of children with enuresis, while diurnal enuresis accounts for about 5%. The balance suffers from both nocturnal and diurnal enuresis (Campbell 1951).

2.2.2 Diurnal enuresis

The TIS (Internet 3) defines daytime wetting as a form of "urge incontinence". The term "diurnal enuresis" applies to people who have not achieved daytime bladder control. A great number of these people also wet their beds at night.

Daytime wetting may be indicative of an underlying disease, like bladder infection, urinary blockage due to a narrowing of the urinary canal and other organic or medical causes (Wiggelinkhuizen 1989:36; Rowan 1974:55). A child who suffers from diurnal enuresis is more likely to be afflicted by nocturnal enuresis (Wiggelinkhuizen 1989:36) than one who is not.

2.3 ENURESIS: PRIMARY OR SECONDARY

Enuresis has further been classified into **primary** and **secondary**.

2.3.1 **Primary (or functional)** enuresis refers to persistent wetting from birth in which dryness has never been achieved at all.

2.3.2 **Secondary (or acquired)** enuresis refers to a minority of children who were dry during the day as well as during the night for a period of at least six months before the condition re-occurred (Schaefer 1979:91). Secondary enuresis is often characterised by regression to bedwetting after a pattern of dryness has been established. When secondary enuresis is suspected, an attempt is made to establish the underlying physical and /or emotional cause. Often, emotional trauma could cause the child to regress to infantile bedwetting. This condition is temporary and often improves after the anxieties and emotional problems have been addressed.

The NES (Internet 1) agree that there are two forms of nocturnal enuresis, namely primary and secondary. Primary enuresis continues from birth with no long periods of dryness, while secondary nocturnal enuresis refers to the return of night-time wetting after a long period of dryness and bladder control. They add that 80% to 90% of nocturnal enuresis is of the primary type. Secondary enuresis is normally of short duration and transitory.

2.4 VARIABLES IN THE DEFINITION OF ENURESIS

As the clinical definitions of enuresis in literature vary so widely, the **DSM IV** [Diagnostic and Statistical Manual of Mental Disorders (1994:29)] formulated a generally accepted definition which includes variables such as age, gender, frequency, incontinence and prevalence.

2.4.1 Age

Enuresis affects 15% of 5-year olds, 5% of 10 years olds, and 1% of 15 year olds. On average, enuretic children are normal, well-adjusted individuals who show no overt signs of psychopathology, although they are quite distressed or saddened by their incontinence (Wagner & Geffken 1986:13).

It is well known that the incidence of bedwetting declines with the increasing age of the child. Children simply outgrow bedwetting and a child is normally dry between two and three years of age (Houts et al. 1994:737). The age limit of 3 was generally chosen, as this is the age at which most children achieve urinary control at night. Among school-starters, it is likely that one or two children in every class are bedwetters. By adolescence, with or without therapy, the incidence drops to 1-2%. One to two percent of young people retain their bedwetting problem until adulthood, even lifelong (Djurhuus et al. 1992:7). Although most children outgrow bedwetting, cessation without treatment can take several years longer than necessary (Houts et al. 1994:737).

2.4.2 Gender

Many more boys than girls wet their beds. The Applied Medical Informatics Inc. [AMI] (Internet 9:2) claim that enuresis is twice as common amongst boys as girls.

2.4.3 Frequency of bedwetting episodes

The criterion for frequent bedwetting varies between 5 and 7 times per week, while others require minimal incidence of 2 to 3 times per week. It is also stressed that enuresis should be considered a problem by the parents (Schaefer 1979:90; Mark & Frank 1995:427).

2.4.4 Incontinence due to organic diseases

According to Regensberg (1988:31) true incontinence in children only occurs when caused by congenital abnormalities like spina bifida, cerebral palsy and ectopic[1] urethra. Organic disease in enuresis is rare and not incidentally found (Wiggelinkhuizen 1989:553). Diseases such as diabetes and polyuria may present with bedwetting. Urinary tract infections are found in less than 2% of all enuretic children with primary nocturnal enuresis, but is more common if daytime symptoms like frequent micturition and fever are present.

2.4.5 Prevalence

Enuresis is reported cross-culturally and prevalent in all socio-economic, educational, racial and ethnic groups. It is more common in males, is often familial and usually disappears by adolescence. This condition is widely regarded as a chronic, frequently occurring symptom in child psychiatry and paediatrics with very good long-term, but poor short-term prognosis (Mishne 1993:4).

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[1] organ (urethra) not in its proper place

2.4.6 Conclusion

If one takes all the above-mentioned aspects of enuresis into consideration, it becomes clear that it is a disorder of unknown and of multifactorial origin.

It appears from the literature, however, that the decision for intervention does not depend on the compliance with the definition of enuresis, but rather upon the degree to which the persons who are enuretic themselves (and those close to them) find the condition unbearable and frustrating (Mohr & Sharpley 1988:70).

Although bedwetting may seem like a minor complaint to an outsider, it becomes a major problem to those who have to look after a bedwetting child for some years. It is then that a parent or caregiver looks back to ponder upon the causes of this perplexing problem they are experiencing.

2.5 ETIOLOGY: THE UNDERLYING CAUSES OF BEDWETTING

Enuresis is a symptom which appears to have a number of underlying causes. The causes of enuresis are complex and controversial. Even though there are numerous theories ranging from medical to psychological, none have been proven beyond doubt.

2.5.1 Psychological factors

2.5.1.1 Emotional disturbances

Patients with nocturnal enuresis normally do not suffer from psychological disorders, although children who wet their bed are likely to

have more associated behavioural problems than those who do not. According to Tissier (1983:334), the incidence of emotional disturbance in enuretic children is about 10-15% higher than that in non-enuretics. TIS however claim that enough evidence supports the fact that bedwetting is not due to an emotional disorder. Bedwetting is not a mental, learning or even a behavioural problem (TIS Internet 3:2). Children who wet their beds are more likely to have behavioural problems than those who do not.

One in five enuretics have accompanying emotional problems, which usually disappear when bedwetting is corrected. Often, it is not certain whether emotional upset is the effect or the cause of bedwetting (Tissier 1983:334; Schaefer 1979:93). Schaefer also claims that the etiology of bedwetting is found to be biological rather than psychological.

The argument is that children do not wet on purpose and that they do not wet at night to spite the parent or to gain attention. There is just not enough evidence to support this view. Studies have shown that bedwetting children have no more emotional problems than their counterparts (TIS Internet 3:2). In spite of these views, many books classify enuresis as an emotional disorder.

It is said that distress and/or anxiety at critical periods of development may have had an effect on attaining dryness and thus on the development of secondary enuresis (Mark & Frank 1995:4290).

It is estimated that only in 10% of all cases is enuresis a symptom of acute or chronic emotional disorder, especially in the case of secondary

enuresis. The latter is characterised by a regression to enuresis after a pattern of dryness has been established. Alon (1995:97) states that although enuretic children displayed more problematic and immature behaviour than non-enuretics, there was no difference between the two groups of children in the number of stressful events occurring during the toilet training years. According to Wille (1983:772), more recent studies have shown that enuretics and non-affected controls show an equal amount of psychiatric problems. He concluded that "if enuresis is a neurotic symptom, one would instead expect the appearance of substitute symptoms to appear after the cure of enuresis".

Associated behavioural problems in neurotic children include the following: negativism, thumb sucking, nail biting, tantrums, jealousy of siblings, poor attention span, poor school adjustment, fear and anxiety (Tissier 1983:333). It is known that fear and anxiety can alter the frequency and disturb the adequacy of voiding. A new baby in the family, household moves, separation from the mother, parental disharmony, accidents outside the home, illness in the family, hospitalisation and staying at a day care centre are examples of traumatic situations that could lead to the recurrence of enuresis, which is then labelled as secondary enuresis. Apart from the increased chances of urination, severe anxiety can also impair learning, especially in the development of bladder control in a young child about to be toilet trained (Schaefer 1979:94; Tissier 1983:334). It must be stressed that not all enuretic children are emotionally disturbed. Four out of five children seem to be happy, well-adjusted children who wet the bed for unknown reasons.

2.5.1.2 Inappropriate parental responses

Inappropriate parental responses towards enuretic behaviour *may* lead to secondary emotional problems which increase stress in the family and maladjustment in school (Schaefer 1979:95).

2.5.1.3 Parental Toilet Training Practices

Parental rigidity, inconsistency, punishment and too much pressure on the child not mature enough for toilet training often cause the child to lose confidence, become anxious and lose of nocturnal bladder control. The opposite was also stated in that there seemed to be no correlation between the timing or intensity of parental toilet training efforts and the development of enuresis (Schaefer 1979:95).

2.5.1.4 Motivation

During toilet training, the young child is normally highly motivated to win social and parental approval through the acquisition of day-time and night-time bladder control. Although there is variation in the opinions and toilet training procedures in different cultures, every human child learns bladder control. In homes where bedwetting is not considered unpleasant and a problem at all, children lack the motivation to achieve dryness. But failure to become dry produces anxiety, which in turn inhibits the emergence of the skill (Kolvin 1983:22). The opposite can also happen if parental expectations in toilet training and night-time control are so unrealistically high, that conflict arises between parent and child, therefore lessening the inherent motivation to gain control of the bladder (Kolvin 1983:17).

2.5.1.5 Faulty Learning

According to the behavioural philosophy most children acquire the habit of keeping dry in the day and at night with little assistance or no training from their caretakers at all. For unknown reasons however, some children cannot learn easily or cannot learn at all (Gustafson 1993:924; Mishne 1993:474).

The learning theory provides insight into how children can acquire correct toilet habits. By rewarding, reinforcing and practising appropriate habits and disapproving negative behaviour, a child will learn without much trouble. Another very strong form of learning is by way of observing and imitating exemplary models. For example, children may learn appropriate behaviour by observing other children to look for or ask for a toilet, to adopt the correct posture for micturition and to undo clothing. There is ample opportunity for children to learn without having to resort to systematic attempts to "train" the child (Kolvin 1973:15).

Some researchers claim that separate, different mechanisms are the basis of day and night-time bladder control. Others claim that maturation is predestined in the nervous system; its development and the sequence of certain learned behaviour patterns play a large role in nocturnal dryness (Kolvin 1973:15).

2.5.2 Physical Factors

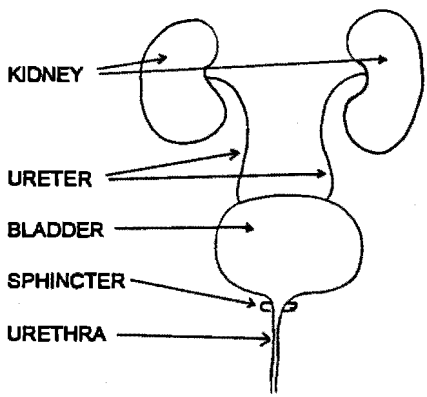
A description of the physiology and functioning of the bladder will provide more insight into the physical causal factors of enuresis:

2.5.2.1 Physiology of the urinary system

On a constant basis, urine is discharged from the kidneys and enters the bladder by two small ducts called ureters. The mouth of the ureter serves as a valve to prevent backflow of the urine into the ureter when the bladder is full and the pressure increases. The bladder is able to fill up to a certain point where it begins to contract its muscles to discharge urine into the tube at the lower end, a tube called urethra.

Figure 2.1

Diagram of Urinary Tract



The round bands of muscles that close the entrance to the urethra are called sphincters. The internal sphincter opens up when the involuntary muscles of the bladder contract, while the external sphincter remains under voluntary control. The external sphincter enables one to start and stop the flow of urine.

pressure. The latter also depends on the amount of urine in the bladder. The bladder muscles only contract when they receive nervous impulses to do so.

The micturitional reflex consist of a strong contraction of the detrusor muscles and the relaxation of the internal sphincter, followed by the relaxation of the external sphincter. The detrusor and the internal sphincter act together in a reciprocal fashion. When the internal sphincter muscle (located at the neck of the bladder) relaxes, urine flows into the first third part of the urethra. The external sphincter muscle, the last barrier, is located here and tends to relax in response to bladder pressure, although it is under voluntary control. When both sphincters relax, voiding occurs.

In an infant, micturition is an automatic reflex. As the child grows, it gains cortical control of the detrusor muscle as a result of maturation and learned control.

The amount of urine produced by the kidneys depends on many factors, like the amount of fluids and solids consumed, the amount of muscular exercise, the temperature and humidity of the air and emotional stress. Also the more rapidly the bladder fills, the more sensitive the neural mechanism is to bladder pressure and the greater the frequency of urgency. The opposite is also true: a considerable amount of pressure can be tolerated when the bladder fills up slowly.

Interestingly, a state of intense emotional alarm, fear or tension may lessen the output of urine as blood flow is reduced to the kidneys and

transferred to the tissues. The reason for this is that the body prepares itself for a flight or fight response in times of perceived danger by absorbing water and initiating the voiding of urine. Simultaneously, bladder spasm and sphincter release occurs independently of bladder volume. The result is an increase in enuresis (Schaefer 1997:101).

A smaller bladder capacity and a larger urinary output at night was noted amongst enuretics (Alon 1995:95). These facts, however, do not provide an answer as to why the enuretic child does not wake up at night when the bladder is full (Djurhuus et al. 1992:13).

2.5.2.2 Small bladder capacity

Difficulty in controlling micturition during the day and at night is reported to be associated with bedwetting (Butler 1987:15). According to various studies enuretic children had smaller bladder capacities when compared to the non-enuretic children (Alon 1995:93). Therefore parents and children were told to teach their children to hold back micturition during the day for longer periods so as to increase bladder capacity. Schaefer believes that this could not be the only cause of enuresis as many adults and children have diurnal and nocturnal frequency, but not enuresis (Schaefer 1979:96).

The National Enuresis Society, (NES Internet 1:2) has presented research findings, which it believes proves that bedwetting children have normal-sized bladders and normal sleep patterns.

2.5.2.3 Large volumes of urine passed (polyuria)

When coupled with other features of general illness, medical problems could be an underlying factor. Butler (1987:53) reports that it takes considerable medical skill to determine which children have dysfunctional voiding patterns, as some urological examinations and procedures are uncomfortable and distressing to the child. The cause of polyuria is believed to be a deficiency of anti-diuretic hormone and may also be seen in diabetics or compulsive water drinkers (Krause 1997).

2.5.2.4 *Deficiency of the anti-diuretic hormone (ADH)*

Recent medical research has found that many bedwetting children may have a deficiency of an important hormone, called the anti-diuretic hormone (ADH). ADH helps to concentrate urine during sleeping hours, which means that at night urine is more concentrated and is therefore of decreased volume. This implies that the bladder does not overfill during sleep, unless the child drank too much at suppertime (NES Internet 1:2). A newly released, synthetic hormone which is believed to alleviate this problem, is likely to be on the South African market soon. More detail about this medication is discussed in Chapter 3.

2.5.2.5 Urinary tract infections

Persistent bedwetting beyond the age of 3 or 4 rarely indicates a kidney or a bladder problem (TIS Internet 3). Children most susceptible to urinary tract infections are predominantly females (5% compared to 2.5% of boys). If a child begins bedwetting after a dry period, has greater frequencies of bedwetting accidents or wets during the day and at night,

the possibility of a urinary tract infection cannot be excluded. A medical examination will be necessary.

2.5.2.6 Painful micturition (dysuria)

This is found to be more common in bedwetting children. Dysuria usually indicates infections in the urine or urethra, or could be a clue to urinary tract pathology (Krause 1997).

2.5.2.7 Associated diurnal problems

About 10-28% of nocturnal enuretics have bladder difficulties during the day. Such children are also less likely to respond to the bedwetting treatment during the day. Frequency of daytime voidings (more than 7 voidings per day) are indicative of low functional bladder capacity and is most probably associated with night-time wetting as well (Butler 1987:53).

2.5.2.8 Organic factors

Anatomical defects such as spinal cord defects, nervous system developmental disorders and epilepsy are some of the organic causes of enuresis. Other symptoms which have been observed in children, and more specifically with secondary enuresis are: constipation, excessive frequency, frequency due to posterior valve dysfunction, dribbling and difficulty in the initiation and cessation (control) of micturition (Schaefer 1979:99). In spite of the fact that the incidence of organic causes accounts for only 1 to 3% of all bedwetters, it would be necessary

to exclude the possibility of organic factors by careful history taking, physical examination and urinary analysis (Schaefer 1979:99).

2.5.2.9 Mental handicap

Mentally retarded children also have a higher incidence of bedwetting than peers of the same age. In the profoundly mentally handicapped child, enuresis is probably due to lack of cognitive ability to learn bladder control. Both sexes are reported to be similarly affected (Mishne 1993:473).

2.5.2.10 Diet

It has been observed that many children wet less often if certain foods like chocolate, eggs, wheat, pork and citrus fruits are excluded from the diet. It has been found that dairy products are often the cause of allergic reactions and have been associated with bedwetting (TIS Internet 3:8).

2.5.2.11 High caffeine intake

Mohr & Sharpley (1988:70); TIS (Internet 3:8) found that a higher intake of caffeine can lead to frequent micturitions (caffeine diuresis). The caffeine acts as a diuretic and a bladder irritant. These authors have successfully treated seven clients by eliminating of caffeine, and with it the symptoms of anxiety produced by the high caffeine intake. Caffeinism (a dependency on caffeine) is likely to result with an intake of more than 500mg (4 cups of coffee) to 600 mg of caffeine per day. This dependency on caffeine has a separate classification in the DSM IV.

An excessive intake of caffeine may result in anxiety, which will have an adverse effect on the child's arousal level and result in urinary frequency.

2.5.2.12 Sleep Arousal Disorders and sleep patterns

Since the early fifties, with the availability of EEG equipment, studies have indicated the occurrence of enuresis during light sleep. In the late sixties, large studies done by Djurhuus et al. (1992:11) found that enuretic children had a normal sleep pattern, but had a deviated pattern of sleep awakening. This would indicate that the enuretic child would wake up during the deep sleep phase without reaching full awareness. Parents of enuretic children spontaneously reported that their child slept very deeply and did not wake up easily (Wille 1994:772).

The early eighties brought more insight into this problem and it was found that enuresis occurred during light and deep sleep. This view has been confirmed by many studies and is today still universally accepted (Djurhuus et al. 1992:11). Many therapists and parents believe that deep sleep may result in bedwetting since the child does not tune in to the increased bladder pressure. A normal child will wake and empty the bladder when it is full, while the enuretic child continues to sleep without awakening (Wille 1994:773). Mark & Frank (1995:428) refer to studies that show that wetting occurs during different stages of sleep. If this is the case, then deep sleep is not the only cause of bedwetting. They conclude that the inability to be fully aroused from sleep by various stimuli is the most important factor in enuresis and in failing to wake with the bedwetting alarm.

Enuresis is also related to other sleep disorders, such as somnambulism and somniloquy, which are disorders of arousal (Klackenberg 1981:453). Here enuresis is labelled as "hypersomnia enuresis" and is accompanied by sleep related disorders such as sleep-walking and sleep-talking. This type of enuresis is usually seen in boys of ages 3 to 9, and also in the first few hours of sleep (Mishne 1993:473). Hypersomnia enuresis is accompanied by excessive daytime sleepiness.

Finley and Wansley (1976:19) believe that the single most important and most frequently noted correlation with enuresis is an elevated arousal threshold during sleep. They claim that the enuretic child is unresponsive to internal cues such as a distending bladder, but also to external stimulation, such as a buzzer alarm (Schaefer 1979:96). Interestingly, it is well known that enuretics often stay dry when sleeping in a different environment, but start to wet their beds again after a few days. This phenomenon could be explained by the heightened arousal level in a new environment, which diminishes with time as the child gets used to the new environment (Wille 1994:774). It is concluded then that enuresis is a disorder of the sleep-arousal system.

2.5.2.13 Slow Maturation

It is believed that bedwetting is the result of a maturational lag in the process in which a child acquires bladder control. This developmental delay may be due to hereditary factors. Schaefer questions whether 'slow maturation' may be the underlying cause when occasional dry nights are experienced. He finds it difficult to reconcile occasional dry nights and

periods of dryness with slow neurophysiological development (1979:96). Kolvin (1973:9) distinguishes between primary and secondary archaic (primitive) motor responses. The primary archaic responses are present at birth, and these include walking, placing and righting responses. The secondary archaic responses include balancing and propping responses which are not present at birth as are the primary ones, but which emerge as maturation takes place in the central nervous system.

Kolvin (1973:9)also distinguishes between maturation and development. He defines maturation as an orderly process which is genetically inherent within the nervous system. It cannot be accelerated by environmental influences, but can be delayed by injury or defective development of the brain. Development is described as the emergence of a succession of behaviours which depend on the maturation of the nervous system. If a child is not dry at night, it might be because his mechanisms have not yet matured. The high rate of success achieved in children who at age 7 years are not yet dry at night supports the view that in the majority of such children maturation has already occurred. He concludes that delayed maturation over the age of five is rarely responsible for delayed dryness at night. This is also confirmed by Butler (1987:19) and Baller (1975:4).

Nocturnal enuresis is often seen in association with other patterns of developmental delay, such as delayed bowel sphincter control as well as delayed walking and talking (Mark & Frank 1995:428). Alon (1995:96) adds that the hypothalamic region of the brain, which causes contraction of the bladder, is also associated with the waking mechanisms. Slow

bladder development should be ignored and accepted, as each child develops at its own pace (Schaefer 1979:94). Prompting a child to become dry before it is able to could lead to additional anxiety and depression in the child, thus reinforcing the problem.

2.5.2.14 Genetic predisposition

Enuresis, especially primary enuresis, tends to occur in families. The chances of enuresis in a child whose father was enuretic is 7.1 times greater than otherwise (Schaefer 1979:96). Wille (1994:773) adds that enuresis occurs in families where there is a history of bedwetting by the father. The corresponding figure for a child of an enuretic mother is 5.2 (Alon 1995:05).

Butler (1987:17) and Mark & Frank (1995:75) state that more or less 70 to 77% of all bedwetting children have a parent or sibling with the same problem. They add that an accurate determination is difficult, because asking the parents about their own childhood is vulnerable to both inaccuracies of memory and the hesitancy to admit to bedwetting.

The following note appeared in the New York Times (July 1, 1995):

"A Genetic Clue to Bed-Wetting Is Located"

"Researchers Say

Discovery Shows the Problem Is Not Emotional"

Quote: "Danish researchers say they have found the general site of a gene linked to persistent bed-wetting in children, and the experts said their report should lay to rest the idea that the problem is primarily emotional. For ten years

the experts have suspected that a gene was a factor in bed-wetting but this is the first proof.

The precise gene has not yet been found, and how it may lead to bed-wetting is not known. Researchers cautioned that they cannot say with certainty at this point if the problem is entirely genetic, or if more than one gene might be involved.

But the immediate effect of the discovery may be in dispelling the stigma and blame that children are often made to feel for bed-wetting. Much of the psychological turmoil associated with bed-wetting is the result of teasing from playmates, punishment or humiliation by parents, or a sense of shame in the child.

"Knowing a gene is causing the problem should alleviate much of the parental blame and a child's embarrassment about wetting,' said Dr. Michael Jellinek, chief of child psychiatry at the Massachusetts General Hospital in Boston. Pediatricians also said that the identification of a gene site for bed-wetting or enuresis, might make it possible for earlier identification and treatment of children prone to it.

In their report, the researchers said a gene for primary enuresis was on the long arm of chromosome 13 of the 23 pairs of chromosomes in human cells. Primary enuresis affects an estimated five million to seven million American children and teenagers. It mainly affects boys, for reasons that are not understood.

Earlier speculations on the probable site for the chromosome had centred on genes involved in regulating the amount of urine output during the night, or genes that control smooth muscle contraction or sleep stages. But none of these genes appear to be in the region identified by the Copenhagen researchers.

The discovery of the gene site was made by Dr. Hans Eiberg and his colleagues in the department of genetics at the University of Copenhagen. A report on the discovery is in the July issue of the journal Nature Genetics.

"This may make it easier for children,' Dr. Eiberg was quoted, 'the families were very relieved to learn it was genetic, and so beyond the control of parent or child'. He screened 400 families to find 11 in which one parent and at least one child both had histories of primary enuresis. The pattern of transmission suggested that the gene was dominant, meaning that if just one parent had the problem, a child would be likely to have it, too".

The Newspaper article added that inheritance played no role in secondary enuresis, and that with these children no one knows what the cause is. According to Dr. Eiberg the cause could range from epilepsy to psychological tensions in the family.

According to Dr. Jellinek there were strong indications of genetics at play in spite of elaborate psychological explanations about bedwetting. If one asked a child's father if he had the problem as a child, and he says yes, you know that the child will stop at the same age he did.

For that reason, the latest discovery was not a huge surprise, but merely a confirmation of beliefs. Experts added that while the discovery is helpful in understanding what leads to bedwetting in some children, it will have little (if any) effect on treatment approaches.

Dr. Stanley Greenspan, a child psychiatrist at George Washington University Medical School, states that there are numerous different factors at play in bedwetting apart from genetics. Bedwetting may be associated with slow maturation of motor control in some children, or

allergies such as to dairy products in others, or out-of-control behaviour in still others. Apart from all this knowledge, one still has to design a treatment in view of a full understanding of the overall pattern (TIS Internet 2:2).

2.5.3 Environmental factors

Tissier (1983:334) has found that certain environmental factors played a role in bedwetting, i.e. lower socio-economic class (e.g. a large number of people per household), maternal smoking, separation from the mother, parental disharmony, sexual abuse and neglect.

2.5.3.1 Number of people per household

Tissier (1983:334) reports that the incidence of bedwetting increases with a larger number of people in the household, but gives no reason why. He suggests that the increase of people and overcrowding could lead to a rise in anxiety and stress, factors which are known to lead to a greater possibility of bedwetting. Also, children who were involved in many household moves (4 or more), were more susceptible to enuresis.

2.5.3.2 Separation

Young children who were separated from their mothers in the past, were 30% more likely to wet their beds (Tissier 1983:334). Where the child had been in hospital, the rate also increased.

2.5.3.3 Sexual abuse and neglect

It is quite understandable that an abused child will wet the bed out of fear, lack of inner control and anxiety. Often, overall neglect, particularly in toilet training, goes hand in hand with abuse. The abusive parent becomes increasingly intolerant of the bedwetting problem. The cycle of abuse is strengthened.

2.6 CONCLUSION

In spite of being able to identify the possible factors which influence whether a child will or will not wet the bed, it is still not known why some children seem to cope with similar stresses without the same result. According to Tissier (1983:334) it seems as if enuresis is a behavioural response to a cluster of stresses, particularly environmental stress which could be treated by reducing some of the stresses and instilling a positive attitude in the parents. As the causes of enuresis are of multiple origin and so difficult to define, the treatment of enuresis remains as varied as all the possible causes themselves. There are many varied approaches in the treatment to enuresis, the results of which are variable and not always predictable. The following chapter deals with these issues.

CHAPTER 3

TREATMENT APPROACHES: THE RANGE OF INTERVENTION METHODS USED BY PARENTS AND PROFESSIONALS

3.1 INTRODUCTION

Enuresis was recognised as a medical problem by the Egyptians as early as 1550 BC (Schaefer 1979:89 & Mishne 1993:470). A medical document advised a mixture of 1 juniper berry and 1 leaf of cypress taken with a glass of beer. Needless to say, it did not work (Greene 1996:1).

During the 18th and 19th centuries, harsh and inhumane procedures were used by frustrated parents. Schaefer (1979:89) reports of incidents in which a child was made to wear his wet pyjamas around his neck, another child's buttocks were placed on a hot stove and another had his/her wet sheets hung out of the window. In other incidents severe beatings were inflicted. In yet another case a mattress was equipped with protruding metal spikes to prevent deep sleep.

Physicians used methods such as bladder and rectal irrigations, constriction of the urinary orifice and severe fluid restrictions before going to bed, as well as during the day (Baller 1975:36)!

During the later, more "enlightened" years a variety of folk remedies were used to eliminate bedwetting, such as the consumption of potions, sleeping on a bed with the foot end elevated, drastically restricting fluid intake at bedtime and waking the child a few times at night to go to the

toilet (Schaefer 1979:89; Mishne 1993:470 & Hamburger 1993:26). For countless years children and their families lived with the dissonance and distress which this condition caused. Behavioural problems and loss of self-esteem would have been common amongst these youngsters.

George Orwell (in Djurhuus et al. 1992:7) in one of his essays, described his bedwetting problem as such: ***"I knew that bedwetting was***

> ***a) wicked and b) outside my control.....***
>
> ***It was possible therefore to commit a sin without knowing that you committed it, without wanting to commit it, and without being able to avoid it...***
>
> ***And the double beating was a turning point, for it brought home to me for the first time the harshness of the environment into which I had been flung....I had a conviction of sin and folly and weakness, such as I do not remember to have felt before"***

Fortunately, as the 21st century approaches, the physiological and psychological mechanisms behind enuresis have largely been discovered and understood. Today's methods of treatment are kinder, simpler and more effective.

3.2 PARENTAL INTERVENTION (as seen from the parent's perspective)

Having a child who wets her bed every night is quite a complex and frustrating problem to solve for anyone.

Under normal circumstances a parent gradually becomes concerned and irritated when a child has reached the age when it is expected to have gained bladder control.

Parents generally seek professional advice when all their own "remedies" or treatments have failed. The most frequent measures adopted by parents are tabled as follows (Butler 1987:54):

Measure	*Attempted n = 100*	*% Persisted, despite ineffectiveness*
Lifting or raising the child at night	97	52
Restriction of fluids before bed	88	55
Stars for dry nights	59	5
Bedwetting alarm	48	10
Child changes the bedding	40	75
Punishment	37	35

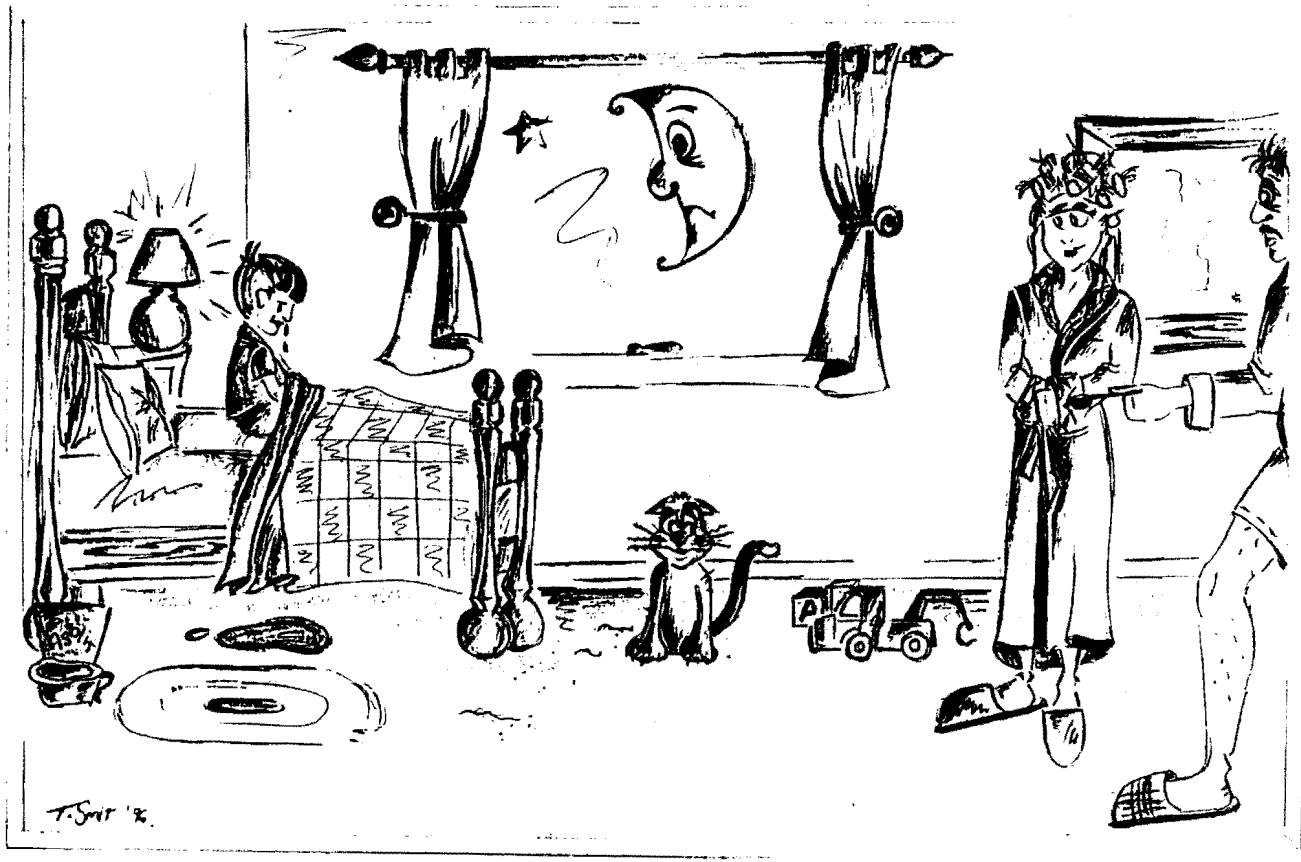
3.2.1 Lifting or raising the child to use the toilet

During the early childhood years, lifting is often attempted to help the child keep her bed dry without waking her child and causing too much fuss. But the opposite effect is achieved. The child never learns to sleep through the night and learn dryness of her own accord, because she is taught to micturate whilst half asleep (Kolvin et al. 1973:185).

3.2.2 Restricting fluids

Restricting fluid intake after suppertime, or even as early as late

PARENTAL INTERVENTION



afternoon, would prevent an overfull bladder at night and presumably prevent bedwetting. Doctors and parents used to believe that this measure was successful, until it proved to be wrong. Kolvin et al. (1973:185) take the view that this measure would only lead to prolonged bedwetting. It is said that the bladder reduces its capacity to hold fluids and merely performs its usual contractions and voiding at a lower level of filling than before. The child's holding ability is thus impaired and bladder control reduced by fluid restriction (Butler 1987:55).

3.2.3 Stars and rewards for dry nights

According to Butler (1987:55) half the mothers in his survey tried these measure but stopped, probably due to lack of opportunity to reward on a regular basis. Butler (1987:55) believes that rewards can increase the child's sense of helplessness and anxiety.

Kolvin et al. (1973:184) find great value in keeping records of events. They state that doctors and psychologists need records to assess progress. By keeping record with charts and stars, the child is involved actively and a positively.

3.2.4 Bedwetting alarm

A bedwetting alarm is applied to wake the child and stop micturition as soon as it starts. Bedwetting alarms will be discussed in more detail under 3.3.3.4.

3.2.5 Having the child change the wet bed

For a younger child, the mother usually changes the bedding and then does the washing on a daily basis. When the child grows older (plus minus 7 years) it would not be unreasonable to expect the child to perform the task for herself, especially if maternal intolerance declines. This task may include washing her own sheet and pyjamas. This measure could be interpreted as a deterrent and may help to encourage the child to stop bedwetting.

3.2.6 Punishment

Punishments meted out range from verbal reprimands to hidings. It is repeatedly reported in literature that next to crying, bedwetting has emerged as the second most stated reason for child assaults and abuse. The child with an already lowered self-esteem does not improve. On the contrary, these actions increase levels of anxiety, shame, resentment and unhappiness and increase the likelihood of enuresis (Butler 1987:56).

3.3 PROFESSIONAL INTERVENTION

The range of treatments presented below demonstrate the lack of agreement on the possible cause and methods for the treatment of enuresis. The most common treatment approaches derive from the **psycho-dynamic, pharmaco-medical** and **behavioural viewpoints** and remain controversial to this day. Treatment methods vary as widely and are as numerous, as are the etiological theories developed to explain the disorder. A summary below provides an overview of the methods commonly applied by the three approaches:

3.3.1 Psycho-dynamic intervention

As discussed before in Chapter 1, the psychodynamic perspective views enuresis as a symptom and not as a syndrome or single disease entity. Counselling is not directed at bedwetting per se, but at the underlying problem that causes enuresis and the accompanying symptoms that appear in conjunction with the main symptom.

With a younger child, therapy focuses on the parents to reduce their anxiety levels and to suggest more discreet or loving care of the child and her problems. With the older child, where the symptom begins to interfere with age-appropriate functioning amongst peers and during activities, more vigorous treatment methods are applied. The older child relies more on the opinion of peers and may feel more vulnerable about disclosing bedwetting secrets. Anxiety and a general feeling of dissatisfaction, tension and uneasiness about the bedwetting could strain normal relationships. These feelings have to be discussed with the older child. The child should learn to deal with the bedwetting problem constructively so as to preserve her self-esteem.

3.3.1.1 Interviewing and intervention

Interviews would include sessions with the child and the parent(s) to find the underlying cause(s) of enuresis. Efforts to correct enuresis must be aimed at locating and alleviating the underlying causes and not at treating the symptom of bedwetting itself. The therapist would probe for details concerning bedwetting, the parents' marriage, the nature of the

mother's pregnancy and early stages in the child's life. A thorough examination of historical data, developmental milestones, illnesses, unusual events and stresses would be the norm. The therapist would be interested in learning more about the child's identifications, mother and child relationship, peer relationships and academic functioning. The therapist would like to know more about the parents' approach to toilet training, their attitude towards the child's enuresis, their response to bedwetting accidents and their handling of the problem. The child's behaviour as it results from the bedwetting is of great importance, although psychological testing is not recommended, except if impairment in the child's cognitive, emotional or behavioural abilities is indicated. An appraisal of the child's physical condition is also an important aspect and would require physical and/or neurological examination. During the interview, it is crucial to observe how the parents and the child interact with each other when providing the required information. The parents' emotions and reactions to the problem are more revealing than the actual facts provided. The child's response to the way in which information is provided can shed additional light. The therapist looks out for clues which reflect possible depression, shame, embarrassment, anxiety, refusal to admit to bedwetting and social disadvantages due to the bedwetting problem. Psychodynamic evaluation thus provides guidelines for individualised, ongoing treatment (Mishne 1993:478).

Treatment methods would include child psychotherapy such as art, drama or play therapy for the younger child or clarifications, insight and

introspection in case of the older child. Therapeutic work with the parents as essential partners to improve the child's external environment would also important.

Baller (1975:28) emphasises the importance of informing the parents and child that their situation is not unique. It reassures the parents and child to some extent know that thousands of children and parents are out there with bedwetting and related problems and that nearly 10% of all individuals between 4 and 14 years of age are bedwetters. This information makes their burden a little bit lighter.

Baller (1975:36) also adds that bedwetters try to "run away" from their problem in the following ways;

- they become deep sleepers;
- they become inattentive and they do not "concentrate" on what other people want them to attend to;
- they withdraw from school tasks that are a bit difficult;
- they "escape" into diversions that bring comfort, like overeating or indulging habits;
- they wrap themselves in "envelope" to protect themselves from anything that hurts them and may consequently appear "thick-skinned".

Baller (1975:36) adds that not everyone employs these escape mechanisms to protect themselves, but that this type of behaviour is

quite common amongst bedwetters and should be addressed during therapy.

3.3.1.2 Hypnotherapy

Hypnosis is another approach to the treatment of bedwetting. Often hypnosis is used with great success as a supplementary treatment method (Baller 1975:36; Internet 1:4). Hypnosis offers the advantage of reducing the cost and duration as well as the side-effects of medicinal treatment.

Recent medical reports show that hypnosis can be effective within 4-6 weeks (NES Internet 1:4).

Three paradigms in hypnotherapy are usually followed, namely:

1. ***trance induction*** (hypnotic induction) enhanced by;
2. ***antecedent counselling*** regarding positive attitude, expectations and motivation;
3. ***self-hypnosis***. Studies have indicated that this form of treatment is successful in highly motivated individuals and in those who have received counselling in which positive attitude and thinking were reinforced (Miller 1993:35).

Butler (1987:91) distinguishes between two aspects of hypnotherapy, i.e. a trance or deep state of relaxation and suggestions given during these states. Suggestions are aimed at relaxation, enhancement of self-confidence and aspects of bedwetting.

Smeets & Striefel (1988:115) describe a treatment method which they claim is very successful in treating enuresis. The hypnosis treatment was implemented as follows:

Counselling. The family, including the parents, enuretic child and siblings were interviewed together and, at a later stage, separately. Initial data-gathering interviews were semi-structured. Treatment commenced with the careful explanation of the functioning, anatomy and physiology of the bladder and its control. Parents and children were told that the brain sent signals to all body parts for appropriate functioning and that they would learn a technique to train those specific and relevant parts of their brain responsible for bladder control.

Relaxation. Children were then taught to relax their body by letting each part relax in full. While relaxed, they were asked to listen to the therapist's voice while imagining the things suggested by the therapist.

Hypnosis was then induced by applying imagery techniques, like a favourite place, a train ride, cloud gazing or a flying blanket. Simultaneously, general suggestions were given regarding the child's involvement in and her own capacity to deal with the problem so that she could contribute to own well-being and control of circumstances.

At a later stage specific instructions were added concerning getting up at night with a full bladder, walking to the bathroom, micturating, returning to the bedroom and going back to sleep.

Two sessions of 30 minutes each were conducted during the first week

and one more during the second week. The frequency of subsequent sessions were guided by the child's needs and progress (Smeets & Striefel 1988:115).

Self-hypnosis. As hypnosis can give children the power to treat themselves, this type of therapy can successfully help to build the child's self-confidence and self-esteem and thereby alleviate the bedwetting problem. This form of therapy requires the child to be motivated to take charge of herself and assume responsibility for her bedwetting (NES Internet 1:4).

Smeets & Striefel (1988:115) further advised that each child be taught self-hypnosis and instructed to apply it before going to bed at night. The child was taught to tell herself that she was in charge of her own bladder, which was only a muscle that could be controlled, that she **wanted** to be dry and **would** be dry. The child would imagine bedtime and switch off the light, sleeping lightly and feeling the urge to micturate. She would recall that she was in control of the bladder and of waking up, going to the toilet and having the pleasure of waking up in a dry bed.

According to Butler (1987:92) hypnosis has been successful as a treatment method for enuresis. Wet nights are reported to decrease, while total cures have also been reported. Miller (1993:35), however, states that data on long-term efficacy is still lacking. He adds that if the child undertakes self-hypnosis several times per day, it limits the compliance with the program.

Edwards and Van Der Spuy (1983:168) found that hypnotherapy is an effective alternative form of treatment. They claim that treatment was most effective when task-motivational instructions, that suggested decreasing enuresis, were given in the waking state before a programme was administered.

3.3.2 Pharmaco-medical intervention

Before medication is considered, a physical examination should be performed to rule out any possible pathological causes. Laboratory tests (such as urine analysis or urine culture) or X-rays should be performed to rule out possible physical causes of the symptoms, including urinary tract infection. Physical causes are rare, but may include lower spinal cord lesions, congenital malformations of the genito-urinary tract, infections of the urinary tract or diabetes (Homsy 1995:1). Medication is one of the most popular methods of treatment, as it is easy to administer. Although no medication has been shown to convincingly cure bedwetting, the three most common medications used to manage it are tricyclic anti-depressants (Tofranil and Tryptanol), oxybutynin chloride (Ditropan) and desmopressin (DDAVP).

3.3.2.1 Medication

a. The Tricyclic Antidepressants, e.g. Tofranil and Tryptanol:

The most frequently prescribed and effective drugs are the tricyclic anti-depressants, of which imipramine hydrochloride (Tofranil) is most often used (Wagner 1987:262). The use of imipramines was first reported in

the 1960's, followed by several studies showing a positive effect on bedwetting. Although the basis for Tofranil's action is unknown (Mark & Frank 1995:431; Wagner 1987;262), its effectiveness is attributed to its anti-cholinergic effects on the bladder, i.e. it relaxes the detrusor muscle and inhibits micturition. Other proposed mechanisms for its action include mood elevation, placebo effects and strengthening voluntary control of the urethral sphincter (Mishne 1993:481). Ironically, imipramine as an antidepressant is mainly used for one of its side-effects, namely the decrease in frequency and intensity of bladder contractions (TIS Internet 3:4). In Butler (1987:87) three possible mechanisms of tricyclic antidepressants and imipramine are mentioned.

They are:

- The medication relieves depression which is already a symptom of enuresis. This is, however, not a popular or convincing hypothesis;
- Medication raises the level of arousal, which results in a more rapid response in the child;
- The third theory is that imipramine works by relaxing the detrusor muscles which allows for a greater expansion of the bladder before the onset of contractions and subsequent voiding. There is insufficient evidence is lacking to validate these theories;

To the parent, it is normally explained that Tofranil reduces the child's depth of sleep, which makes her more aware of a full bladder (Wiggelinkhuizen 1989:557).

Tofranil, a very powerful drug, works immediately as an anti-enuretic agent, but normally takes ten days to improve the mood. However, enuretics are normally not depressed (Mark & Frank 1995:431). Tofranil reduces wetting frequency in 85% of children with nocturnal enuresis (Butler 1987:86).

The dosage of imipramine, administered as a single dose after the evening meal are suggested to be:-

- 20 to 25 mg for patients 5-8 years old;
- 25 to 50mg for the 9 year olds;
- 25 to 75 mg for children older than 12 years.

(Krause 1997)

Wiggelinkhuizen (1989:557) suggests that if no response is obtained in 3-4 weeks, another smaller dose should be given later at night after the child has been lifted. Marked improvement was observed with doses up to 75mg after the age of 10 years and 50mg below that age. Higher doses do not seem to be more effective (Alon 1995:97).

Tricyclic antidepressants are potentially lethal and are reported to be one of the most common causes of fatal poisoning in children under the age of 5 years (Butler 1987:86). An overdose of imipramine could lead to

cardiac arrest. The Food and Drug Administration (FDA) reports that about 1,000 children are brought into emergency rooms each year with an estimated death rate of 10 per year (TIS Internet 3:4).

According to Mishne (1993:481); Mark & Frank (1995:430) children initially respond positively to this medication, then relapse after the drug is withdrawn. Taking the drug should however be continued for 2-3 months to reduce the relapse rate.

Wagner (1987:262) is more critical and states that high relapse rates could suggest that imipramine treatment must be viewed as a "simple method of temporarily suppressing a troublesome type of behaviour".

Krause (1997) responds that this medicine is vastly underrated. If used properly with the correct dosage and period of time, and obeying safety profiles, it is a good treatment. Recently the drug became very popular in the treatment of pain as an adjunctive therapy for some severe forms of pain, e.g. tension headaches.

Side-effects of imipramine, affecting up to 40% of users, were reported to be restlessness, irritability, decreased appetite, poor concentration, mood and behaviour changes, sleep disorders and a dry mouth (Wiggelinkhuizen 1989:557; Kolvin et al. 1973;186; TIS Internet 3:4).

b. Oxybutynin Chloride

A second drug, oxybutynin (Ditropan ® - Restan) is also one of the most frequently used drugs. The function of Ditropan is to increase the

capacity of the bladder and reduces detrusor contractions. The drug is thus helpful to patients with a small functional bladder capacity. Children of 7 years and older receive a dose of 5mg two or three times a daily (Mark & Frank 1995:430).

Reported risks include negative side-effects such as an increase in the pulse rate and diastolic blood pressure. Other side-effects, like dry mouth, blurred vision, constipation and face-flushing are less common in children and depend on the dosage.

A combination of imipramine and oxybutinin is often used (Wiggelinkhuizen 1989:557).

c. Desmopressin

Desmopressin acetate (Minirin, better known as DDAVP), is a man-made form of an anti-diuretic hormone and only recently registered in South Africa. It has also been approved by the FDA. This new drug is a synthetic analogue of the human antidiuretic hormone. Since some bedwetting children are unable to decrease urine output at night as their counterparts under normal circumstances do, desmopressin can correct this deficiency, thereby reducing urine output at night (TIS Internet 3:4). DDAVP is said to have a better safety profile than imipramine and a more rapid onset of action when compared to conditioning devices.

Its trade name has not yet been released by the pharmaceutical manufacturer, Akromed. It is reported that the drug will be commercially

available within the next few months (end 1996). It will be sold in two forms: as a nasal spray (Mark & Frank 1995:75) and a tablet. The recommended retail price of the nasal spray will be approximately R340 for just under a month's supply.

The manufacturer does not recommend this drug for use on children under the age of 6 years. The drug's effect is felt immediately and it is believed that some children will be dry after the first night. Doctors who participated in the trials recommend using desmopressin for 3 months, followed by a tapering off period to determine whether the child can remain dry on her own. Doctors also prescribe desmopressin only when the child has to sleep away from home (NES Internet 1; TIS Internet 3:4). DDAVP's fast action makes this a good choice for the temporary management of bedwetting. Like imipramine, it is likely that bedwetting will resume after medication has been withdrawn.

According to the Rhone-Poulenc Roper data sheet (TIS Internet 3:5), DDAVP nasal spray is suggested for short-term use. It is very effective in children aged 6 or older with severe nocturnal enuresis. This drug has been shown to be very powerful, but safe. It is reported that due to its strength, the manufacturers of DDAVP recommend periodic laboratory tests of blood electrolyte levels for children using this drug for periods longer than 7 days (TIS Internet 4:1). Rhone-Poulenc Roper add that adequate controlled studies with the DDAVP nasal spray in nocturnal enuresis have not been conducted beyond 4-8 week's duration.

Some side-effects of DDAVP have been reported, such as headaches, a runny nose, pain in the nostrils and nasal stuffiness (NES Internet 1; TIS Internet 3:4).

In America, the high cost of this drug presents a major drawback. The high relapse rate when treatment is stopped and the cost of the drug cause some physicians to prescribe it only for special occasions such as sleeping out and camping (Mishne 1993:481 ; Mark & Frank 1995:75). This hormonal substitute is more expensive than the enuresis alarms in America.

What do doctors recommend? According to TIS (Internet 3:8) a survey of 446 American doctors was undertaken and the following statistics obtained:

- 69% recommended reassurance, fluid restrictions or rewards;
- 28% recommended medications;
- 3% recommended alarms.

3.3.2.2 Surgery

a. Cystoplacy (operation on the urinary bladder)

Surgical therapy with cystoplacy is only indicated when enuresis lasts into adulthood (Mark & Frank 1995:75).

b. Bladder Stretching

Measuring bladder capacity and stretching exercises appear to be successful only in one third of patients. Its validity is still questioned today in the treatment of primary nocturnal enuresis (Miller 1993:33).

Wiggelinkhuizen (1989:557) also agrees that bladder stretching exercises are relatively ineffective.

3.3.2.3 Alternative forms of treatment

a. Dietary control

It has been suggested that bedwetting may be related to food allergies. The breakdown of certain foods irritates the bladder and causes bedwetting. Dietary control includes elimination and alteration of certain products like milk products, coffee, citrus fruit, citrus fruit drinks, sodas and chocolate. Fluid substitutes such as apple juice, ginger ale and water are suggested. Some children have benefitted, but research continues (Miller 1993:34); (Butler 1987:87). It is also strongly believed that caffeine products such as tea, coffee, cocoa and cola drinks during the early evening hours have a diuretic effect and increase in micturition (Butler 1987:87).

b. Naturopathic Remedies

According to Miller (1993:35) many physicians question the naturopathic approach to medicine. Does it really benefit the client? Although the parents' attitude and belief in these remedies cannot be discounted, controlled trials, possible side-effects, cost and the efficacy of naturopathic remedies need to be investigated (Krause 1997).

c. Chiropractic Manipulation and Acupuncture

In spite of anecdotal reports of successful treatment for primary nocturnal enuresis (PNE), researchers still are not convinced of the effectiveness of this mode of treatment (Miller 1993:35).

3.3.3 Behavioural methods of treatment

3.3.3.1 Introduction

Unlike the psychodynamic approach that views enuresis as maladjustive behaviour of an underlying symptom, the behaviourists claim that no new problems have arisen following successful treatment. There is thus no question of "symptom substitution". Focus has shifted to addressing the reasons why behaviour therapy yields more success that conventional psychotherapy. Apart from the kind of therapist-client relationship forged, and changes in adjustment made during treatment that could partially be responsible for successful outcomes, the conditioning treatment of enuresis has been reported to be very effective, but not widely used, probably due to the "symptom-substitution" concern (Baker 1969:42).

The most common methods of treatment are bladder control exercises and the bedwetting alarm.

The basis of evaluating treatment consists of behavioural recordings which provide precise information about the frequency and timing of enuretic events, such as the frequency of wet nights, the amount of urine

passed, the size of the wet spot and instances of appropriate bladder control. The behavioural approach also encourages the parents to check the child periodically at night to see when and how often wetting occurs.

Treatment according to the behavioural approach should be directed at bedwetting itself by arranging a suitable training setting. If the child can be trained to stay dry, the problem is fully solved and no symptom substitution should be expected (Gustafson 1993:924).

3.3.3.2 The underlying conditioning principles of behaviourism

Learning occurs when people change their behaviour or form new associations as a result of new experiences. The formation of single associations has been studied by both classical and operant conditioning techniques.

There are two types of conditioning, **namely classical and operant (instrumental) conditioning:**

a. Classical conditioning

Classical conditioning, being the simplest form of learning, is the child's response to something that she experienced in her environment. When a child has learned that food (unconditioned stimulus) is tasty, she will have pleasant feelings and thoughts about it. This is a natural unconditioned response.

A Russian psychologist, Pavlov, noted that specific stimuli elicit innate, automatic responses from a human being or an animal. The smell of

cooked food (unconditioned stimulus) causes salivation (conditioned response). In a similar way the constriction of pupils is the response to light stimulation in any person or animal.

Pavlov concluded that other stimuli can be deliberately implemented to obtain a desired behaviour. This natural pairing of (US-UR) responses as seen above, can be repeatedly and deliberately paired with a conditioned stimulus (CS) to obtain a conditioned response (CR).These deliberate stimuli, acquired through training, become conditioned stimuli (CS) which are elicited only under certain conditions. For example, if a new stimulus is used to cause salivation in a dog, the new stimulus (CS) must repeatedly be followed by the food. Only then will the new desired response (CS) be obtained (Mussen, Rosenzweig, Blumenthal, Aronson, Elkind, Feshbach, Geiwitz, Glickman, Harvey, Murdock & Wertheimer 1979:149;).

In classical conditioning, the stimulus must occur before the response (Van den Aardweg & Van den Aardweg 1988:29). The same stimulus elicits the same response from all organisms of the same species.

b. Operant conditioning

A second form of conditioning was suggested by Thorndike and Skinner. Operant conditioning applies to circumstances in which "someone does something to get something" (Mussen et al. 1979:156). A person "operates" in a special way to obtain her reward or goal.

The difference between classical and operant conditioning is simply that

learning during classical conditioning is accomplished through the formation of an association between events that occur at the same time, whereas in operant conditioning associations are formed between events or responses and their consequences.

In order to maintain the desired responses, the same or different stimuli are given at certain intervals. This process is called reinforcement. Positive reinforcements elicit positive responses, whereas negative reinforcements like punishment will eradicate unwanted behaviour (Mussen et al. 1979:156).

Skinner recognises two types of reinforcement, namely primary and secondary. Primary reinforcers (unconditioned reinforcers) are events, objects or rewards that possesses inherent reinforcing properties. Food and water are examples of primary physiological reinforcers, e.g. hunger is satisfied by the consumption of food. Food as a reward is independent of learning. Secondary or conditioned reinforcement is any reward that motivates a person to act or operate in a certain way. Positive reinforcers include attention, affection, good marks, money, success, or any other desired agents.

Not all human behaviour is controlled by positive reinforcers. Negative reinforcers or aversive stimuli also play a role. Aversive stimuli are aversive, painful, unpleasant or anxiety-arousing consequences associated with certain responses in an individual. Unfortunately, negative reinforcement is one of the most applied methods of controlling children's behaviour, whereas positive reinforcers could have a longer

lasting, or even permanent effect (Hjelle & Ziegler 1981:206-207). Unlike punishment, negative reinforcement generates and maintains operant behaviour which allows the individual to escape or avoid an aversive stimulus. A bedwetting child equipped with a bedwetting alarm would like to avoid the loud of the alarm by either waking up or not wetting the bed at all. These processes function at a sub-conscious level.

3.3.3.3 Conditioning methods in the treatment of enuresis

Conditioning methods without apparatus:

a. Urine Retention and Sphincter Control Exercises

The aim of these exercises is to assist the child to gain control over the micturition reflex and increase functional bladder capacity. The child is taught to go to the toilet when she feels the need to urinate and is told to refrain from micturating for as long as possible thereafter (Mishne 1993:482).

b. Dry Bed Training

This method of treatment relies on an operant conditioning approach which applies positive reinforcement for inhibiting urination for retention control training, night time awakening, mild punishment, full cleanliness training and family encouragement. This type of treatment relies heavily on the parents' and child's co-operation, as well as adequate supervision and enthusiastic support by a qualified professional (Mishne 1993:482).

It is an intense, complicated behaviour modification programme which claims to cure bedwetting quickly. This programme has its origins in a programme for treating the mentally retarded designed by Nathan Azrin, a medical doctor (TIS Internet 3:6). Azrin, Sneed & Foxx (1972:430) worked out a successful procedure and sequence of steps to be taken during dry-bed training.

About one half-hour before bedtime the child was given two cups of a favourite drink. The urine alarm was placed in the bed. The parent/caretaker awakened the child hourly by using the minimal prompt needed for awakening. The child was guided to the toilet using only instructions and gentle manual guidance. If micturition did not occur within 5 minutes, the child was guided to bed, given 2 more cups to drink and praises for getting out of bed and walking to the toilet. When micturition occurred, a candied snack was offered as a reinforcer together with the 2 cups of fluid. Back at the bed the child was directed to touch the dry sheets on his bed and verbally praised for having dry sheets. The child was allowed to return to sleep until the next scheduled hourly awakening.

Training was terminated when no more than one accident occurred during the entire night and/or when the child had voided in the toilet during the scheduled hourly visits.

When an accident occurred during sleep, and the alarm went off, the child was awakened and occupied for 45 minutes. Firstly the child was reprimanded for wetting the bed and sent to the toilet. Back at her bed,

she again was taken again through the "cleanliness training session" which required of her to remove the wet linen, take it to the laundry, fetch fresh linen from the cupboard and remake the bed. This lengthy procedure was followed until the child became dry which occurred after about 14 days.

(One can only wonder how many parents have the motivation, the time and patience to follow this ardent toilet training procedure without giving up).

Some main aspects and components that are addressed in this programme are as follows:

A dryness contract is drawn up between parent and child. Rewards are indicated, as well the benefits withheld with failure to be dry.

Correction: If the bed is wet, the child immediately strips it and remakes it. The wet sheets have to be taken to the laundry or even be washed by the child.

Dryness Benefit Review: All the benefits gained after being dry are emphasised, for example:
"If I am dry, I may sleep over at my friend's home";
"If I'm dry, I won't have to be secretive about my bedwetting any longer";
"My sister/brother will stop teasing me".

Overlearning: In this highly stringent method, the child has to 'relearn' after wetting the bed once by visiting the toilet 20 times during the night and 20 times before bedtime the following night (TIS Internet 3:6).

This programme by Azrin is questioned by the TIS, as it falls short of being an "ego-building" programme. Not much consideration is given to the emotional costs to both parent(s) and child. The child may perceive herself as a failure and possibly act with anger or shame and feelings of guilt (TIS Internet 3:8).

This programme is very structured and requires that the child follows it with robot-like precision. This could lead to failure if the child or parent does not comply accurately with it. The rigid behavioural conditioning method reduces the child to a mindless creature with no choice and will of her own.

c. The Kimmel and Kimmel method (1970)

Some studies have found that bedwetting children have smaller bladder capacities than same-aged peers. It was consequently thought that an increase in bladder capacity could allow the child to sleep through the night without the need to urinate. The essential component was to "train" the child to inhibit micturition for as long as possible and gradually increase bladder capacity in that way. The detrusor muscles became used to an increase in bladder pressure and volume (Butler 1987:89).

This method, called the Kimmel and Kimmel method, involves increasing oral fluid intake, lengthening the period between daytime voids and recording the time and volume of voiding. The aim is to produce larger volumes of voids with longer intervals between voids (Baller 1975:45). Parents were also asked to encourage their child to practise starting and stopping the flow of urine while voiding, so as to enhance the awareness of a full bladder and to strengthen the sphincter muscle (Butler 1987:87; TIS Internet 3:7).

Although functional bladder capacity has increased with this method, it has not been successful in treating enuresis (Mark and Frank 1995:430). Wagner (1987:262) adds that although these exercises increase functional bladder capacity, wetting does not decrease. Kimmel and Kimmel in their research found only three remissions, but others were unable to replicate these findings (Wagner 1987:262).

d. Cognitive-Behavioural Intervention

When the cognitive learning theory is applied to enuresis, the child gradually learns the specific skills necessary for bladder control. This approach assumes that self-control is a learned skill or a set of skills. Cognitive interventions with children focus on the shift from external to internal control by way of goal setting, problem solving and self-instruction.

Intervention is divided into five components:

1. *Modification of irrational beliefs and misconceptions of enuresis, e.g. "I am the only child in grade one wetting the bed!";*
2. *Rational analysis of bedwetting;*
3. *Sensitisation to pressure in bladder (Dry-bed training) (Urine alarm);*
4. *Self-control training in different situations (Kimmel and Kimmel method);*
5. *Exercises in self-observation, charting, self-assessment and self-reinforcement.*

A high success rate, low dropout level and low relapse rate was reported by the authors Ronen et al. (1992:12) who found that due to the child's direct involvement and the parents' support, the intervention process became challenging, interesting and motivating with minimal daily interruptions.

Counselling consists of support, advice, encouragement and reassurance to both parents and child. The main aims are to alleviate anxiety over bedwetting to encourage the child to take responsibility for being dry and to alter parental reactions to wet beds.

Butler (1987:95) uses a typical counselling approach by explaining to the child that bedwetting is not her fault and that she will improve.

The child is asked to record all the dry nights. This emphasises the fact that she is also capable of keeping her bed dry and allows her to focus on her problem in a positive way. The dry nights could be marked with stars or by drawing a happy face. Fluids are not restricted and parents are asked to be encouraging and not punitive.

Butler (1987:95) describes a technique based on the acceptance of responsibility by the child instead of the "passivity" that medication, bedwetting alarms and surgery may induce. This assumption is that the child must change her behaviour pattern and work responsibly to reach her own goal. The procedure recommended is the following:

The child keeps a progress report. All the wet and dry nights are charted. When wetting occurs, the child is to note down any factors that could have induced the bedwetting, for example excessive fluid intake, going to bed too late, worries and over-excitement. When dry, the child could place a star on the chart. During discussions with the therapist, the child could learn to obtain an overview of possible causal factors that could lead to her bedwetting. This also gives the child a sense of control over such causal factors. (This method is very useful for younger children, as it gives them a sense of control and insight into what is happening).

Response shaping. The child is asked to set an alarm clock at regular intervals to wake herself so that she can empty her bladder. The child is gradually instructed to lengthen the intervals between waking and emptying the bladder. These intervals should be recorded for observation and a sense of being in control.

Sensation awareness. The child is taught to become fully aware of the sensation of a full bladder by holding urine for as long as possible. Stopping and starting the stream during micturition also enables the child to increase awareness of control.

Self-suggestions and statements, such as

- I am the boss of my bladder;
- I want to be dry and I'm going to be dry;
- I have control over my situation;
- I can control my bladder like I control all my other muscles.

Internal attributions. To reduce the chances of relapses, internal attributions can be encouraged, such as:

- Only I can change my bedwetting behaviour;
- I am responsible for improvements and not the bedwetting alarm.

This technique is reported to have a low relapse rate (Baller 1975:36), as the child is treated with a technique that reinforces responsibility. Some children are reported to have achieved dryness, but no statistics were recorded.

Insight into the possible underlying causes of bedwetting alleviates the child's burden and some guilt. However, as already mentioned in Chapter 1, in spite of dozens of attempts to correct bedwetting, the results have not been promising (Baller 1975:36).

3.3.3.4 Conditioning treatment methods with apparatus:

a. The Urine Alarm

Introduction. The Urine Alarm involves a moisture-sensitive pad connected to a bell that goes off after a few drops of urine are passed by the bedwetter. Its basic principle is to alert and sensitise the body to

respond quickly and appropriately to a full bladder while asleep. At the ring of the bell the child wakes up, the detrusor muscle contracts and further micturition is inhibited (Butler 1987:99). Originally all devices used a pad on the bed, but new devices are small enough to be worn inside the underclothes.

In America alarms and enuresis treatment programmes (together or separately) can be purchased through mail order. Published results for the treatment programme used on their own claim to be a 65% success rate, while a success rate of up to 95% is claimed for the alarms (TIS Internet 3:5).

The mechanism of conditioning treatment of enuresis with a bedwetting alarm.

Using classic conditioning paradigms, the urine alarm connects the bladder distension and urination with the sound of the alarm, and conditions the child to wakefulness and the use of the toilet. The concept involved here is that the child wakes as wetting occurs and in time learns to associate the feeling of micturition with the feeling of waking up.

Mowrer and Mowrer propose that the alarm acts as a stimulus which wakes up the child. Waking up is the response that is associated with bladder distension. The stimulus acts at the very same time that the child begins to urinate. Repeated stimuli from the alarm bell produce a conditioned response from the child in which she is gradually conditioned to wake up by herself before wetting the bed (Butler 1987:102).

Critics of this view of classical conditioning theory, state that the alarm sounds when micturition has already begun and not with the sensation of a full bladder. Azrin (1973:427) has found that bedwetting stops while the bedwetting alarm is worn. The alarm does not sound at all. A parent might as well wake the child with the same effect. This suggests that effectiveness is not due to the association between the alarm and bladder sensations.

Lovibond (1963:17) agrees with this viewpoint and adds that the issue is not the classical conditioning principle, but avoidance conditioning. In classical conditioning the conditioned response gradually weakens after the stimulus is withdrawn. The process at stake is one of instrumental avoidance rather than the classical pattern. The child does not merely wake at the sound of the alarm, but tries to avoid the aversive consequences that the ringing of the alarm bell will bring. Such consequences include changing sensations such as the loud noise of the alarm, the wet bed, adapting the eyes to the blaring light, the body cooling off due to getting out of bed, increased in activity (disturbed sleep, going to the bathroom and changing the sheets when necessary) and negative effects on the child's self-image (loud alarm bell that wakes the family and maybe even friends, disappointment in herself, guilt for affecting other peoples' sleep or averse reactions from the family for the disturbance). Therefore, the bell is an aversive stimulus which is the basis for the conditioning of an avoidance response of awakening and contracting the sphincter. The permanent pattern of continence is thus due to the resistance to extinction of conditioned avoidance responses.

To avoid this, the child subconsciously tries to wake up by herself. This has the effect that the child sleeps lighter and wakes up to the sensation of a full bladder, thereby contracting the sphincter muscle. The other alternative way of avoiding the demands made by the alarm is not to respond to the alarm at all by pretending to be fast asleep or by failing to switch on the alarm. It is for this reason that therapy should engage the parent and child in treatment. A positive approach, support and encouragement from the therapist are of great help to the family (Butler 1987:99).

b. The advantages of the bedwetting alarm:

Suitability. Depending on the type of alarm, bedwetting alarms are safe and easy to use (Kolvin et al.1973).They have been used successfully with children aged 4 year and older. The age at which the alarm can be introduced is debatable. The recommended age varies from 4 to 8. It is believed that when a child understands *why* she should be dry, *how* to be dry and the simple mechanisms of the *use* of the bedwetting alarm, she may be ready to use it (Butler 1978:119).

A long-term cost-effective method of treatment. An important advantage of the enuresis alarm is that although the initial cost may seem to be high, it is in fact more cost-effective than taking medication or attending repeated counselling sessions. It is recommended that all cases be medically screened before using the alarm is used.

Increase in functional bladder capacity. The avoidance of bedwetting causes the child to retain an increasing quantity of urine until the sensation of a full bladder wakes her up. Some children retain the urine quite effectively and only wake up the next morning. It is assumed that these children have the capability of achieving functional bladder capacity and that the averse effects of the alarm bell is sufficient motivation not to wet the bed at all.

Expectancy effects, social and motivational factors. When treatment with the alarm bell is initiated and the family's anxiety is reduced by reassurance, positive encouragement and the support of knowing that this condition can be treated, an expectancy arises in both the parent and the child and serves as motivating factor for becoming dry. In some children it could lead to spontaneous recovery.

The sounding of the alarm bell at night creates an expectation in the family that the child is taking the responsibility to get up and stay dry. This is far more effective than the scenario of an over-reaction to a wet bed in the morning when the consequences and the bodily functions which precipitated the consequences are too far removed by time.

The role of bedwetting-alarm in keeping the bed dry. Not only is the child conditioned to stay dry; the alarm has the added advantage of sounding before the bed becomes too wet. Even if not used with the intention of achieving bladder control, the alarm has an alerting function, especially in the case of elderly, incontinent and bedridden people.

c. **Disadvantages of the bedwetting alarm:**

Age. When used at too young an age, the child never learns bladder control of her own accord. The natural process of learning bladder control is therefore hindered, which could cause bedwetting problems later in life. The parent should know that the chance of acquiring continence without treatment increases significantly as the child becomes older. As mentioned above, the alarm should only be introduced when the child is old enough to understand the reasons for using it.

Commitment. Getting up at night (sometimes twice) at the interrupting, harsh sound of the alarm bell and reacting positively to it requires commitment and motivation from parents and child. Lack of tolerance and declining motivation and commitment are the most frequent causes of terminating treatment.

Stress. If the bedwetting is the result of a transient stressful situation at home or at school, the alarm treatment should be delayed on order to deal with the stress. Situations such as moving house, the beginning or end of a term and family discord could increase the rate of bedwetting.

Fear of using the alarm. Reaction to the alarm varies from embarrassment to fear and reluctance to use it. Embarrassment at the sound of the bell at night can also cause the child not to switch it on at all. These matters could, however, be dealt with by familiarising the child, parents and siblings to the alarm and by explaining exactly how and why it works. The child may be also too embarrassed to use the

alarm in the company of friends. Therefore it is advised to remove the alarm box from sight during the day when friends come to visit.

Inappropriate use of the alarm. A child with daytime wetting problems and abnormal frequency of micturition should not be treated with the bedwetting alarm at all. Consultation of and treatment by a medical doctor would be advised. A child rated as 'disturbed' by parents, teachers and psychologist or psychiatrists may respond to the alarm just as well as any other 'non-disturbed' child, but nay also be more likely to sabotage the bedwetting alarm treatment and discontinue treatment. Research findings indicate that children who are seen by their parents as being less withdrawn and more socially inclined have a better chance of achieving night-time bladder control (Butler 1987:102).

Factors in the family and home. Factors that could reduce the effectiveness of the alarm include maternal intolerance, lack of commitment and support, negative reactions from the family to the noise of the sounding bell, chronic or mental handicap in the parent, discord in the family, marital distress, family disruptions and disturbances, poor sleeping arrangements, absence of an indoor lavatory and a wetting child sharing the room with other children (Butler 1987:120-123).

Alarm failure. The following factors could lead to alarm failure:

- failure of the alarm to go off;
- a design that is user-unfriendly and uncomfortable to use;
- buzzer ulcers as a result of the contact between the wet skin and the electrodes.

These issues are dealt with in greater detail in the following chapter.

3.4 CONCLUSION. As mentioned in Chapter 1, behaviourists consider alarm treatment for nocturnal enuresis a more cost-effective, safer and successful method of treatment than other methods.

Reasons for choosing the bedwetting alarm include the following:
The alarm can be very effective especially when coupled with cognitive behavioural intervention;

- it is suitable for all ages and gives the parent and child a sense of own control. It allows for a more active role in treating the problem of bedwetting. Compared to all other methods of treatment, this method has been shown to work;
- it is a long term, cost-effective method of treatment;
- it creates awareness of bladder distension (Finley et al. 1976:19);
- it increases the expectancy results as anxiety is reduced;
- the bed is kept dry because the alarm rings before the bed gets wet.

To understand how present-day alarms function, Chapter 4 will inform the reader about bedwetting devices in general with a special reference to their development, functionality, improvements and ways of use.

In Chapter 5, a new bedwetting device will be described, with special reference to design and a user package that includes instructions and guidelines.

CHAPTER 4

THE DEVELOPMENT AND USE OF ELECTRONIC BEDWETTING ALARMS

4.1 INTRODUCTION

Records show that bedwetting alarms had been considered long before the 20th century. However, it was only in 1904 that the use of electrically powered alarms were considered for use in bedwetting. In this chapter the evolvement of present-day bedwetting alarms will be described. Some of the problems encountered during the last 90 odd years will be discussed and improvements to the various models suggested. In some instances short descriptions of clinical results will be included to clarify the issues involved for the readers.

4.2 EARLY ALARM DESIGNS FROM 1904 TO 1963

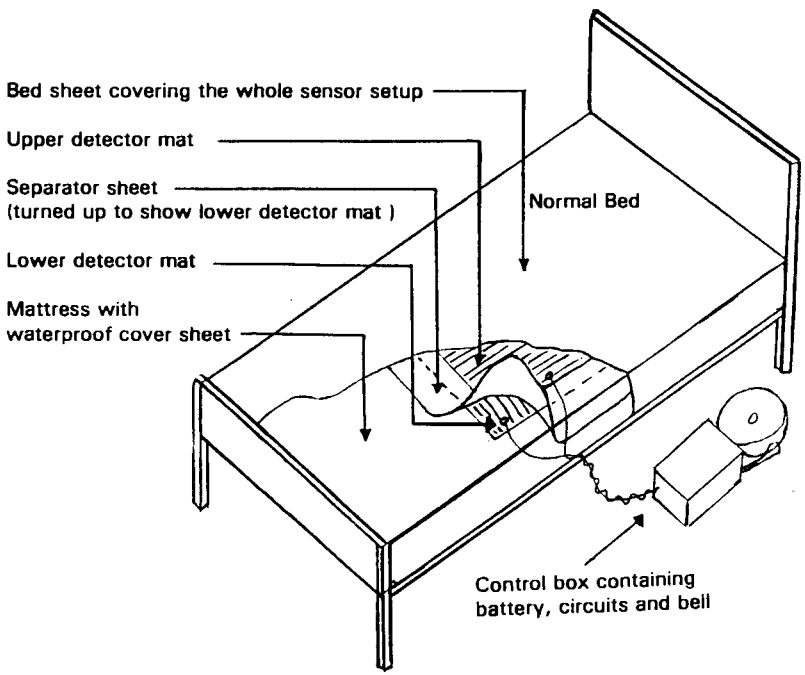
4.2.1 1904 - First Documented Vision of the Electronic Alarm

The potential therapeutic effect of the urine alarm, also known as the bell-and-pad procedure, was first recognised by Pflaunder in 1904. The primary purpose of Pflaunder's device was to detect wet diapers amongst children in hospitals and places of care. However, Pflaunder recognised the device's potential for treating patients continuously for longer periods of time (more than a month) (Seiger 1946:733).

He described his devices consisting of batteries and an electric bell with a sensor pad made of two layers of tin foil separated by a layer of linen. Later the foil was replaced with wire screens to enhance durability.

Figure 4.1

Conventional bedwetting alarm showing arrangement of two detector mats with separator sheet in between (Butler 1987:105).



4.2.2 1908 - First Experiments

The device, as described by Pflaundler, was used by Genouville and Rémy-Roux four years later with apparent good results (Rémy-Roux 1910:337-340). For unknown reasons, the device did not come into general use. It was suggested by Seiger (1946:733-736) that this was probably due to the crude design which made its use very complicated. It was moreover reported that the Pflaundler design required a relatively large amount of urine before the bell was triggered. Rémy-Roux replaced the linen with a layer of absorbent cotton to improve the sensitivity of the device.

In his paper on wet diaper signal devices, Seiger reported that numerous units similar in design to that of Pflaundler had been described on in newspapers and periodicals and that only a few researchers had published their results in scientific publications. None of these designs showed any significant advantages over Pflaundler's device.

In Seiger's view, all these devices had one common fault, namely that they consisted of two conductors separated by an absorbent non-conducting material. When the material became wet, it formed an electrolytic bridge, closing the circuit and ringing the bell. The wet absorbent material needed to be replaced before the device could function again. The soiled material had to be washed and dried to prepare it for renewed use. This step not only removed any residual salts, but also eliminated odours.

4.2.3 1938 - The Quilted Bed Screen

Mowrer and Mowrer popularised the previously described design(s) with the introduction of their bed-and-pad procedure. They improved on the original designs of Pflaundler, Genouville and Rémy-Roux by permanently quilting the wire screens into the pad and improved the sensitivity of the device by including a relay in the circuit (Mowrer & Mowrer 1938:436-459).

Mowrer & Mowrer reported that enuresis was completely eliminated in 30 children aged 3 to 13 years. They found that a maximum period of 2 months was necessary to obtain cessation of enuresis, and that the promptness of the therapeutic effect depended largely on the child's age and her eagerness to overcome the problem.

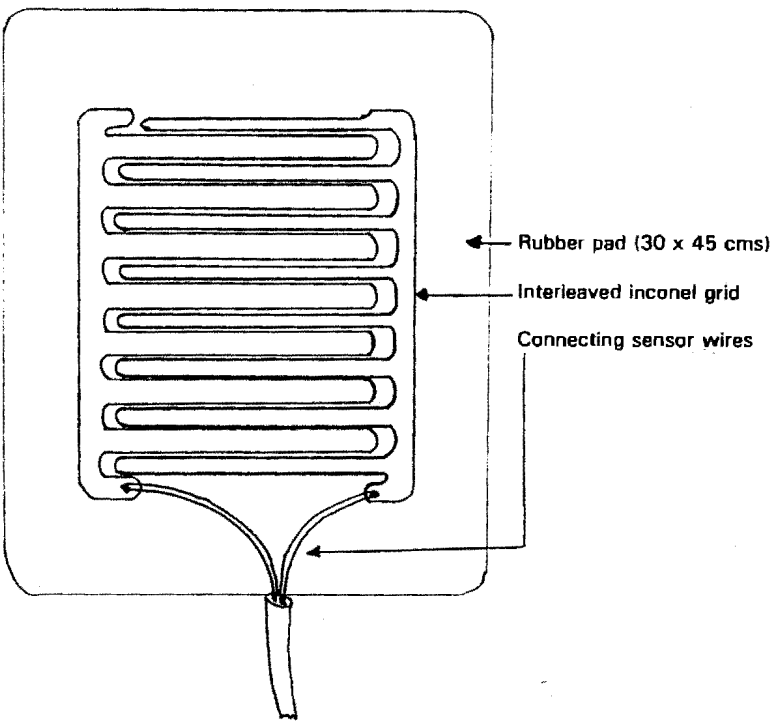
4.2.4 1946 - The Vulcanised Sensor Pad

Seiger published details in the USA in 1946 of his solution to the problems encountered with earlier bed-pad designs. He described a rubber vulcanised pad with an interleaved electrode metal grid made of inconel (nickel chrome alloy). The electrode section measured about 10x15 cm, while the outer edge of the rubber pad measured 30x45 cm. This pad had the advantage of using the diaper cloth itself as an absorbent conductor when wet. The added advantage of the vulcanised sensor pad was that the alarm bell immediately stopped ringing when the wet diaper was removed (Seiger 1946: 733-736).

As with the earlier designs, the bed either had to be remade or the device switched off to stop the ringing.

Figure 4.2

Diagram showing the layout of the vulcanised sensor pad (Seiger 1946:735)



4.2.5 1950 - The Electro-stimulus Apparatus

Neil Crosby of the University of Adelaide in Australia, experimented in 1950 with an urine alarm apparatus aimed at detecting the earliest signs

of involuntary urination. Instead of relying on the conventional bell to wake the patient, this apparatus applied a mild electrical stimulus to the patient's loin region. Moreover, instead of the conventional bed pads, the urinary electrodes in his apparatus consisted of non-corrosive metal strips, separated by a gap just small enough to allow the surface tension of a single drop of urine to bridge the gaps and conduct electricity.

Two urine sensory devices were used, one for males and another for females:

- The male sensor electrodes were screwed into a plastic tube which was attached to the end of the penis with "Elastoplast", which formed a light but water-tight seal.
- The female sensor electrodes were inserted into a plastic strip about 6mm wide, which was worn in the manner of the sanitary pads of that time and attached to a belt (Crosby 1950:533-543).

Instead of a bell, a stimulus was applied through two small metal buttons making contact with the skin in the loin region. The stimulus buttons were attached to a cloth belt. Prior to use, the strength of the stimulus was adjusted by holding the buttons against the patient's forearm and adjusting the level to 'just less than enough to cause discomfort'. This device also served the purpose of alerting the observer/researcher as to when micturition commenced. Some versions of this apparatus, particularly those used in children, included a thermo-relay to reduce the duration of the stimulus to a period less than fifteen seconds. This device

was patented by the University of Adelaide.

In discussing his results with the electro-stimulus device, Crosby (1950:543) stated that 'the establishment of continence is the only satisfactory criterion of successful treatment for enuresis...'. He went on to say that mere improvement in, or a reduced incidence of bedwetting was considered unsatisfactory and recorded as a failure.

4.2.6 1963 - The Twin Signal Apparatus

During 1963 Lovibond developed the twin signal apparatus which emitted a loud hooted (car hooter) alarm for just under a second. This was followed by silence for about a minute after which a buzzer sounded to call the attendant (Lovibond 1963:17-24). This device was powered by 240 volt mains. The sensor pads were those described by Mowrer (1938:436-459). In 1963 Lovibond did comparative studies of the procedures described by Mowrer and Mowrer, Crosby's device and his own twin signal modifications. In these studies Lovibond replaced the Crosby genital electrodes with the pad type electrode. He retained the electric stimulus belt as described by Crosby.

From the results obtained on 36 patients aged between 6 and 14, Lovibond concluded that his twin signal device produced the best results. While using the Crosby and the Mowrer instruments in this series of experiments, Lovibond found one failure in each group. No failures were experienced with the Lovibond twin signal instrument.

It was reported that the median number of reinforcements required for initial arrest with each device was:-

Mowrer device	30.5
Crosby device	20.0
Lovibond Twin signal device	14.5

4.3 MEDICAL CONDITION CAUSED BY EARLY DESIGNS AND SOME SUBSEQUENT MODIFICATIONS TO THE ALARM DEVICES.

4.3.1 Buzzer Ulcers

Buzzer ulcers were completely painless cutaneous ulcerations which occurred in the skin closest in contact with the enuresis bed sensor mat. They often took on the shape, size and spacing of the holes in the upper electrode foil of the enuresis alarm. At this time, a number of investigations and experiments were conducted by various researchers to establish the reasons for urine-alarm or buzzer ulcers which occurred in some patients.

Earlier papers also referred to the occasional occurrence of urine-pad ulcers (Gillison and Skinner 1958:1268-1272). It was believed that buzzer ulcers only occurred when the patient's skin remained tightly pressed against the wet linen and electrode pads with the current still flowing. This theory was later confirmed by experiments conducted by Borrie and Fenton (1966:151-152).

They showed that some devices had insufficient power to drive the relays when the battery had become partially drained. Insufficient power and the consequent inaction of the relay resulted in a current passing through the wet skin for an indefinite period of time. Experiments showed that an exposure of 25 minute's duration could produce a painless ulcer 48 hours later (Borrie & Fenton 1966:151). Greaves described three cases where buzzer ulcers occurred. In two of these cases, lesions corresponded directly to the holes in the upper foil sheet of the mat. All 3 patients stated that they had switched off the buzzer while leaving the main switch of the unit on (Greaves 1969:440-442).

It was in response to the finding of buzzer ulcers in some patients that a number of designers electrically (through a relay), disconnected the mat as soon as it got wet. Others designed mats with better electrode isolation from the patient's skin.

4.3.2 1965 - Development of the Recessed Electrode Pad

With reference to the issue of pad design, Coote reported that earlier mat designs gave false alarms due to perspiration. This also happened when the wire screens had been replaced by perforated aluminium foils. These aluminium foil pads disintegrated quickly due to the weakness of the thin foil material. Coote added that sheets of rubber or other fabrics which were manufactured to conduct electricity had also been used, but provided no further information. He claimed that all of these designs

shared the common disadvantage of requiring a separator (dry linen or other non conductive material) in a sandwich-like structure. This necessitated the use of numerous clean separators. Coote suggested that each patient should be supplied with up to 6 units per night (Coote 1965:233-238).

In contrast to the above-mentioned report, Seiger's vulcanised interleaved inconel bed-mat (Seiger 1946:733-736) and the zig-zag sewn wire on a rubber mat of Davidson and Douglass (1950:1345-1350) could be wiped dry after each use. The electrodes on the surface of the mat caused a conductive problem due to perspiration and simultaneously increased the risk of buzzer ulcers. Additionally, Coote (1965:233-238) pointed out that a too flexible mat could crumple and generate false alarms due to the short circuiting of sensor wires. Coote reported that he had found significant electrolytic corrosion on the anode (positive electrode), even when the alarm was not triggered. He stated that this was due to perspiration or moisture in the air. He also showed that ulcers could occur if bare skin came into contact with exposed electrodes under hot and humid conditions. Coote devised a mat which he believed would eliminate all the ulcer problems associated with the earlier versions.

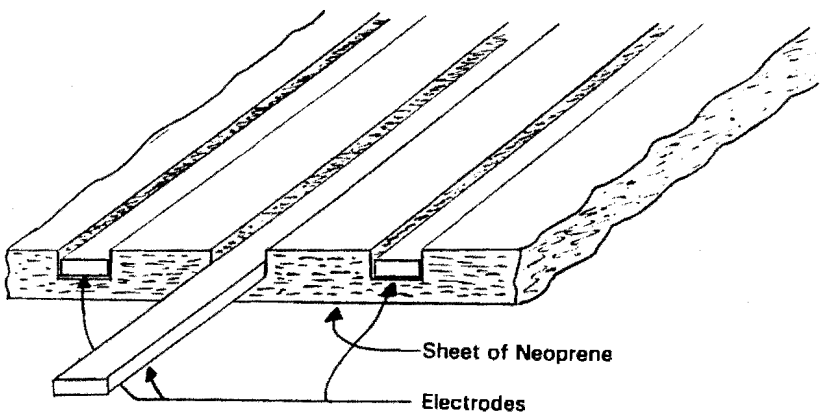
4.3.2.1 The pad construction and modification

The modification consisted of recessing the electrodes below the surface of a neoprene sheet, so that the electrodes did not come into contact with the draw-sheet. A seventy-two strand nichrome braiding was used as the electrode. The resultant air gap prevented any conduction of electricity due to perspiration.

This recessed electrode principle was patented in Australia (patent no. 236255) and in New Zealand (patent no. 125511).

Figure 4.3

Sketch of Recessed Electrode Pad (Coote 1965:235)



In correspondence published, Neal (1969:651) discussed his experience with the recessed electrode pads designed by Coote. He encountered mild ulceration in only one case, which he clearly attributed to improper care and neglect of the pad.

Neal also responded to Coote's (1965:235) suggestion of using an upper foil electrode pad with smaller perforations than those 19mm used by Neal. Neal claimed that such pads were already in use but that this modification alone would not prevent buzzer ulcers. He added that most

alarm designs already disconnected the sensor pads when the alarm was switched off and that the improved versions disconnected power from the pads as soon as the alarm was triggered. He reported that appreciable currents could be measured through the drawsheet even when the drawsheet was not perceptibly damp. He did not, however, indicate if he believed that these currents caused ulcers. In his view most damage occurred while the circuit was idling, the drawsheet displaced and the patient's skin exposed in direct contact with the electrodes. Supporting the use of the recessed electrode bed-pad structure, he added that the electrodes of braided nichrome wire needed to be checked after each treatment, to ensure that they remained intact and properly recessed. Other advantages of using the recessed electrodes were :

- elimination of false alarms due to perspiration;
- inter-electrode contact;
- reduced corrosion of electrodes, giving longer life to the pad.

4.3.2.2 Improved Detection Circuitry

Due to the added sensitivity required while using the recessed electrode pad, Coote (1965:236) designed his own simple controlling circuit. In the original design, the circuit had two sequential relays. The first, described as "highly sensitive" and very expensive, closed a light duty contact. This in turn activated the slave relay, which had dual contacts. On this relay, the first contact was used to provide the alarm or stimulus. The second contact closed to provide a holding circuit on the first relay. At the same time, the holding circuit removed the potential difference between the electrodes on the mat. Later models replaced the first very expensive relay with semi-conductor amplification. This transistorised controlling circuit was provided and patented in Australia by Wragge in 1964.

Figure 4.4

Circuit diagram of a simple relay control device used satisfactorily in research work (Coote 1965: 236)

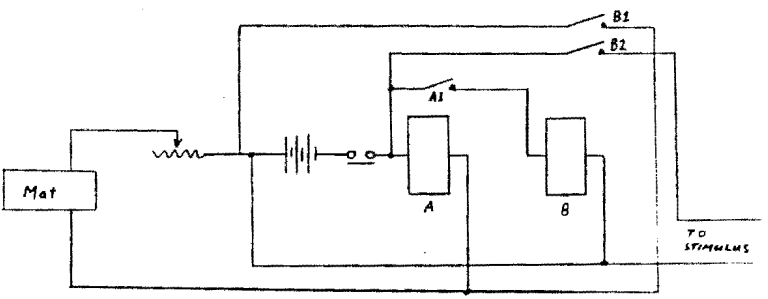
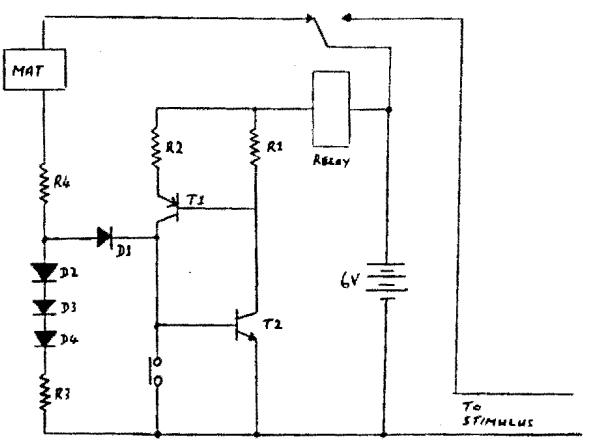


Figure 4.5

Improvement of the relay control circuit in 4.4 to a cheap, effective semi-conductor amplification circuit (Coote 1965: 263)



Component list :

R1	:	220	R2	:	390	R3	:	560
D1	:	OA200	D2,3	:	OA95	D4	:	OA95
T1	:	BCZ13	T2	:	BFY11			

4.3.3 Examples of Research Using Similar Devices

In 1968 Peterson, Wright and Hanlon studied the effects of extending the CS-UCS interval on the effectiveness of conditioning treatment. They used the Enurtone Bell-Light Conditioning Apparatus which was a commercial version of that described by Lovibond in 1964. The apparatus was, however, modified with time delay circuits which could be used with "no delay or 3 minute delay" (Peterson et al. 1969:351) from first signal to continuous alarm, as required by Peterson, Wright and Hanlon's experiment. The results of this study on 28 enuretic patients were inconclusive. However, whereas one patient in the no-delay group showed no improvement, two in the no-treatment control group improved spontaneously improvement. The control group consisted of patients on a waiting list for the apparatus. They were instructed to keep accurate records for the duration of the experiment and only received with treatment three weeks after completion of the experiment (Peterson,Wright & Hanlon 1969:351-357).

In 1969 Baker used similar equipment to explore the role of the therapist-patient relationship in 30 enuretic children. The equipment used was slightly modified to use 2x 6 volt batteries and a buzzer in the continuous signal mode as well as foil pads with holes in the top pad. For the comparison group Baker used a bulletin board as a star chart, a container of stars and a wind-up alarm clock. He also concluded a control group whose subjects were not treated immediately, but were but interviewed at home to obtain more information about the children's enuresis. He found that successful treatment was not based solely on the therapist-patient relationship (Baker 1969:42-49).

In 1970 Turner, Young and Rachman published their results of various studies carried out on 115 enuretic patients. During these studies they used a twin-signal apparatus as described by Lovibond but modified to work on a 9 volt battery. Both signals were produced by the same source at an intensity of 80dB at 3 feet. Two wire gauze mats were used as sensor pads. The pads were placed underneath the child. A bed sheet acting as insulator between and over the pads ensured that there would be no contact between the child's body and the metal. In the course of their studies these researchers found that the detector mechanism was unsatisfactory due to false alarms triggered by the movement of the child (Turner, Young and Rachman 1970:367-381).

In order to provide a brief description of how the apparatus was used in numerous experiments carried out by various authors, an extract of one of these series of experiments is included from the article published by Turner, Young and Rachman (1970:368).

'(a) ***Conditioning techniques***

Continuous signal apparatus *(CS)*. As soon as the child wet the bed an alarm signal was triggered, which ceased only when the machine was switched off. Parents were instructed to take the child immediately to the lavatory (or to use the pot), and then to remake the bed, resetting the apparatus. The mother was first shown how to use the alarm set and then she was requested to assemble the apparatus while observed by the therapist. Initially mother and child were seen at intervals of a week, but when the therapist was satisfied that the

mother was using the apparatus correctly, they were seen once a fortnight. Mother and child were always interviewed together, usually for about five minutes. The therapist inspected the night wetting record, counted the bedwetting frequency and asked if there had been any technical problems with the apparatus.

Twin-signal (TS). In most respects the procedure was identical to that described in the preceding paragraph. The one difference was that the mother was told that the apparatus would emit two signals, the first brief signal would sound as soon as the child wet the bed; this would be followed by a second continuous signal, which lasted until the machine was switched off. Mothers were instructed to wake the child (if not aroused by the first signal) at the onset of the second signal.

Twin-signal intermittent re-enforcement (T.S.-I.R.) For the first two weeks these children were treated exactly as in the TS group. Mothers were given an intermittent (50 per cent) re-enforcement schedule, and asked to switch the machine off whenever this was indicated on the programme. Mothers were asked to try to keep the subject unaware of the schedule so that the child went to bed not knowing whether or not the apparatus would be triggered by bedwetting.'

(Turner, Young and Rachman 1970:368).

In this particular research project therapy was stopped in 47% of cases due to deviation from the required therapy instructions. This was due to lack of co-operation by patient or parents.

This research project found that the average period to initial arrest of enuresis (criteria = 14 consecutive dry nights) was 6.8 and 6.2 weeks for the CS and TS procedures while the TS-IR procedure averaged 10.2 weeks. Also of interest was the finding that 45% of patients wet their bed more than once per night but that this figure decreased after the first week of treatment.

4.4 USE OF AN ENURESIS ALARM FITTED TO THE USERS PANTS

4.4.1 1971 - Pants-Alarm

In 1971 Arzin, Bugle and O'Brien (1971:249-253) described a transistorised device they designed and successfully used in the toilet training of profoundly retarded children. Its purpose was to alert the child and her minder that she had wet her pants. The Pants-alarm as it was referred to, was a simple design consisting of a four component controlling circuit, "beep-tone" signal device and sensor wires connected to two ordinary metal clothing snaps fastened to the crotch area of a normal pair of cotton briefs. The space between the snaps was reported as 37mm. The snaps were also offset, one diagonally in front of the other, so as to prevent them from touching and giving false alarms. The Pants-alarm sounded as soon urine wet the cotton briefs. As with all earlier devices, this was due to the urine forming a salt solution conductor between the contacts or electrode points.

Figure 4.6

Diagram showing how metal snap buttons are fitted to a normal pair of underpants.

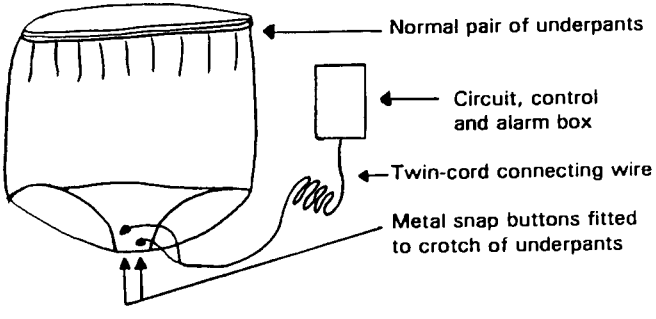
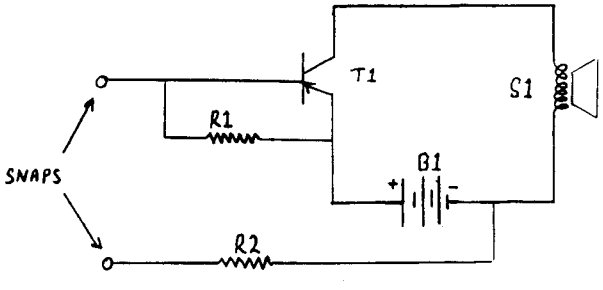


Figure 4.7

Circuit diagram for wet-pants alarm (Azrin et al 1971:251)



Component list :

S1 - Beep-tone	T1 - # GE-2 Transistor	R1 - 100 Ω
R2 - 15 kΩ	B1 - 9 volt Battery	

4.4.2 1973 - Dual Transistor Circuit

In 1973 John Herreshoff (1973:54-55) reported two modifications to the Pants-alarm circuit described above. He used a transistor and 12 volt relay in the first modification and two transistors in the second. Herrshoff reported that a wider range of slave devices could be used with those two circuits.

Even though Azrin et al (1971:251) had developed the pants alarm he continued research with other workers in improving the sensors fitted to the bed. Together with Sneed and Foxx they published their findings on using the commercially available urine alarm (Lite Alert, Sears Co.) on retarded patients. This device used two aluminium foil pads placed on the patient's bed. The upper foil pad was perforated and separated from the lower by a cloth which formed a conductor when wet with urine (Arzin, Sneed & Foxx 1973:427-434).

4.5 USE OF DIFFERENT AROUSAL DEVICES

4.5.1 1973 - Investigation Into the Effect of the Loudness of the Alarm

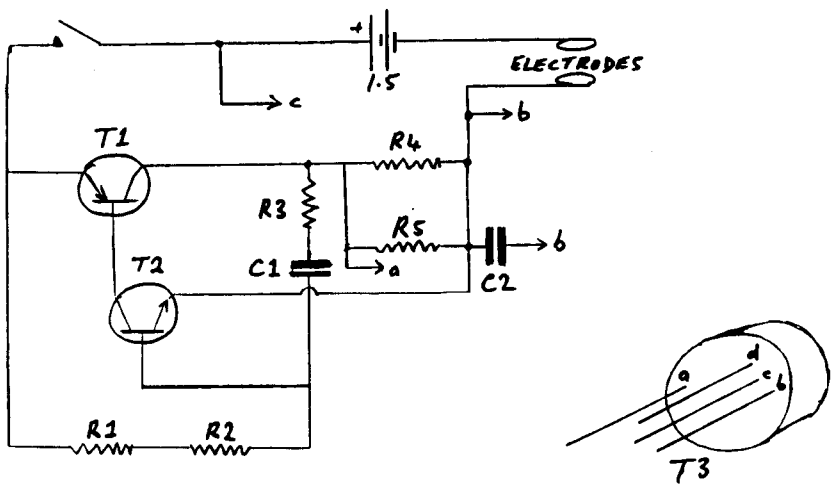
An investigation of the auditory effect of various buzzers used in commercially available bell-and-pad devices by N.H.Eastwood & Sons Ltd was undertaken by Young and Morgan (1973:411-416). After detailed evaluation the authors found that the alarms tested varied between 80 and 90 decibels with Speech Interference Levels of 76 to 84. In applying the devices they could not show that the higher decibel or SIP level made any difference to the arousal of the patient.

4.5.2 1975 - The FM Radio Alarm Device

Robert Fried (1974:682-684) published details of a device and circuit which emits FM radio signals which could be received on a standard FM receiver. This device benefitted the parent since the urine alarm could be monitored at a distance without laying cables or wires.

Figure 4.8

Circuit diagram of a simple FM radio frequency alarm device. (Fried 1974: 683)



Component list:

R1 : 30 kΩ	R2,3 : 100 Ω	R4 : 5Ω	R5 : 15Ω
C1 : 0.47μf	C2 : 0.01μf	T1,2 : 2N107	T3 : FMM-1

4.5.2.1 1975 - The Copper Wire and Pillowcase Sensor Mat

Fried (1974:682-684) briefly described the electrodes in his FM radio device. The electrodes were constructed of copper or brass screens placed on top of each other with a layer of towel separating the two. When the towel became wet, it conducted electricity. The author suggested that the electrode be edged with muslin binding sewn on by machine to prevent the metal screens from causing the patient physical injury.

Research findings reported in 1975 by Finley and Smith (1975:273-276) of the Children's Medical Centre in Tulsa indicated that the original sandwich pad of Mowrer was still widely used, but that it was cumbersome, shorted out easily, was difficult to sanitise and relatively insensitive to small amounts of urine. Although Crosby and Seiger both designed metal strip pads, Coote was generally credited with developing the most satisfactory design (1965:233-238) with an extremely long life. Its main disadvantage was its initial high cost and its unavailability in the USA. Crosby and Seiger thus experimented with various designs, but finally settled on one pad which was manufactured from half-inch flat-braid tinned copper wire attached to a rubber mat with a silicone seal. The two electrodes were placed on the mat in an interleaved format and sealed with the silicone. Precise manufacturing details were provided. The completed pad was placed inside a pillowcase which insulated the electrode from the patient but which completed the circuit between the electrodes once it got wet.

The cost of this pad was estimated in 1975 at about $20 + 4 hours labour.

Figure 4.9

Wiring schematic for the braided copper wire pad which is inserted into a pillowcase (Finley & Smith 1975: 274)

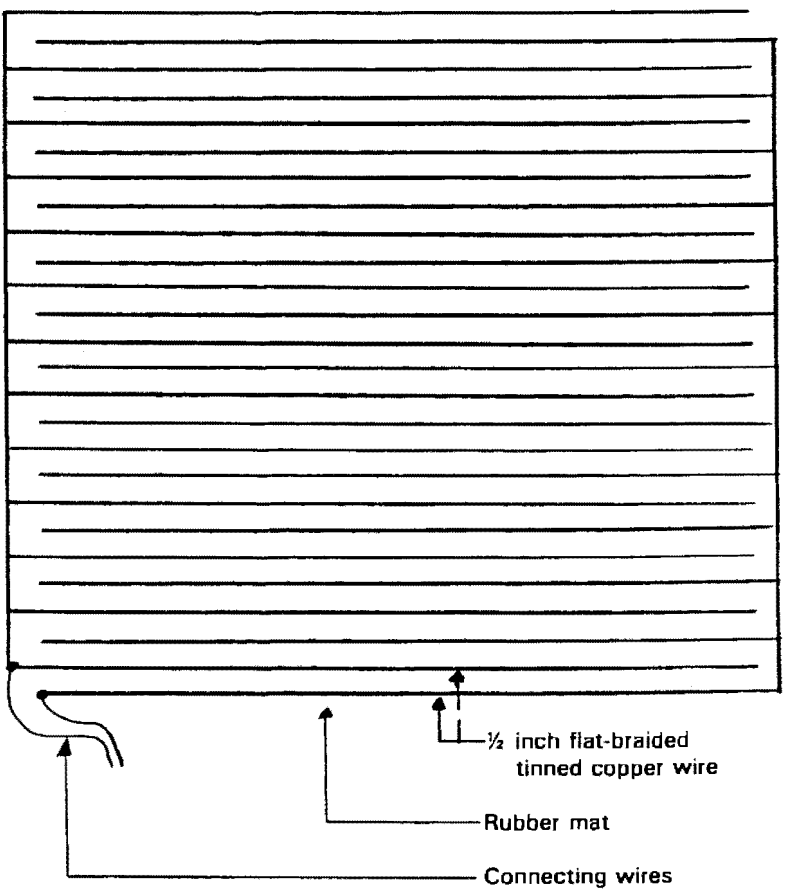
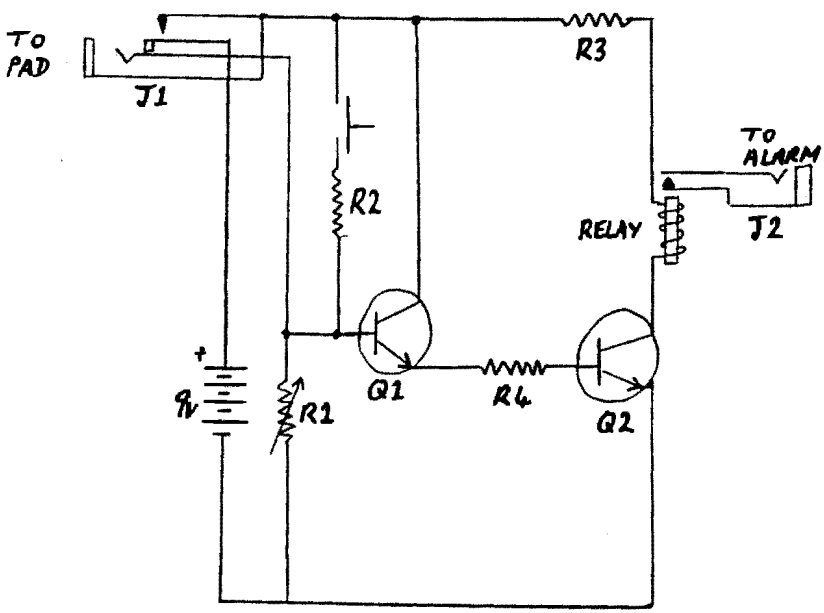


Figure 4.10

Diagram of an enuresis detection circuit which switches on whenever the pad is connected. The alarm is a separate device with its own power supply (Finley & Smith 1975: 274)



Component list :

R1	: 5 kΩ	R2 : 4.7 kΩ R3 : 270 Ω
R4	: 4.7 kΩ	
Q1,2	: 2N5172	Relay : Sigma 65F1A-6DC
J1	: Mallory 703	
J2	: Any two pin plug not compatible with J1	

Crosby and Seiger reported that during the 2 years that this pad was used, it was to be flexible and reliable and posed no discomfort to the sleeping child. The authors published details of their alarm circuit

although their pad was also compatible with circuits designed by other workers(Azrin, Bugle & O'Brien 1971:249-253; Herreshoff 1973:54-55). The authors recognised that the size of the pad was a problem, since small children tended to migrate off the pad, which occasionally resulted in its failure. To solve this they recommended taping wooden blocks to the top of the mattress to restrict the child to the sensor pad area.

4.5.3 1976 - The Spot Light Alarm

Significant and practical changes were made to the Mowrer procedure and apparatus for use in the clinical enuresis treatment program offered by the Children's Medical Centre, Oklahoma. The Medical Centre applied their own pad design with a monitoring circuit which used two discrete circuits. The first was the simple 6 volt battery powered sensor circuit. Linked to this optically, by means of a momentary light flash down a plastic non-conductive rod, was a mains power circuit which sounded the alarm and also switched on a spot light directed into the child's face to help wake her. The alarm circuitry could also be programmed to give a 20 minute delay in 30% of events so as to train the patient into own detection. The other important feature of the detection circuit was that the electrodes were monitored in an iterating fashion using multivibrator circuit switching the anode and cathode at about 400 Hz. (Finley & Wansley 1976:24-27) U.S.Patent 3,810,140 applied to this Programmed Enuresis Treatment (PET).

4.6 1983 - THE USE OF BEDWETTING ALARMS IN SOUTH AFRICA

The only published reference to the use of enuresis alarms in South Africa was found in a letter to the Editor (SA Medical Journal) from MS Bornman and DJ du Plessis (1983:638) of the Urology division, H.F.Verwoerd Hospital, Pretoria. This letter briefly described an imported alarm with the name WET GUARD which used a sensor strip attached to the patient's underwear with the alarm in the pyjama pocket. Three sensor strips which could be washed in water and dried in the sun were supplied. The authors of this letter stated that they found this device to be a useful method of conditioning due to the small size of the alarm, the sensitivity of the sensor strip and the convenience of being able to replace the wet strip.

4.7 DEVICES AND DESIGNS CURRENTLY COMMERCIALLY AVAILABLE IN OTHER COUNTRIES.

4.7.1 ENURAD (Sweden)

The ENURAD alarm consists of a "wet-sensor" with a built-in radio transmitter. The "wet-sensor" is placed into a self-adhesive panty-shield which has been cut open at one end to allow insertion of the sensor device. The panty-shield is then placed into the child's pants. An alarm clock with a special radio receiver is used to wake the child.

This alarm clock receiver can be placed up to 6 metres from the transmitter. In their information notice UKEAB reports the following

features as significant:-

- alarm-bell looks like an ordinary alarm-clock and does not draw any unnecessary attention;
- no wires or carpets in the bed or around the body;
- the moisture-sensitive sensor is always correctly placed regardless of how the child lies;
- no strong currents or allergy-evoking materials.

This product is designed and manufactured by UKEAB Sweden and sells for US$198 (December 1996 = R 932.00 + import duties & postage) (ENURAD :Internet 8).

Demographic detail: Backa Bergögata 8, S-42246 HisingsBacka, Sweden
Tel: +46 3158 2710
Fax: +46 3158 5930

4.7.2 WET-STOP

The WET-STOP is an ultra-small moisture sensing device. It is placed into a soft cotton flannel pocket which is sewn onto the outside of ordinary underpants. A Velcro patch attaches the buzzer device to the shoulder of the child's pyjama.

The device is supplied together with the following items in kit form :-

- Four soft cotton flannel pockets for inserting the sensor
- Extra set of 1.4 volt batteries
- Velcro pyjama shoulder patches

- Instruction booklet
- Universal calendar success records
- Gold and silver stars
- Bedside reminder poster suitable for colouring.

(Palco : Internet 5)

Supplied by Palco Tel : (408) 476-3151

4.7.3 NYTONE ENURETIC ALARM (UTAH USA)

This is a solid-state transistorised warning device worn on the wrist like a watch. A wire is passed up the sleeve and down the front of the shorts where it is connected to. When the child starts to wet herself, the device detects the moisture and sets off the alarm. The alarm is stopped by releasing the fasteners thus breaking the circuit.

In their information notice Nytone refer to historic findings that a conditioning process being initiated in the child if the alarm goes off at the instant wetting commences and if this process is continued for an average of 30 days.

- 15 volt battery
- size : 5.7 x 6.4 cms
- weight : 225 gms

This device is sold by Nytone Medical Products for US$48.50 plus shipping charges (Nytone : Internet 7).

Demographic detail : Nytone Medical Products, 2424 South 900 West,
Salt Lake City,Utah 84119
Tel: 801 973-4090 Fax: 801 973-0176

4.7.4 DRI SLEEPER (Canada)

This device uses a small moisture detector attached to the outside of the child's underwear. The moisture detector is plugged into an alarm unit. OMS reports complete treatment time with the Dri Sleeper of 3 to 6 weeks although periods of up to 12 weeks may be necessary to ensure a low risk of relapse (OMS : Internet 6).

Demographic detail : OMS Comp. 14, Site 9, R.R #6,
Fredericton, NB Canada, E3B 4X7
Tel: (506) 363-5918

4.8 CONCLUSION

4.8.1 Summary of Historical Designs

During the preparation of this chapter various aspects of design were identified as significant. In some instances it was the danger or impracticality associated with particular designs while in others it was the changes in technology which made designs more reliable and economical. Since not much is known in practical terms about the alarm designs due to their unavailability in South Africa, the comments below only refer to those aspects gleaned from the available literature.

Early alarms were true bedwetting alarms with sensors designed to react to wet beds. With the advent of the smaller sensor worn in the patient's clothing, the term *bedwetting alarm* becomes a misnomer. However, most

people still refer to a bedwetting alarm since the device is used to prevent the wetting of the patient's bed.

Designers of some of the later alarms tried to eliminate the wire linking the sensor pads to the controlling circuit. Although this would be ideal since the patient would not be restricted to any specific area of the bed, the cost of the technology needs to be considered. A length of soft flexible wire, if positioned correctly, is not too restrictive and keeps the technological cost down.

Many different ideas have been used in the controlling circuitry ranging from relay controlled devices to solid state integrated circuits. Certainly at the voltage and current levels being used to detect moisture, solid state technology (transistors or IC's) should be considered as irreplaceable.

Output devices used have ranged from audible hooters and buzzers to radio receivers emitting a high frequency tone, electric shock stimuli, spot lights and vibrators. As far as can be ascertained, these devices have proved equally successful. It is thus up to the manufacturers to determine which device is the most suitable for their design.

Power sources have varied from mains power to single penlight batteries. It is essential that any electronic device powered by mains should be suitably isolated to ensure the patient's safety. However, this should however not be restrictive when designing a new alarm. What is considered restrictive is the requirement that the patient should sleep near a power point when the unit is connected to mains.

Where the small sensor is worn in the patient's clothing in some of the newer versions, it is believed to have distinct advantages by comparison to the unit installed on the patient's bed:

- Simplicity of use (no technical skill required to use/install it)
- Easily changed when wet
- Easy to clean/wash or in some instances disposable
- Very little likelihood of buzzer burns
- Not very noticeable
- Appears to be more sensitive (faster response)
- Not uncomfortable to use
- Patient is not restricted to a small area of the bed - some freedom is possible.

4.8.2 Significant Alarm Attributes Identified During the Literature Research

During the literature research design weaknesses were identified in the alarm device which resulted in problems in their use. The following list was prepared to assist in planning around the errors of the past and to ensure that these errors are not repeated, but pave the way to improvement.

- All components or units of the alarm device should be low voltage and battery powered.
- Sensor detectors and the alarm should be one integrated unit. If components can be detached the whole device should not function or a fault signal should be generated.
- Sensor pads should be soft and comfortable to wear.

- Sensors should be easy to clean or disposable.
- Sensors should be durable.
- Sensors should be easily and quickly exchangeable.
- The user should have the assurance and confidence that the alarm will work every time.
- The alarm should respond virtually immediately to the start of micturition.
- The whole device with all components should be easy to use, e.g. "Plug & Play".
- The user should not be exposed to any bare wires even though low voltages are used.
- The alarm should be clearly heard by the user.
- The device should be durable and be able to withstand dropping.
- The alarm device should be placed next to the patient in line with her hips - not on the bedside table near the headboard to prevent strangulation.
- User instructions should be clear, concise and easy to understand.
- Manufacturing costs should be kept as low possible.

CHAPTER 5

THE DEVELOPMENT AND USE OF THE LOCALLY MANUFACTURED BEDWETTING ALARM

5.1 INTRODUCTION

Readers of the previous chapter may feel justified to ask: Why develop a new device if there are so many already in existence?

At the time this work was initiated, the models referred to in chapter 4 were not available in South Africa. Many doctors and pharmacists knew that such equipment existed but none were able to source any units. The pharmacist who eventually found a source reported to us that the supplier quoted him a price of just under R 2,000 and warned that it would take a long time to import the unit. This was found unacceptable both from the point of view of the price as well as the long delay in importation.

The researcher felt strongly that there was a need for such a product in South Africa and that patients should not be deprived of this alternative to a simple drug-free solution. While researching prototypes and the literature it also became obvious that the units that were being sold overseas could be significantly improved upon if the knowledge gleaned from own experiences was implemented. The details given in chapter 4 were also encouraging in that they confirmed many of the thoughts experienced and experiments conducted while the local development and prototyping was in progress.

Additionally the literature research did not bring to light any reference to the significant improvements implemented in this local device, i.e.

a) a soft reusable cotton pad worn under the panty;

b) a sensor pad fault detection circuit which confirms operation.

Although it is now known that bedwetting alarms had been developed as early as 1904, this researcher had no knowledge of the large variety of devices available overseas at the time of initiating the design and development of a locally produced unit.

The very first design built was based on common sense, logic and first principles. In later designs some changes were introduced to accommodate experiences and knowledge obtained from the literature study.

It was in response to the desire on the part of the researcher to encourage her own daughter to stay dry at night that the first very basic alarm device was built. This device had a sensor pad placed on the child's bed and used very simple electronic circuitry. Since this device was seen as a rudimentary, simple switching device which rang a bell when the mat became wet, no research was considered necessary at that time. This very simple device proved to be relatively successful and the child responded so quickly that there was no need to proceed into refinement and design changes at that time because the problem was solved.

Only after the second daughter presented with nocturnal enuresis a few years later, was it considered worth the effort to design a proper and more effective alarm. As the basic design was already in existence (first

daughter) no thought was given to additional literature research; the designs were just improvements on the first.

This chapter describes the development of the researcher's own bedwetting alarm from its inception to the stage of a complete alarm package with user instructions and guidelines to make the use of the bedwetting alarm more functional.

5.2 EARLY DEVELOPMENT OF THE ALARM

5.2.1 1990 - First Design (For own use)

At the time when the first alarm device was built, it consisted of a very simple monitoring circuit and a mat made of linen sheeting 60 cm X 90 cm with a copper wire filament (single strand of copper wire taken from an electric cord) sewn onto each side of the linen sheet using a zigzag stitch. The rows of sensor wires were spaced at 2 cm intervals across the sheet. The opposing copper elements were positioned on opposite sides of the linen sheet and separated only by the single layer of linen. The sensor mat was designed to be stretched across the bed and fastened with cords to the bed frame below. A waterproof sheet was placed below the sensor mat to keep the mattress dry.

The control circuit of this device used a 9 volt battery, a relay and a domestic door bell to wake the patient. Within days this initial design was upgraded to a more reliable circuit. The door bell was replaced with a much smaller particle electronic buzzer and the relay with a simple switching circuit using a single standard (NPN) transistor.

Figure 5.1

Cross-section view of linen sensor mat.

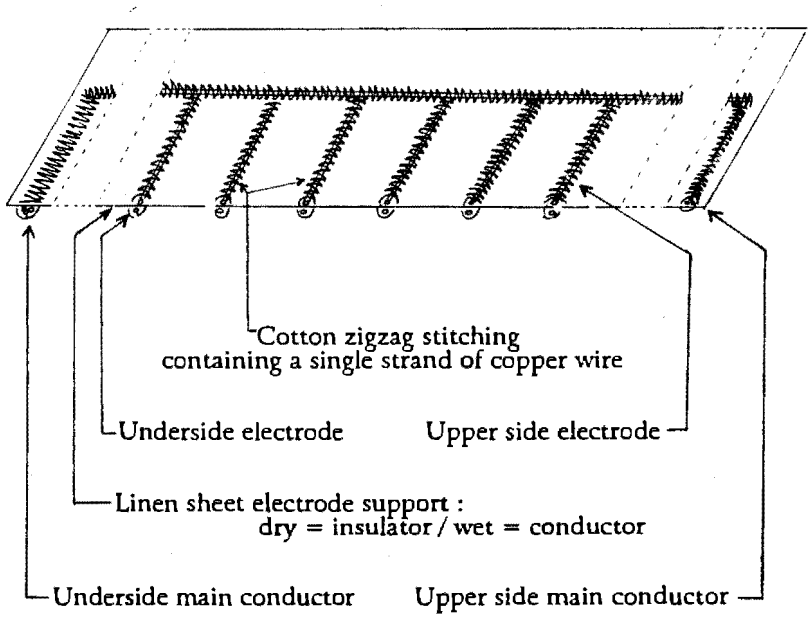
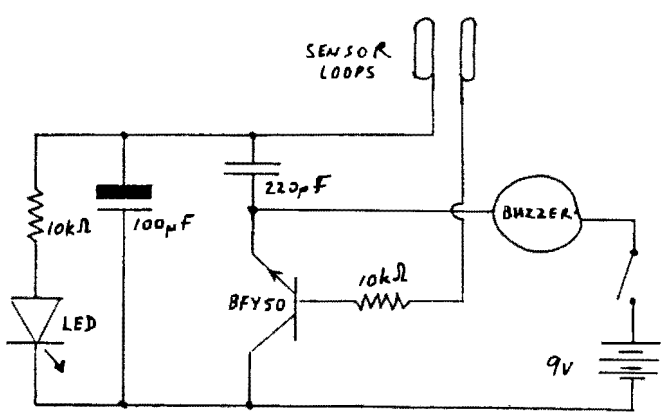


Figure 5.2

Circuit diagram of single transistor pad monitoring circuit.



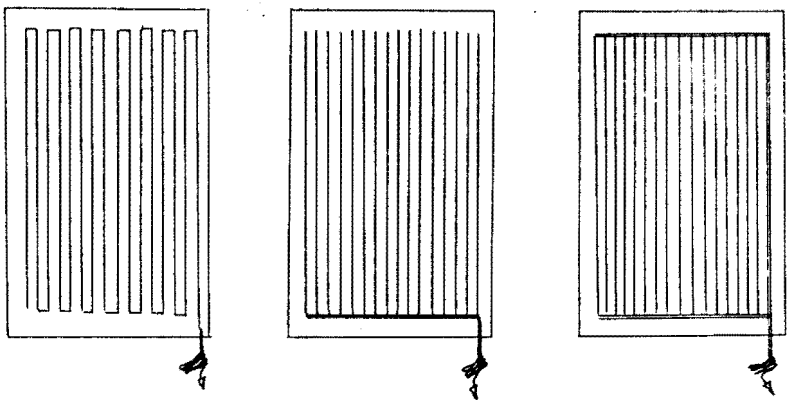
Although the device served its purpose at the time, it frequently failed. Fortunately the device was used by the developer in the own home which facilitated running repairs. The failures were primarily due to the copper wire strands breaking as a result of the regular flexing caused by the child moving during sleep. These broken wires did not only cause the device to fail but were also a cause for irritation to the sleeping child in that the broken wire ends pricked the child's skin.

During this treatment programme, 3 sensor mats were made, with each mat and its accompanying change in the layout of the sensor wire network was considered an improvement on the preceding design. The sensor grids were changed from one where the wire grid was a single filament zigzag design across the entire mat, to one with a main conductor supporting many parallel filaments and finally to one with a parallel filament grid in which each wire filament was connected to a main conductor at each end of the mat. These changes resulted in much greater reliability, although the wire breakage rate did not decrease. The improvement in reliability was at the time ascribed to a better main conductor structure in that even if some of the wires broke they continued to function as detectors linked to the main conductor.

No records were kept by the parents, but they do recall that their daughter was cured of bed-wetting after a few weeks even with the frequent failure of the moisture detection mats.

Figure 5.3

Top view of the three sensor mat network layouts



Design 1

single wire zigzag grid

Design 2

parallel grid with single main conductor

Design 3

parallel grid with main conductor on two sides

5.2.2 1994 - The Second Design (for own use)

In 1994 the researcher's second daughter also developed nocturnal enuresis. Local pharmacies were unable to provide any commercially available devices for detecting bedwetting. The researcher was advised by pharmacists and her doctor that although such devices available, they were difficult to obtain (presumably due to long delivery periods) and very expensive. In desperation the old unit used for the first daughter was retrieved from the electronic junk box, repaired and put back into use. Although the sensor mats still worked, they were in bad condition.

It was then decided to manufacture a new, smaller sensor pad (5 cm x 16 cm)which could be worn inside the pants instead of a mat placed on the bed. A small linen sheet which measured 5 cm x 16 cm and to which the copper wire filaments were sewn, was constructed and then covered with cotton flannel to make it more comfortable to wear. In another change introduced at this stage, the device was modified so that this small pad could be worn inside a pair of panties at night instead of being attached to the bed. These two changes in design (reduced size and worn inside the pants) represented a major improvement in performance and durability. The sensor mat was no longer part of the bed and since it was worn like a piece of clothing, it was a lot easier to change. An additional advantage was that the smaller pad closer to the body allowed for earlier detection of micturition than a sensor mat stretched across the bed. In practice it was found that once the child got used to responding to the buzzer, only the pad and panty became wet while the bed stayed dry and warm.

It was, however, not long before it was found that the single filamented copper strands were inadequate even in this application. They frequently broke and then pierced through the cotton cover. This made the pad unpleasant to use and in some instances, depending on where in the sensor network the break occurred, defective. At this stage the controlling circuit was still a single transistor switching circuit as used in the first design.

Once again no definitive records were kept but nocturnal enuresis ceased after about 10 nights. The patient was using Tofranil at that time which could have influenced the quick result.

5.3 REFINEMENT OF THE ALARM FOR PUBLIC USE

5.3.1 1995 - The Third Design

Following the surprisingly rapid cure of the researcher's daughter and the unavailability of commercial alarm units, a need was recognised for a locally manufactured device to treat enuresis in South Africa. To design, manufacture and market a reliable product requires a great deal more research and development work than building a device for own use which can easily be maintained. Problems experienced had to be carefully analysed and changes introduced to the designs to remedy these faults. Also, problems that could occur when the device was used outside the manufacturers' direct control, had to be identified and addressed.

Some of the more significant changes in the design of the alarm units and pads supplied for testing and evaluation are listed below. Obviously not all changes can be detailed since the whole device was re-engineered to make it practical and suitable as a commercial package.

The more significant changes implemented were:-

- The 16 cm X 5 cm pad with single wire filaments was not durable. The pad needed to be soft and flexible without wires that could break and cause the patient pain and discomfort or injury, even if injuries were limited to minor pinpricks or

scratches. Pad replacement needed to be a simple procedure and pads washable or disposable.

- Broken sensor wires could lead to device failure (not detecting moisture and thus not ringing). Some form of signal was needed to advise the user as soon as a fault occurred in the pad. The pad could also become detached from the control box with the same unfortunate result - a wet bed without the alarm ringing. The alarm needed to be sound in the event of a sensor fault occurring.
- The control box had to have a loud alarm device to wake the patient quickly. Ideally this had to be at a high frequency and emit a shrill sound.
- The device had to be very simple to use and user friendly. Instructions had to be clear and easy to follow.
- Costs had to be kept as low as possible so that the device would be accessible to most patients.

The above mentioned changes were only some of the changes to the alarm package which consisted of :

control unit with
sensor pads (2x)
user instructions
therapy guidelines
short story & picture
battery & questionnaire

5.3.1.1 The Control Circuit

The first phase of the project revolved around designing a control circuit with two requirements:

- monitoring of the sensor pad integrity;
- the sounding of the alarm when a wet pad condition was noted (this being the primary purpose of the device).

Numerous solid state designs using commercially integrated circuits were evaluated and refined. Eventually it was decided to use a voltage comparator chip as a two stage comparator. This satisfied both of the above mentioned requirements.

The circuit was also designed in such a way that when the battery power became too low for proper functioning of the high frequency buzzer, the test circuit failed first while the moisture detection circuit still functioned. Thus failure due to low battery power was easily noted and eliminated.

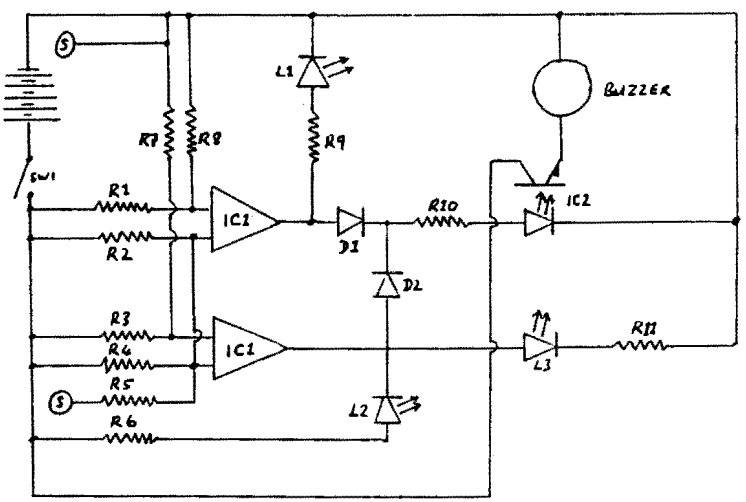
Three LED's (light emitting diodes)were arranged to protrude through the box cover so that the user could clearly see the state of the alarm device. The green LED indicated that the alarm was on while the yellow LED advised that the moisture detecting pad was wet. The red LED was the alarm and indicated that the sensor pad was either not plugged in or faulty.

The control box also had an on/off switch so that it was easy to switch off once the patient has been awoken.

An RCA audio plug adjacent to the on/off switch was used as the connector between the moisture detector (sensor) pad and the control box.

Figure 5.4

Circuit diagram of the DRY-by-NIGHT alarm.



Component list :

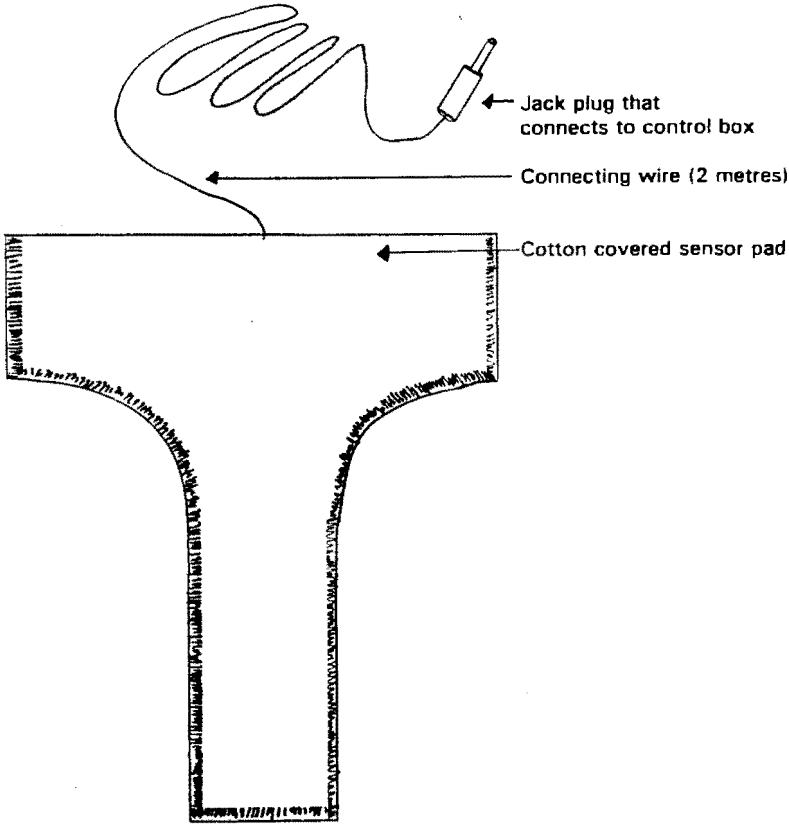
R1,2,3,4,7,8	:	1MΩ ¼W	R6,9,10,11	:	1kΩ ¼W
D1,2	:	IN4007	L1,2,3	:	LED 5.0mm
IC1	:	LM324	IC2	:	CNY 74-2

5.3.1.2 The Sensor Pad

Rectangular pad designs did not satisfactorily address the requirements for both boys and girls. The shape of the pad was thus changed from the rectangular shape used in the second design to a "T" format.

Figure 5.5

Diagram showing T-shaped cotton sensor pad which is worn inside the panty.



Linen was still used as the primary supporting medium acting as insulator when dry and as a conductor when wet. Very flexible copper wire electrodes were fastened to both sides of the linen. The wire used was specially manufactured and very flexible and did not break as easily as the filament strands used in earlier designs. The electrodes were attached immediately adjacent to each other on opposite sides of the linen. The network of each electrode was once again designed in such a way that even if one of these very thin wires broke, the circuit functionality was maintained. These two electrode networks were connected to the controlling circuit by means of a two metre long thin, twin core, wire flex.

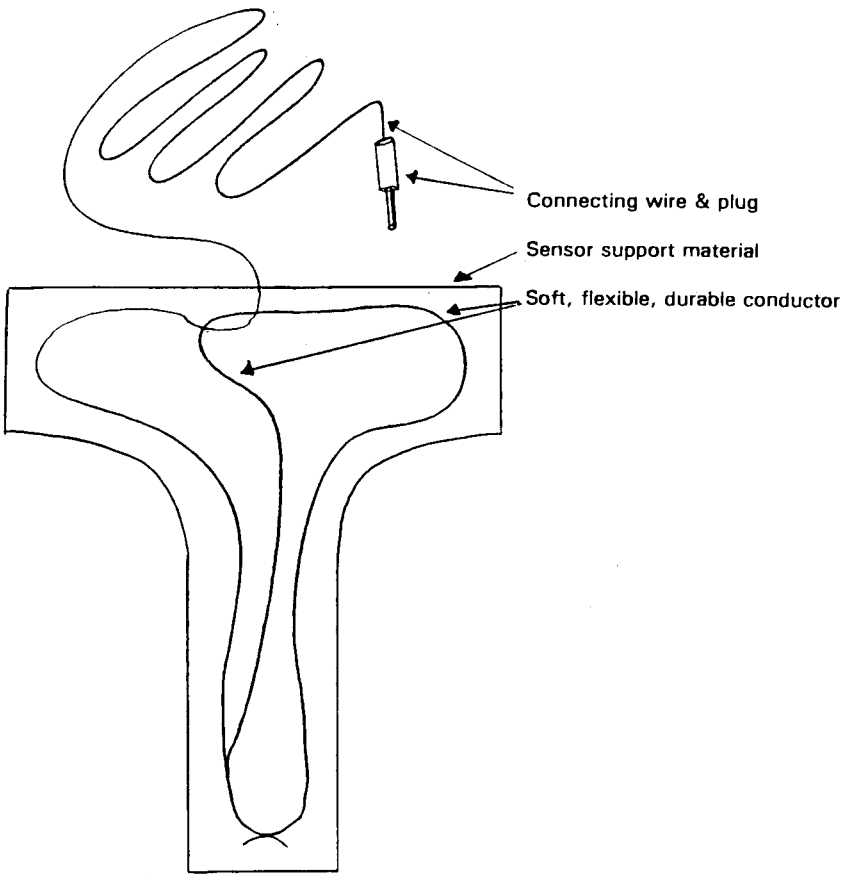
The sensor pad (linen with adjacent wire networks) was permanently covered by soft cotton material in shades of pale green or salmon. The edges of the sensor pad were stitched with an overlocker to prevent fraying and ensure a comfortable fit for the user.

Each kit was supplied with two (2) identical sensor pads, so that the patient could be treated for at least two wetting episodes per night.
(It was recommended that for more frequent wetting, the patient wore a diaper after the second wetting so that he/she could enjoy a good night's rest after the second incident).

The sensor pads were reusable requiring thorough rinsing each use. Pads then had to be blotted dry between two layers of towelling and allowed to dry. An instruction referring to the correct method of cleaning/rinsing was attached to each pad.

Figure 5.6

Diagram showing the top inside view of the sensor pad



5.3.1.3 User Instructions

Comprehensive instructions for use and maintenance were issued with the device. These are appendixed to the end of this chapter.

5.3.1.4 Picture and Bed-time Story

To make the package more appealing to youngsters and to show them that they were not unique in having this problem, a short story about a ghost and his solution to the problem was included in the package. Accompanying this story was a colourful picture of a (dry!) happy ghost awakening on a sunny morning.

5.3.1.5 User Guidelines

To enable the client to benefit fully from the alarm, independent of professional guidance and assistance, guidelines were prepared on how to avoid the common errors made during treatment in both the use of the alarm and support given to the child. These guidelines added general therapeutic value to the alarm device by advising parents on handling their child's problem in a firm but sensitive manner. A clear note to parents was also included with advice on when to consult and obtain professional assistance.

5.3.1.6 Packaging and Content

User instructions (see 5.4.1), user guidelines (5.4.2), the story of Jasper the bedwetting ghost (5.4.4), the control box together with 2 sensor pads, a 9 volt battery and the questionnaire 2 (5.4.3) were all placed into a large see-through plastic zipper bag.

5.4. DOCUMENTATION SUPPLIED IN THE ALARM PACKAGE

5.4.1 The user instructions

See 'ALARM & TRAINER' on pages 137 to 139.

5.4.2 The user guidelines

See 'IMPORTANT GUIDELINES' on pages 140 to 141.

5.4.3 Questionnaire 2

See 'ALARM EVALUATION FORM' on pages 142 to 143.

5.4.4 The story of Jasper, the bedwetting ghost

See 'Jasper, the unhappy little ghost' on page 145.

5.5 CONCLUSION

The alarm as described above was available to the consumer through the pharmacies. A contact telephone number and address were included in the package should the consumer experience any difficulties or have enquiries. Whether or not this alarm will be useful to the bedwetting child, will be established through the design and application of the empirical research in the following chapter (6).

XXXXXX[1] ALARM & TRAINER

Manufactured by :xxxxxxxxx[1] Tel: xxxxx[1]

DESCRIPTION

This is a low voltage sensing device designed to detect urination as soon as it commences while sleeping. A high frequency tone is emitted and the yellow light comes on as soon as a few drops of urine are detected by the specially designed sensor pads.

The device is also self-checking in that if the sensor pad becomes disconnected or a fault develops inside it, the unit will emit a similar high-pitched tone but with the red fault light being illuminated.

The device has been found ideally suited for bladder control training in young and older children.

Also useful for incontinent adults.

This device should not be used on children under the age of four years, as this would be an unreasonable expectation.

A doctor should be consulted before the this alarm is used to exclude any organic or pathalogical cause of enuresis.

PURPOSE / OBJECTIVE

Some children over the age of 5 years have problems in controlling their bladders at night.
The xxxxx[1] Alarm has been designed with a high-pitched sound-bomb so as to wake the child quickly, as soon as urination commences. At the same time the sub-conscious effect of being woken by this high-frequency tone, results in the spontaneous contraction of the urethra muscles, stopping micturition (urination) immediately. The high-pitched tone will continue as long as the sensor pad is wet.

Once awake, the child can go to the toilet normally, thereby getting used to the feeling of a full bladder and responding to it timeously.

COMPONENTS

The xxxxx[1] Alarm consists of a small plastic box with red, yellow and green LED's (lights) and an externally mounted high frequency buzzer. At the one end of the box there is an ON/OFF switch and a plug to where the sensor pad is connected. The box contains the electronic circuitry as well as the small 9 volt battery.

Two 'T'shaped sensor pads are supplied. These are suitable for both boys and girls. The pads contain sensitive electronic components which could be damaged by folding, wringing, stretching or ironing. The used pads should be rinsed after use every time.

NB. (To clean after use, the pad should be rinsed in clean water, pressed between layers of towels and hung up to dry)

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[1]Name and details removed for ethical reasons.

USE of the alarm - BOYS & GIRLS

Before going to bed the child should go to the toilet and empty its bladder. Please ensure that the skin around the urethra is dry with no drops of urine still present. (One single drop is enough to trigger the alarm). Place the specially designed sensor pad directly on the skin between the legs with the top of the T-section resting comfortably on the pubic area. The sensor control wire protruding from the top of the 'T' should be positioned centrally in line with the child's navel. Ensure that the sensor pad is flat and not twisted before pulling on a pair of well-fitting cotton underpants or panties. This ensures that the sensor pad is kept comfortably in position.

A NAPPY SHOULD NOT BE USED TOGETHER WITH THE SENSOR PAD.

Plug the other end of the sensor pad wire into the xxxx Alarm box and switch the device on. Only the green light should be on and no sound should emit from the device. If the red light is on, either the sensor pad is not plugged in correctly or there is a fault in the sensor pad. If the yellow light is on the sensor pad is still wet and cannot be used.

It is strongly recommended that the xxxx Alarm box be placed on a chair next to the bed in line with or below the hip line with the wire hanging freely between bed and chair or lying on the floor. The device will thus not hinder the child if he/she turns during the night.

The xxxx Alarm box should not be covered in any way since this will reduce its effectiveness by muffling the high frequency sound.

NEVER PLACE THE XXXX ALARM BOX ABOVE THE HIP LINE SINCE THIS COULD LEAD TO ACCIDENTAL STRANGULATION IF THE WIRE WERE TO WRAP ITSELF AROUND THE CHILD'S NECK.

When the alarm sounds with the yellow light on, this indicates that the sensor pad has detected urine. The child must be woken while the alarm continues to sound. Tell the child to switch it off and then send the child to the toilet.

With the alarm switched off, unplug the wet sensor pad from the unit; replace the wet pad with the second dry sensor pad and switch the unit on again - only the green light should now be on.

Before returning to bed please ensure that the skin around the urethra is dry with no drops of urine still present. (One single drop is enough to trigger the alarm). Put on the sensor pad as described previously and cover it with a fresh dry pair of underpants or panties.

Should the child urinate twice during the night it is recommended that a nappy be used thereafter without any sensor pad and alarm. Although the reason may seem obvious in that only 2 sensor pads are supplied, experience has shown that if sleep is disturbed more than twice during a night this adversely affects both the child's and parent's performance during the following day. Continued frequent sleep interruptions could result in the child resenting the disturbances and thus finding reason not to use the device.

ALARM MAINTENANCE

Green light	=	ON
Yellow light	=	Sensor pad wet
Red Light	=	Sensor pad disconnected or faulty.

During tests it was found that a normal small 9 volt battery (not alkaline) lasts at least 7 nights. This obviously varies dependent on use. Test for proper operation by unplugging the sensor pad while switched on - red & green lights should show. Replace battery as soon as the buzzer becomes fainter or fails to sound while being tested. The lights will still show correctly.

NEVER USE MAINS POWER THROUGH A TRANSFORMER ON THIS DEVICE.

SENSOR PAD CARE

The specially designed sensor pad is critical to the proper functioning of the device.

Within the pad there are very delicate micro-components. Any rough treatment (wringing, folding, ironing, bleaching) could result in the pad failing.

To clean the sensor pad after use just rinse it in fresh water (a mild soap may be used, but rinse well!), lay it flat on a half open towel, use the other end of the towel to blot up most of the moisture from the pad and then hang it up to dry.

The sensor pad should be rinsed in clean water <u>each time after use</u> *to ensure that no salts accumulate. Accumulated salts will cause the pad to become insensitive to moisture.*

DO NOT FOLD, WRING, IRON, STRETCH OR BLEACH THE SENSOR PADS.

GUARANTEE

This device and its pads have been manufactured with utmost care and tested before being issued. The sensor pads are considered as consumable units but are guaranteed for 4 weeks provided they are used and cleaned as described above. The control unit is guaranteed for one year from date of purchase.

MANUFACTURE

The device and pads are designed and manufactured by :-
xxxxxxxxxxx Tel: xxxxx

IMPORTANT GUIDELINES **Please read the following carefully for improved results**

Guidelines for seeing a doctor, psychologist or professional of own choice

- Your child is at least 7 years old and has never been dry at night
- Your child also wets or has bowel movements in his or her pants during the daytime
- Your child was dry at night, but has begun bedwetting again
- You are troubled and frustrated by the bedwetting
- You push or are concerned that you might punish your child for wetting the bed
- Your child has emotional problems due to the bedwetting problem

Guidelines when using the alarm

1. Encourage the child not to drink too much before going to bed and to drink only when thirsty.

2. Ensure that the child visits the toilet and empties his/her bladder immediately before going to bed.

3. On the first few occasions the child may not immediately stop micturating when the alarm sounds.
   It is thus recommended that a waterproof sheet be used. Dry clothing and linen should be available for changing the bed. The child must help to change the bed linen when it is wet. Older children should accept responsibility for changing their own sheets.

4. If the child does not initially wake to the sound of the alarm, do not reprimand him or her. Rather wake the child quickly and gently **while the sound-bomb is left on.** Although inconvenient, this is essential if the child is to associate the sound with the need to wake and go to the toilet. **The child must switch off the alarm him/herself.**

   It is advisable for the child to remain in his/her own bedroom during training to avoid a change of routine. The high frequency 95dB alarm is loud enough to hear in adjacent rooms.

5. When the child has improved his/her bladder control to the stage where he/she has experienced 14 consecutive nights without the alarm sounding, the use of the sensor pads and the xxxx Alarm unit could be discontinued.

6. It is of utmost importance to encourage and motivate your child. The younger the child, the more he/she responds positively to rewards, e.g. stars or a happy face marked on the calendar for every dry night. Respond gently to accidents. Do not blame, criticize or punish.

7. Some children, even older children, quite rightly fear anything linked to wires and electricity and if such items are placed between their legs, this fear may be particularly acute. The child can easily be reassured that it has nothing to fear by carrying out the following experiment. By allowing your child to experiment, he/she will become accustomed to the procedure and able to follow it at night.

   Experiment:
   Connect a sensor pad to the alarm box. Let your child switch on the alarm on so that the green light shows. He/she may pour some water onto the pad and wait for the high frequency noise to sound, also getting used to the sound. By placing the hand on the pad, the child realizes that are no strange sensations at all. The child can switch off the alarm him/herself.

8. Relapses could occur and are not uncommon, particularly during stressful periods and events. An occasional relapse following a dry period, should be ignored. If the relapse extends to a second night, the xxxx Alarm should be used again until the 14-day dry period has been achieved.

9. The xxxx Alarm will not lead to eventual reliance on the device. To the contrary, it leads to the subconscious habit of tightening the muscles resulting in an end to bedwetting. The child also learns to associate a full bladder sensation with waking up.

10. If regular bedwetting still persists after using the device for a few weeks, there may be a medical condition and a doctor should be consulted. If emotional or family problems arise due to the bedwetting, it would be advisable to consult a professional of your choice.

XXXXXXXXXXXX ALARM EVALUATION FORM

Your assistance is required in further refining the alarm, the sensor pads as well as the instructior provided. Would you please be so kind as to complete this short questionnaire and return it to:

xxxxxxxxxxx Tel: xxxx

COULD YOU EASILY UNDERSTAND THE WRITTEN INSTRUCTIONS PROVIDED?

NO: Please tell us where we should improve the instructions?

IS THE LABELLING ON THE DEVICE EASILY UNDERSTOOD ?

NO: Suggestions please?

DID THE DRY-by-NIGHT ALARM WORK AS DESCRIBED ?

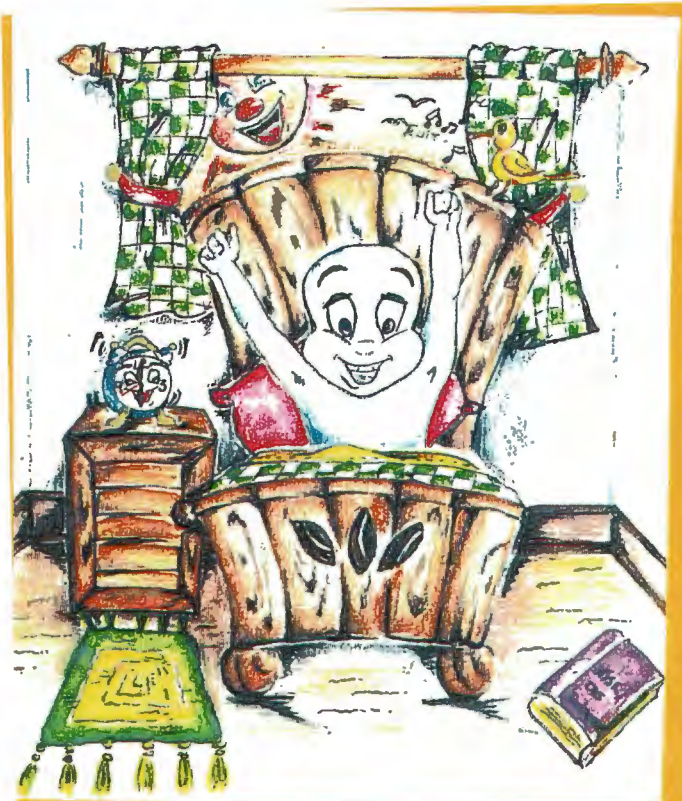
NO: Details please?

Date of first use:

Age of child: [ ] Sex of child: [ ]

DID OR DOES YOUR CHILD SUFFER FROM ANY MEDICAL CONDITIONS THAT HINDERED PROGRESS TO A NORMAL NIGHT-TIME URINATION PATTERN ?

NO	YES: Could you please give us more details?



Jaspar, the unhappy little ghost

Jaspar was a friendly little ghost with a huge problem which he kept as a big secret! He would not tell his friends or anybody about it! Will you tell anybody? No, that s why he will tell you his secret His problem was that he wets his bed every night and he couldn't help it. He felt very embarrassed about it, because he was already a big ghost now and was not supposed to wet his bed every night anymore Sometimes he cried about it and it sounded like this: Boo-hoo! Boo-hoo! It made everyone in the house shiver with fright! Ghosts! There are ghosts in this house, they said and moved out! Sometimes Jaspar didn't care and sometimes he felt very ashamed of himself. What will his friends say? They will tease him if they ever found out! What if there are really nice people in the house. He didn't want them to be afraid too and move out!

Jaspar had a girl friend, who also had this problem. The doctor gave her special tablets and her bedwetting stopped Jaspar's mother tried it too, but the medicine didn't help She scolded him, yelled at him, gave him a uding when he wet his bed, she promised to give him stars if he didn't wet his bed, but later she gave up She bought nappies for him to put on so that the bed doesn't become wet, but it was so embarrassing! A ghost with nappies! What will his friends say? Poor Jaspar.
Jaspar s mother and father were also embarrassed and worried about this bedwetting problem and every night you could hear their boo-hoos in the house! It scared all the people in the house!

One day Jaspar's parents said: "Look, Jaspar, you are too old to wear nappies, besides, they cost a lot of money! Let s think and make a plan. Were are sure that we can work something out to stop you from wetting your bed every night!"
They sat and thought and thought. No more boo-hoos during the night, because they were all too busy thinking Then suddenly, Jaspar's dad had an idea! He jumped up and started to build a little black box and a panty pad which made a big noise when Jaspar would start to wee.
took dad many days and even weeks to build it, and then came the night his mom and dad tried it out

t first, Jaspar was afraid of this funny thing with the wire which made a big noise when a drop of wee came on it. ach time the bell rang, his mom (or dad) woke him up and took him to the toilet. Can you imagine a ghost on a ilet? Sounds funny, but, yes, ghosts also have to go, like everybody else! This getting up every night was awful, hy can't he just sleep? The ringing and waking went on and on for many nights, until Jaspar stopped wetting his ed What a relief for Jaspar and his parents! No more ringing, no more nappies, no more unhappy feelings! very morning, when Jaspar woke up, he was dry and had no wet bed or nappies anymore He felt so good about mself, that he was not ashamed to be with his friends anymore. Man, he felt good, like this:

☺

nd do you know who else was very happy? The people in the house, of course, because there were no more oo-hoos at night! Everybody in the house was very relieved and they lived there happily ever after!

HOW DID YOUR CHILD REACT TO THE DEVICE - AT FIRST SIGHT ?

VERY POSITIVE	INTERESTED	RESERVED	ALARMED/ UNHAPPY

AFTER FIRST NIGHT ?

VERY POSITIVE	INTERESTED	RESERVED	ALARMED/ UNHAPPY

AFTER FIRST 7 DAYS ?

VERY POSITIVE	INTERESTED	RESERVED	ALARMED/ UNHAPPY

HOW MANY DAYS DID YOUR CHILD REQUIRE TO DEVELOP FULL AND PROPER BLADDER CONTROL ?

Days

LAST DATE XXX ALARM WAS USED : _____

Any comments or suggestions?

_____

_____

_____

_____

_____

CHAPTER 6

THE DESIGN AND APPLICATION OF THE EMPIRICAL RESEARCH.

6.1 Introduction

From the information gathered in Chapters 2 and 3, it became clear that the possible causes of bedwetting are numerous, which makes the choice of effective treatment more complicated and difficult. Literature research also indicated that the alarm treatment based on the avoidance conditioning principle is not completely effective, as so many factors determine the efficiency of the treatment. These factors include alarm failure, improper use of the alarm, lack of motivation and lack of perseverance in using the alarm. It also became clear that not all conventional methods as described in Chapter 3 were suitable for all bedwetting children and their parents. Reasons provided included the following:

- medication had no effect on the bedwetting at all;
- the possible side-effects of medication made this a less popular choice with many parents;
- psychological treatment, e.g. therapy in the form of rewards, motivation, drybed treatment, hypnosis and various other methods did not always have the desired effect;

the cost of long-term medical and psychological treatment became too high for many parents.

It can be concluded that the efficacy of the selected treatment approaches plays a major role in the control of both primary and secondary enuresis. Although parents cannot be held accountable for diagnosing the cause of their child's bedwetting problems, the appropriate treatment method should be consulted with them.

The reasons for consulting with the parents lies in addressing the needs of both the parent and the child and combining these with the skills and knowledge of the professional. The professional has to take into account the parental needs (finances, preferences or biases about treatment methods), as well as the enuretic child's emotional needs and problems, thereby eliminating any possible causes of bedwetting and environmental factors. Any one of the recognised approaches and their methods (discussed in chapter 3) can be effectively integrated and combined with the conditioning alarm treatment method (6.4.5). Although the use of the bedwetting alarm with clear guidelines on its own will be effective enough, the use of conventional and accepted methods of treatment can provide emotional support for both the child and the parent, particularly where a behavioural problem is experienced due to the bedwetting problem. Such a combined approach will lead to better results and less relapses.

When considering a combined treatment method for enuresis, a variety of factors should be taken into account, such as:

- the varied causes of bedwetting which cannot always be easily pinpointed (Chapter 2);
- different treatment approaches and methods (Chapter 3);
- the various circumstances and personal needs relating to bedwetting (6.4.1.4).

In view of the above it would be not be logical to consider only one or two options as far as treatment is concerned. A more holistic and integrated approach is called for, which will ultimately result in a far better success rate.

Each individual is unique and the circumstances are so varied, that the method of treatment should be flexible enough to implement some or all the methods as described in Chapter 3. It would therefore be difficult to prescribe a preset range of psychological tests or treatment programs for any one individual.

When determining the family's needs and circumstances as related to alarm therapy, one should take into account that only one in five enuretic children has accompanying emotional problems (Tissier: 334; Schaefer 1979:93). Cognisance must be given to the fact that some parents have become quite knowledgeable in dealing with their child's bedwetting problems. These parents have tried

"everything", for example cutting down on fluids, lifting or waking the child at night, rewards, bribery and / or punishment. Their tolerance level may be very low. Consequently they do not wish to become involved in any elaborate programme which would include measures such as daily record keeping, charting progress by the hour during the night, measuring wet patches on the bed and training the child frequently at night. Such parents may have acquired the necessary skills to cope with bedwetting so that they will be able to use a urine alarm and user instructions on their own (provided a medical practitioner has been consulted first to eliminate any underlying physical or organic problems).

The answer for an individual, holistic approach would be to cater for various needs on various levels, ranging from as little interference as possible, to more in-depth parent/child counselling and guidance. Lastly, at the other end of the continuum, therapy as a desired means of intervention should be provided for the estimated 10% of children who have accompanying emotional problems (2.5.1).

For the purposes of this research, information on enuretic patients[1] is to be obtained from the two pharmacists. The chemists will be thoroughly informed of the alarm, its operation and procedure of use. As the Hippocratic oath does not permit doctors to divulge in

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[1] The term patient in this context is interchangeable with client since medical practitioners are also consulted.

details on any patient, no information will be required from them. Also, they will not be asked to keep the alarm in stock, but both pharmacies will. The latter will be required to advise patients on consulting a medical practitioner before purchasing the alarm. The reason is to rule out the possibility of an underlying organic medical condition.

If the patients are keen to use the alarm, they will have the option of obtaining the alarm directly from the researcher. This process will proceed with minimal interference so that the effect of the complete alarm package can be observed.

6.2 THE AIM OF THE EMPIRICAL RESEARCH DESIGN

6.2.1 General Research Design

The long-term goal of this research is study the effects of the "alarm therapy" to bedwetters in the home environment within the framework of pharmaco-medical, psychodynamic and other counselling therapies.

6.2.2 The Specific Research Design

The short-term goal is to investigate the effectiveness of a bedwetting alarm combined with a user package. This is done by making it available to bedwetting children and their parents who wish to use it.

It is believed that the efficiency of the alarm will be enhanced by additional professional intervention as well as assistance in counselling, parental guidance and emotional support.

6.3 THE HYPOTHESES

In the literature, it was found in some studies that the bedwetting alarm was more effective than certain pharmaco-medical and psychodynamic treatment approaches. As alarms generally, and functional one's more specifically, are not readily available on the market, there was a need for a new unit to be developed and tested.

It was decided that in order to improve the efficacy of the new device, it would be accompanied by detailed user guidelines and instructions. The instructions state very clearly though that before the alarm is used the client/patient is advised to first undergo a medical examination to exclude any organic or pathological cause of enuresis.

Thus four hypotheses were formulated:

1. *The bedwetting alarm is functional and effective;*

Literature findings indicate that four out of five bedwetting children are emotionally healthy and well-balanced (2.5.1). Most of these

childrens' parents are able to deal with their child's bedwetting on their own and may only require the help of a bedwetting alarm.

2. *The guidelines and user instructions provide adequate assistance to the parents and bedwetting child who wish to deal with the bedwetting problem independently of professional assistance;*

If 20% of children suffer from emotional problems relating to their bedwetting experiences (2.5.5.1), the alarm treatment may not address the underlying symptoms in these cases. Psychotherapy and parent counselling would be an essential part of the treatment. Research has confirmed that good maintenance, regular follow-ups and in-use counselling resulted in better records of cures (Hunt 1983:55).

3. *Some parents and children desire additional counselling and support.*

While some parents/clients may be capable of dealing with their problems without professional assistance, minor underlying emotional problems may delay or hinder treatment without causing failure. In such cases counselling may improve the success rate of the treatment. Therefore a combined alarm and therapeutic approach would be beneficial.

Hence the hypothesis below:

4. *The effectiveness of the alarm treatment (apparatus, user instructions and guidelines) will be further enhanced by a holistic approach, in which the three main treatment approaches, as they focus on the client's needs, circumstances, possible causes of bedwetting and emotional/behavioural problems, will be taken into account.*

Additionally, where organic causes are found (1-3% of the bedwetting population), medical examination and treatment should be undertaken prior to any other therapy.

6.4 THE RESEARCH METHOD

To test the four hypotheses, it was decided to make the alarm available to two pharmacies. The alarm will also be introduced to two medical doctors. The alarm, its functioning and user guidelines will be carefully explained and demonstrated to them.

The following notice (next page) in the doctors' consulting rooms and a similar one in the pharmacies will focus client awareness on the existence of a bedwetting alarm and inform them that doctors or pharmacists can be approached.

To test hypothesis 1 and 2, questionnaire nº. 1 (see addendum) will be included in the alarm package. The client can complete it and

JASPER, THE UNHAPPY LITTLE GHOST

Jasper was a friendly little ghost with a huge problem which he kept as a big secret! He would not tell his friends or anybody about it! Will you tell anybody? No; that's why he will tell you his secret. His problem was, that he wets his bed every night and he couldn't help it. He felt very embarrassed about it, because he was already a big ghost now and was not supposed to wet his bed every night anymore. Sometimes he cried about it and it sounded like this: **Boo-hoo! Boo-hoo!**

Now there is a solution. Stop being embarrassed and use the P-P Alarm with special sensor pads. It will wake you immediately and train you to stay dry at night.

Ask your doctor about this unique device and wake up happy every morning as Jasper does in this picture.

send the answers directly to the researcher at the address supplied in the questionnaire. A telephone number will also be supplied to facilitate contact if required. As stockists of the alarm, the pharmacists will normally be the only contact persons and suppliers of information to both the client and the researcher, thereby retaining patient privacy.

To support or reject hypothesis 3, the ratio of alarms sold at pharmacies will be compared to the number of clients who were referred or who asked for counselling. The user guidelines in the alarm package will provide the researcher's address and telephone number if further assistance and guidance are required.

The pharmacists and doctors will be informed that guidance and counselling will be provided, should parents and the enuretic child express the need or wish for such intervention. For those parents who purchase the alarm and do not require professional assistance, the user instructions and guidelines will be sufficient. On this level, information and feedback from questionnaire 1 and the two pharmacists (with the buyer's informed consent) will reflect only the efficiency of the alarm, the clarity and usefulness of the user instructions and the extent to which the family coped with their problem on their own.

For ethical reasons no information about the patient's progress will be requested from the doctors, unless of course they refer the patient for psychological counselling.

Hypotheses 3 and 4 call for professional guidance and counselling of the enuretic child after referral by a doctor or pharmacist or after direct contact made by the parent/client herself.

These clients will be assisted in the following manner:

> As the causes of bedwetting vary for each enuretic client and her family, the specific needs and circumstances of the client will have to be carefully assessed and considered. Here questionnaire 1 (as seen on pages 192 - 194) provides background information, developmental milestones and familial circumstances, will assist in obtaining the necessary information.
>
> Additionally, a checklist (6.4.1.4) will be used as a tool to reveal all aspects of the behavioural manifestations of enuresis. This will provide a better understanding of the child's circumstances as well as possible physical, familial, scholastic and emotional problems that could have an effect on her bedwetting.

After reviewing the information provided in the checklist and questionnaire 1, the method of treatment can be discussed with the parents and child involved. Depending on the diagnosis and the parents' experience and creativity in dealing with bedwetting on their own, the alarm treatment programme could include some aspects of psychotherapy, bladder training, dietary control, cognitive-behavioural intervention, hypnotherapy, conditioning training and counselling. The levels of assistance to the child will vary due to the above-mentioned reasons. Some families will only use the alarm, combined with personal advice on how and when to start and end treatment. Some families may require more guidance, encouragement and counselling regarding more complicated issues, such as behavioural, emotional or physical problems. In the latter case the client will be referred to a medical practitioner.

The choice of treatment will depend on the outcome of careful assessment, historical data obtained and counselling. As cognitive control on the part of the clients will play a very important part in the successful outcome of treatment, the parent and child will be guided through this process and assisted where needed. If a parent's first choice is guidance and counselling and if such a parent copes with the emotional problems of the enuretic child, further therapy for the child is unnecessary. If the child has accompanying emotional problems and the parent cannot deal with these, therapy will be provided.

The procedure for any client will be as follows:

6.4.1 Session 1: Obtaining historical data and information

6.4.1.1 Historical data (questionnaire 1...see pages 192 - 194).

As already stated, the underlying causes of bedwetting have to be identified before individualized, ongoing treatment can be applied (psycho-dynamic approach: see 3.3.1.1). Background information and thorough assessment of all problems concerning the enuretic child and her problems are essential. Questionnaire 1, completed by the parent, will provide such information. The questionnaire and the checklist used during interviews with the parents and the enuretic child will moreover provide insight into any possible physical, social, personal or environmental causes of bedwetting before therapy, with its focus on solving the bedwetting problem itself can commence (these underlying causes were discussed in Chapter 2).

6.4.1.2. Bedwetting as seen from the parents' point of view.

During the discussion of the child's bedwetting problem, the parent will have the opportunity to express her experiences, frustrations and concerns about the bedwetting. The checklist may be very useful for obtaining as much information as possible. If not, more information can be obtained during later sessions.

6.4.1.3 Bedwetting as seen from the child's point of view.

Talking to the child about bedwetting will be aimed at determining her opinions and feelings, with the issues on the checklist also kept in mind. The child will be asked to draw a person (DAP) "waking up in a wet bed". The drawing can be done immediately, or during the following therapy session. During the interview with the child, the drawings will be discussed to obtain the necessary information from the child, allowing her to express her specific problems, needs, concerns, fears, hopes and expectations concerning the bedwetting.

Care should be taken to be on the look-out for physical problems that possibly need medical attention, scholastic difficulties that could add pressure on the child, high expectations from on the part of herself or her parent, possible sexual or verbal abuse and peer pressure. For this reason a checklist was compiled for the therapist to use as a guide in order to ensure that all aspects are covered.

Aspects covered are:

- physical and organic problems;
- emotional problems relating to bedwetting;
- familial problems;
- environmental circumstances;
- social problems;
- scholastic problems.

6.4.1.4 The Checklist

The Checklist

Physical and organic problems:
Frequent urination during the day
Frequent urination at night
Pain when voiding
Pain or discomfort in abdomen
Constipation
Did anyone cause you to have pain in your genital area?
Did you see the doctor about your bedwetting problem?

Emotional problems related to bedwetting, e.g.:
excessive anxiety
excessive shyness
tearfulness
escapism into indulging habits
does fear make you want to wet yourself?
anyone making the child uncomfortable or scared?
high expectations
lack of self-confidence
withdrawal from difficult tasks
"thick-skinned" behaviour

Familial problems
criticism from parent(s) and siblings
too much pressure on the child (by parents or the child herself)
punishment and humiliation from parents and siblings
rebellion against parent(s)
fighting amongst siblings because of teasing
secretive behaviour due to bedwetting, e.g. hiding sheets and wet bedclothes
signs of sexual or verbal abuse by a parent, family member or someone else

Environmental circumstances:
does the child sleep in own room
adequate lighting in the room at night
toilet or potty in the house
(poor families without adequate housing do not have indoor toilets)

Social problems:
not mixing with friends
not bringing friends home
avoiding certain people who could possibly know about the bedwetting problem
feeling very guilty amongst friends
not allowing anyone in her room

Scholastic problems
declining school performance
inattentiveness
avoiding school activities
shyness at school

As the above-mentioned problems could have a direct impact with far-reaching consequences for the bedwetting child, one will have to deal with these problems in consultation with the child and parents before and during the course of alarm treatment. If, for example, a child complains about criticism and punishment by a parent, the issue will have to be resolved during counselling with the parent.

Bearing in mind that the alarm therapy is the focus of treatment and that parents will have tried to deal with these problems with or

without professional help, guidance and counselling should be flexible and practical and appropriate to the client's needs.

6.4.1.5. The Baseline

During behavioural treatment practices it is standard procedure to request a baseline[2] from the parents (3.3.3.1) in order to establish the exact frequency, volume and time of voiding. This research project will depart from such procedure as the researcher is of the opinion that it is not really necessary. By the time the parents visit the doctor, they will have endured many exhausting nights trying to solve the bedwetting problem. They will already know exactly how often their child wets the bed. They will not be interested in time-consuming details that serve no obvious purpose.

However, a baseline will be required before starting alarm treatment if physical problems like bladder infection are suspected, or if too frequent daily and nocturnal "accidents" occur due to organic, suspicious or unknown reasons.

It is important to inform both parents and child that enuresis is not a disease, but rather a condition that, if not treated, should hopefully disappear in the not too distant future. Many children wet their beds every day but keep it a secret because of embarrassment.

---

[1] Gathering information of the status quo

The family should also be told that the child has no control over her bedwetting and that it is normal for the child (and the parents!) to feel embarrassed and to lose confidence and self-esteem (Hamburger 1993:26)

6.4.2 The second visit by the child and parent(s)

- ***Reviewing the completed baseline, if applicable***

Discussion of the baseline information will be the starting-point, from which more information could be gathered. At this stage the researcher will have enough information at hand regarding the extent to which the child experiences emotional, familial, social and scholastic problems.

- ***Applying more tests and therapeutic tools if underlying emotional and / or social problems are suspected.***

The following tests (applied during the first or subsequent sessions) will provide additional information regarding the emotional state of the child, and specific character traits like excessive anxiety or perfectionism that could be some of the underlying causes of bedwetting:

- DAP and KFD for all age groups;

- Bibliotherapy or storytelling (supplied in the alarm package) for the lower primary school child;
- Techniques such as letter writing for the adolescent;
- Incomplete sentence test for all age groups;
- EPI for the older child (when anxiety and tension seem to be the underlying factors).

6.4.2.1 Introducing the alarm

The bedwetting alarm should only be introduced to children 6 years and older.

The bedwetting alarm will be introduced after testing, provided that the parents and child agree to using this treatment method. They will then be familiarized with the contents of the package, and have the equipment demonstrated to them.

To reduce anxiety, the bedwetting alarm will be demonstrated and tested in the presence of the bedwetting child. She can become acquainted with the loud sound of the alarm by pouring water onto the pad. She should touch, connect and handle the alarm. The child's anxiety at being injured or shocked by the alarm is thus eased. It is important that the child handles the alarm herself to give her a sense of control and responsibility. This has the added value of raising the child's self-esteem, especially in the younger child.

Reward and praise as motivation after a dry night will enhance the child's feelings of success. The parent(s) should, however, understand that withdrawal of a reward can discourage the child. Occasional mishaps should be taken note of, but fussing about it should be avoided. To heighten motivation and provide a clear picture of the success of the treatment, the parent and child should draw up a chart and keep a record of successes and failures.

The alarm should only be withdrawn after 14 consecutive dry nights and reintroduced if a relapse occurs (more than one night). The timetable serves as an important tool to record these dry nights.

6.4.3 Follow-up visits

It is important to allow the parents and their child to be self-directive and to accept responsibility for the bedwetting problem (cognitive-behavioural intervention, see3.3.3.3d). Even at the age of seven the child can be made responsible for handling the alarm by herself, changing sheets and bedclothes (if necessary and possible), keeping record of wet nights and rewarding herself for dry nights. The parents should be actively involved in motivating the child, praising when necessary and acting positively. Psycho-dynamic intervention places the emphasis on reducing the parents' anxiety level and parent guidance (3.3.1). Too much interference from the

parents will remove the child's responsibility in coping with the problem (Cognitive-behavioural intervention: 3.3.3.3).

The methods of treatment which are chosen depend on the information gathered, and the needs of the parents and their child. Their requirements may include the alarm package on its own, or this in addition to minimal assistance or emotional support. The possibility exists that additional, alternative methods of treatment may be required and these include:

6.4.3.1 Additional, alternative treatment methods

- **Self-suggestive statements** as part of hypnotherapy can be very helpful for internal attribution (3.3.3.3), for example :

  "I can control my bladder like all my other muscles";
  "I am responsible for improvement, not my bladder";
  "I want to be dry".

- **Sphincter control exercises and sensation awareness** (3.3.3.3)

- **Additional medication** for lighter sleep (if a child does not wake from the alarm)

- **Dietary control**, e.g. less caffeine in case of excessive voiding and more fibre in cases of constipation.

6.4.4 Last visit

Counselling will be discontinued after the bedwetting has ceased and the related problems have been solved. Parents should be cautioned that relapses may occur. After a relapse, use of the alarm will have to be resumed until 14 dry nights have been achieved. A parent will be requested to complete questionnaire 2 to establish the efficacy and functioning of the bedwetting alarm.

6.5 THE MEASURING INSTRUMENTS

The following measuring instruments and therapeutic tools will be applied during research:

- The bedwetting alarm package (see Chapter 5);
- Assessment form for parents to complete at first visit: Questionnaire 1 (see p 192 - 194);
- DAP and KFD combined with questions from the checklist;
- Letter-writing technique (for children who are able to communicate through writing);
- EPI;
- Questionnaire 2 for parents to complete at the last visit (see 5.4.3 - Alarm Evaluation Form).

6.5.1 Rationale for the choice of the above-listed measuring instruments.

Although the conditioning method of the bedwetting alarm has been selected as the most effective treatment method, it does not exclude the use of psychodynamic and medical methods. Firstly, as already stated in 6.1, therapy sessions with children should attempt to locate and alleviate the underlying cause(s) of enuresis before an attempt is made to correct the problem. The use of the bedwetting alarm focuses exclusively on the treatment of the symptoms. Therefore a combined approach should be attempted for this group: both the underlying causes as well as the symptoms of enuresis could be treated.

As it is not always clearly understood why children wet their beds, one also needs to focus on the consequences of bedwetting. Most children and parents have feelings of anxiety, shame and embarrassment leading to anger, irritation and even a heavy-handed approach by the parent. Therefore it is not uncommon for children to have a low self-concept and poor relationships with their parents, siblings and peers. It is also quite possible, as mentioned in (2.5.4), that pressure from the parents and from within the child, could lead to excessive anxiety and result in bedwetting. A vicious circle of anxiety, bedwetting and tension is created. It will therefore be necessary to address these problems by allowing the clients, which

will include both parent(s) and child, to identify and talk about their feelings and deal with them constructively. For this purpose measuring instruments have been designed (Questionnaires 1-2) and existing instruments selected to allow the counsellor to focus on the:

- feelings of both parent and child;
- emotions ;
- self-concept of the child;
- relationship between the child and the own self, people and environment.

Because of the above-mentioned problems and since needs vary from child to child, only the relevant measuring instrument will be applied. This will allow for more flexibility in the choice of a particular instrument for each case. Attention will now be given to the aim, format and content of these instruments.

6.5.2. Questionnaire 1 (for parents)

Rationale. As stated in 3.3.1.1, collecting historical data is important for establishing the possible physical and emotional causes of enuresis, especially in the case of secondary enuresis (2.3.2). If there happens to be an underlying medical problem like UTI (urinary tract infection) or diabetes, this will first have to be treated before alarm treatment is considered. The possibility of child

abuse being the cause of enuresis could possibly be ascertained by the questionnaire (as well as the checklist : see 6.4.1.4).

Aim. The aim of this questionnaire is to obtain background information concerning the mother's pregnancy, developmental milestones, illnesses and diseases during childhood (2.3.2), as well as the parents' opinion regarding their child's bedwetting problem and resulting behaviour.

In short, the aim of this questionnaire is :

- to understand the nature and extent of the bedwetting problem;
- to provide a necessary tool for reflection for the parent and;
- to serve as a conversation tool.

Format. The questionnaire seeks information on the child's name, address, age, birth history and general development. It requires answers to questions about the child's particular problem, the effect it has on the child, environment, family, school and association with peers. Questions also focus on the child's home environment, emotional state and co-operation.

6.5.3 The Checklist

Rationale. This checklist is designed as a screening tool in an attempt to determine any underlying anxieties, fears, psychosomatic problems or causes leading to enuresis. These questions, posed directly or indirectly, have the added value of allowing the child to gain insight into her own problems.

Aim. The aim of this checklist is to provide questions which the counsellor can use as guidelines while conducting an interview with the child.

These questions could be used by the counsellor in a structured interview, or posed indirectly in combination with the DAP or KFD or at any point during the counselling procedure. The answers to these questions merely provide the necessary information needed to understand the bedwetting problem and to formulate a treatment program.

Format. This checklist is structured and consists of 4 parts which pose specific questions about the following parameters:

- The child and bedwetting
- The family and bedwetting
- Social life and bedwetting
- General

The questions in each category focus on bedwetting, its consequences for the child and relationships, emotions, opinions and actions taken.

6.5.4 Questionnaire 2 (for parents after alarm treatment)

Rationale. The answers given by the parent will provide insight into the alarm functioning and the user instructions. The outcome of these answers will support or reject hypotheses 1 and 2.

Aim. The aim of this questionnaire is to obtain the parent's opinion regarding the success/or failure of the bedwetting alarm after its use. The questions relate specifically to the use of the alarm, the clarity and usefulness of the instructions and parents suggestions for improving the alarm.

Format. Questions are structured in column form. The parents provide answer by filling in the appropriate response and/or adding brief comments (space is provided for these).

6.5.5 Incomplete Sentence Blank (ISB)

The rationale for using this test. The Sentence Completion Test is ideal for young users from the age of 8 and upwards. It will provide the researcher with information which could provide more insight

into the child's bedwetting problem and relationship with the father, the mother, friends and environment.

This test has therapeutic value in that the child indirectly uses self-suggestive statements for internal attribution, like :

I wish....*that I could stop wetting my bed*

I need...*to stop wetting my bed* (see Chapter 7)

The test also allows for the expression of feelings about bedwetting, like :

I hate.....*waking up in a wet bed*

I feel....*bad when I wet my bed*

I suffer....*from bedwetting* (see Chapter 7)

The purpose of the test. When this test is administered, the testee is asked to complete the unfinished sentences.

During the interpretation of the test, the following aspects are looked for:

- obsessive-compulsive thoughts
- anxieties, fear and conflicts
- fantasy
- withdrawal
- wishes

- child-parent relationship
- child-child relationship
- language abilities (sentence construction and spelling)
- perseverance
- emotional problems
- attitudes (positive or negative) in general.

The format of the ISB. The sentence completion test is a semi-structured projective technique, in which the subject is asked to complete a sentence to which the first words are supplied. As in other projective devices, it is assumed that the subject reflects her own wishes, fears, concerns and attitudes in the sentences responses. The tester could use the test as a means of stimulating discussion involving the client about the content or to derive the deeper meaning of the content of the testee's answers.

When administering the ISB, no attempt is made to measure speed reaction or to put pressure on the client to provide an immediate reaction as required in the word association test (Rotter, J.& Rafferty 1950:3).

Although the responses of the ISB tend to provide the information that the subject is willing to give, there is nevertheless a tendency to interpret an ambiguous incomplete sentence construction so that it conforms with past experiences and present wants. Subjects

mostly draw from their own experiences and express their sentiments, needs, fears, wishes and thoughts conscientiously or unconsciously, thereby providing the tester with important clues (Murray 1971:1).

6.5.6 The Letter-writing Technique

Rationale for using this technique. This unstructured test is designed to elicit the true opinions and feelings about bedwetting and the use of the alarm. Many children, especially the older ones, do not like using the alarm for various reasons. Through letter-writing, the child will reveal more to a friend. This could especially apply to adolescents, who are too shy to talk about their problem, yet will not mind to reveal everything to a friend of the same age.

The aim of the letter-writing technique. The aim if this technique is to elicit the true feelings and opinions of the child about the bedwetting and the use of the alarm.

Format of this technique. The child will simply be asked to write a confidential letter to a friend about the bedwetting and the alarm. This is an unstructured technique.

6.5.7 The Emotions Profile Index (EPI)

Rationale for using this test in the research project. The EPI offers valuable information to older children and adults. It points out the major areas of conflict in the testee's personality. The counsellor can use this information as a basis for further discussion pertaining to important areas of the client's personal and interpersonal functioning. The duration of the test is only 15 minutes.

Aim of the EPI. The EPI is a personality questionnaire which supplies information about certain personality traits displayed by an individual. The aim is to identify areas of conflict in a person and also to the degree to which these personality strengths and weaknesses are present.

The EPI was developed by Plutchik between 1955 and 1970. According to Plutchik's theory, there are eight emotional dimensions in a persons life, which the EPI examines (Plutchik & Kellerman 1974:1).

Format of the EPI. The EPI consists of 62 word pairs, representing 12 personality traits. The testee is requested to circle the one word that best describes . As an example, the testee should decide without pondering too much whether he/she would describe herself as more aggressive than timid.

The bi-polar word pairs describe these personality traits:

Timid	-	Aggressive
Trustful	-	Cautious
Controlled	-	Impulsive
Sociable	-	Depressed

These word pairs are used in various combinations in the EPI questionnaire to determine the following 12 emotional states that a person experiences every day:

Adventurous	-	Obedient
Affectionate	-	Quarrelsome
Brooding	-	Self-conscious
Cautious	-	Shy
Gloomy	-	Sociable
Impulsive	-	Resentful

(Plutchik & Kellerman 1974:2).

The EPI also consists of a motivation-distortion (M-D) scale which determines the degree to which the testee is "masking" her true emotions by offering a more acceptable response. A high M-D count can be of significance when attempting to identify the reason for this pretence.

6.5.8 The Draw-a-person (DAP) and the Kinetic Family Drawing (KFD)

Rationale for using the DAP and KFD. The DAP and KFD will be applied by the researcher to gain insight into the child's self-perception of her own self. The assumption is that the enuretic child has a low self-concept due to her "childish" bedwetting behaviour. This unstructured test will serve as a communicative tool to talk to the child about herself and will, for the purposes of this research, be combined with the topic "I have wet my bed again!".

The KFD will be applied if a child is too young for the sentence completion test. The drawing of the child's family and their activities could provide enough information about the dynamics within the family about the bedwetting problem. Important clues about the child's concept of herself, her body, her family and environment could assist in adapting the treatment programme to her needs.

Aim of the DAP and KFD. The aim of the DAP and KFD will be to provide the researcher with important clues regarding the underlying, unconscious feelings, anxieties and conflicts within the child, the family and the child's environment.

These drawings could serve as a communicative and therapeutic tool during therapy, allowing the therapist and the child to interact with each other about the problem(s).

The DAP and KFD have a very important function in that the child communicates via drawings her feelings, wishes, fears and anxieties. The child's real world, her involvement, experiences and the meaning of her world is expressed.

Format of the DAP and KFD. The DAP and KFD are projective techniques whereby the child is requested to draw a person and tell a story about the person she drew. In case of the KFD the child draws herself and the family. Analysis of these drawings is based on the assumption that the child projects the perception of her own self into the situation in the drawing. The interaction and relevance of the family, the environment and her spiritual life in specific as well as general problems, are all represented in the KFD.

The function of the above measuring instruments and therapeutic tools is to seek the necessary information so that parent, child and counsellor can acquire a better understanding of the problem of bedwetting and related problems and talk about it. Each family will receive a questionnaire to complete, but the therapeutic tools such as the KFD, DAP, the Sentence Completion Test, EPI and letter-writing technique will only be applied where children experience emotional difficulties resulting in or due to enuresis.

6.7 PROCESSING THE DATA

6.7.1 Idiographical

The ***idiographic approach*** will be applied to organise the information and process the data obtained from the parents and the bedwetting child in an attempt to understand and describe the findings obtained from each individual (Van den Aardweg & Van den Aardweg 1988:113). The higher the level to which the client proceeds, the more information will be gathered from intensified counselling and treatment.

At this stage, it is not known how many enuretic children will seek help on each level, therefore the number can only be supplied in the following Chapter. Care will be taken, however, to ensure that as many ***examples*** are given from each level, with as much accompanying information as possible.

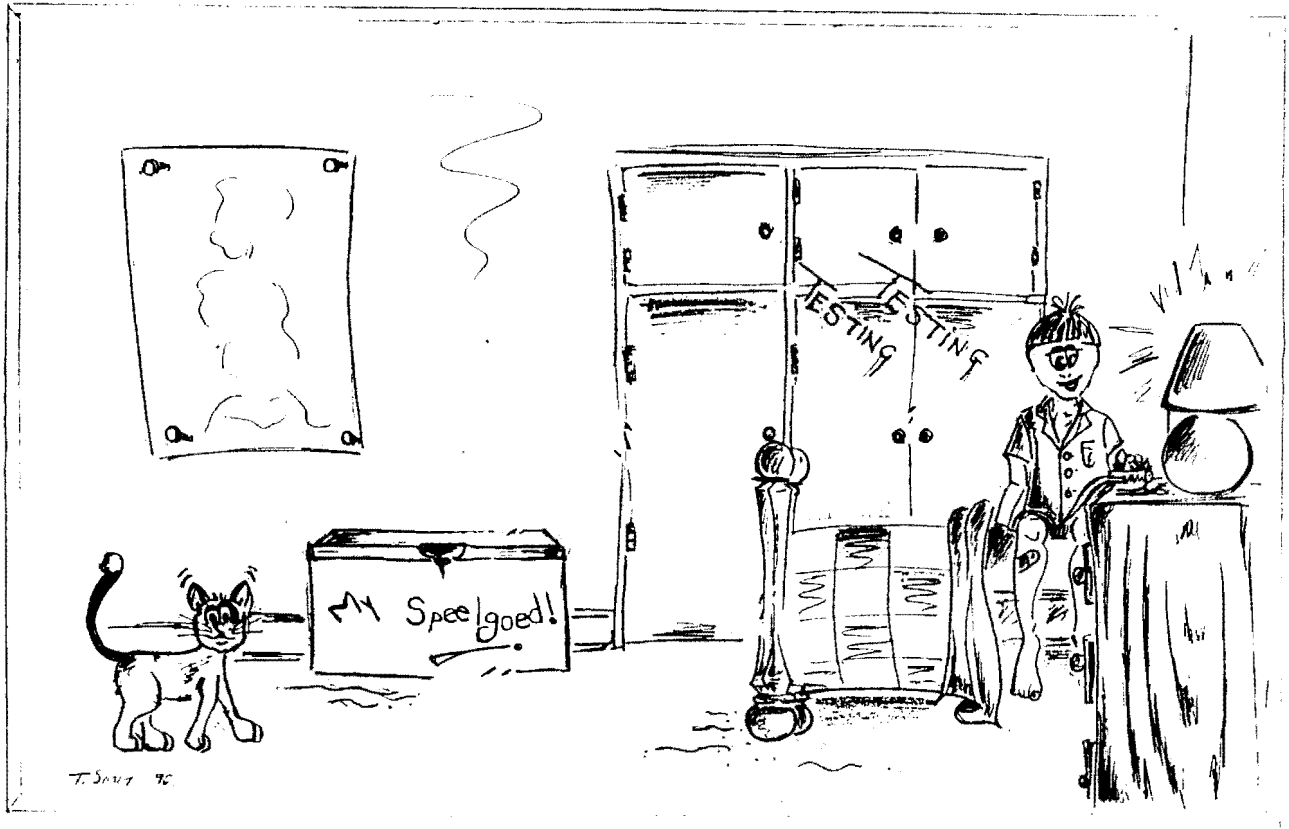
The findings of each level will confirm or reject the four hypotheses.

6.8 CONCLUSION

In this chapter a description of the research method was given to provide answers to the hypotheses posed. The idiographic approach will shed light on the success of the bedwetting alarm and its

package as well as the result of the additional professional involvement. The outcome of the observations will be discussed in the next two chapters.

The illustration on the next page depicts a typical scene of a boy testing a bedwetting device before going to bed.



"Preparing for Bed"

CHAPTER 7

RESEARCH RESULTS

7.1 INTRODUCTION

The research procedure described in Chapter 6 was applied. The alarm was made available at the two pharmacies. Information was obtained from 13 children of which 10 parents and children opted for the alarm treatment only, without supporting therapy and counselling.

Three (3) children needed more than just the alarm treatment. Due to related behavioural problems, their parents needed professional guidance, whereas the children required therapy concurrent with the alarm. One of these three bedwetters, Peter, was only seen twice before the alarm was introduced. His mother, a teacher, was sensitive to his problem and quite capable of dealing with his emotional problems through parental guidance and encouragement. Because these three children were seen personally, the procedures as described in 6.4.1 were applied.

7.2 ALARM TREATMENT WITHOUT PROFESSIONAL GUIDANCE AND CHILD COUNSELLING.

Minimal information was obtained from the ten children whose parents preferred alarm treatment only. Information was primarily obtained from the pharmacists (who had close contact with these users). Additional information was also obtained in some instances by personal telephone contact with some of these users. Only one completed questionnaire 2 was returned. The lack of co-operation from the 9 other

parents was possibly due to the lack of personal contact between the client and the supplier of the alarm. To obtain as much information about the effectiveness of the alarm and the user guidelines as possible, personal enquiry of the above-mentioned persons and the pharmacists became necessary. Although the verbal feedback was not as complete as desired, it did however provide enough information supporting or rejecting hypotheses 1, 2 and 3. The feedback obtained for these ten cases will be described below:

7.2.1 Monica (7)

Monica used medication (Tofranil) but her mother was not satisfied, as the medication did not have the desired effect. Monica's mother, with whom contact was made telephonically, heard of the alarm from a friend. She preferred to use the alarm treatment and wanted to manage on her own. Being very enthusiastic about the alarm treatment, she gave her daughter positive support. She clearly understood the instructions. According to her feedback, her seven year old daughter woke up from the alarm, went to the bathroom and returned to sleep on her own every night. On one occasion Monica's mother called on the researcher as she needed one pad replaced due to a fault (broken wire). It was reported two weeks later that Monica had stopped bedwetting completely. **The alarm treatment worked.**

The cost of the alarm was fully recovered by the client's medical aid after a recommendation by her doctor, who had treated Monica's bedwetting for some time.

7.2.2/3 Elizabeth (13) and Rowena (12)

Two business women heard of the alarm from Monica's mother. They both purchased the alarm, after every other method had failed. Their girls, Elizabeth and Rowena, also used Tofranil and Ditropan, but bedwetting continued. Initially, the alarm worked well on their teenage daughters, but gradually Elizabeth became accustomed to the ring of the bell and no longer woke up from the noise. According to her mother, she slept very deeply and could not be woken easily. Rowena was not motivated to use the alarm any longer. Reasons for the lack of motivation are not known.

During the telephonic follow-up calls, it seemed as if both mothers became increasingly annoyed with their daughters' bedwetting, as well as with the alarm that did not wake them or were no longer used. It was clear that the two ladies were too impatient and irritated by their daughters' bedwetting to provide their full co-operation and support. Even after suggesting that Elizabeth use Ditropan in conjunction with the alarm to reduce deep sleep, her mother did not persevere. Therapy was suggested to the two mothers since motivational factors and possibly emotional and other unknown factors could have played a role. They were not interested.

It is believed that in these two cases the alarm treatment failed to produce the desired results, as the teenage girls did not wake from the sounding of the alarm. Personal contact and counselling with guidance

for both mothers and daughters would possibly have had a better effect on their bedwetting.

7.2.4 Charles (7)

Charles, a seven year old boy, was advised to use the alarm by a doctor. The alarm was purchased at pharmacy no. 2. According to the doctor and the pharmacist, complete success was achieved within one week. Full background information on this client and his enuresis was not provided and probing into the client's privacy was considered unethical.

The cost of the alarm was fully recovered by the client's medical aid association after a recommendation by his doctor. No additional treatment followed.

7.2.5 Sam (8)

Sam's parents purchased the alarm at the pharmacy no.1. This pharmacist took the time to explain the functioning and procedures of the alarm personally, believing to do so would only improve their insight and produce better results. One week later, the pharmacist reported that this client returned with a complaint. The alarm did not seem to function properly, as it was going off all the time, even when dry. The pharmacist immediately replaced the unit with another from his stock, and the faulty unit was collected by the manufacturer for examination. The alarm was indeed malfunctioning and went off with the wet pad light showing, even though the pad was dry. The "dirty", grey colour of the pads and their smell raised suspicion. On closer examination, a significant amount of a

crystalline deposit was found on the electrodes and the supporting material. It was quite clear that the pads had hardly been rinsed after use and were probably just left to dry. Once the source of the problem was established, the pharmacist was informed. He in turn explained to his client how to take necessary care of the pads. No further problems were experienced and **the alarm worked.**

This was one example in which the user did not read the user instructions properly (possibly due to the thorough explanation given by the pharmacist). This was also the only case in which this problem occurred. To prevent the future recurrence of this problem, washing instructions in the user guidelines were highlighted in bold print. In addition to this, a strip of paper with clear washing instructions was attached to each pad.

7.2.6/7 Tessa (5) and Greg (7)

A granny, Mrs. Smith, purchased the alarm for her two bedwetting grandchildren directly from the supplier after reading the notice at the doctor's consulting rooms. Knowing all about bedwetting alarms from experience gained in England, she chose to use the alarm as a first option and treat the bedwetting before it became too problematic. Therefore she showed no interest in using medication. Her older grandson was 7 years old, while the granddaughter was 5.

Mrs. Smith did not want any help, since she was familiar with bedwetting alarms. In spite of the clear instructions, she still wanted a

demonstration to see how it functioned. Being a primary school teacher, Mrs. Smith was confident that she could cope on her own. One week later, she called to say that the alarm functioned well. No further contact was made after that date. Since she did not want to be "bothered" by completing a questionnaire, Mrs. Smith supplied all answers to questionnaire 2 verbally. The answers on the questionnaire reflected her satisfaction with the alarm, the clarity of the instructions, as well as the interest shown by the two children in using the alarm. The alarm worked immediately, but still went off occasionally in the beginning. No suggestions or comments were given. She was just satisfied with the result.

7.2.8 André (7)

André's father, an insurance salesman, was enquiring from various doctors about the availability and effectiveness of bedwetting alarms. He believed that this was the only available option after all other treatment had failed. Medication was unsuccessful, as well as the bladder stretching operation his son had undergone. André's father was very keen to obtain an alarm and enquired from various medical sources about the efficiency of such a bedwetting alarm. Agreeing that such an alarm might work, a specialist (gynaecologist) who had heard about this alarm, suggested that they try it. After purchasing the alarm, André's father stated clearly that neither his family nor his son needed counselling, as no additional problems were being experienced apart from their son's bedwetting.

André was seen once only, when the alarm was shown to him. He was fascinated by the alarm and its story. That night he could not wait to get to bed and try it out.

Feedback from the father was interesting. The alarm never went off and his son slept through every night without any enuretic episodes. After 12 days the battery went flat, and since the family did not have a spare one in the house, the alarm was not used that night. The following morning, however, André's bed was wet. During that day, a new battery was purchased, the alarm was switched on that night and André was dry once more. **The alarm as an aversive stimulus functioned well.** According to the latest reports, André remained dry and the use of the alarm was discontinued a few weeks later.

André's mother was contacted once during therapy. She seemed quite disinterested in the alarm. She explained that she believed that such an alarm with a pad in the pants ought not to be worn by a boy, but then hastened to admitted that the alarm was effective.

The cost of the alarm was covered by his medical aid association after André's paediatrician wrote a letter of recommendation.

7.2.9 Mary (12)

Martha, a Care Worker at Ekupholeni Mental Health Centre, complained of her 12 year old daughter Mary's bedwetting every night. She knew how to assist bedwetting children through counselling and was frustrated that she had failed to help her own

daughter. Anxiety did not appear to be the cause of the problem. Mary was a well-adjusted, happy and outgoing girl. When Mary was shown the alarm, she suddenly became highly embarrassed about her problem. She did not want to come for treatment as she was too ashamed to allow herself to be seen. In an effort to avoid this feeling of dread, she told her mother that she would rather light a candle next to her bedside every night and pray until the problem was over. Martha was very amused by her daughter's desperate efforts. Not long thereafter, her daughter stopped bedwetting completely. **In this case no alarm was used**, which again confirmed its avoidance conditioning effect on the child, if only at the suggestion of applying it.

7.2.10 Pieter (8)

This boy, aged 8, was referred by one of the doctors to obtain the alarm from the pharmacy. After two weeks, the child stopped bedwetting. **The use of the alarm was successful** and the parents sent a "Thank You" note to the manufacturer, expressing their appreciation and gratitude that the problem was over.

The cost of the alarm was repaid by the medical aid association after the doctor's recommendation.

7.3 ALARM DEVICE USED IN CONJUNCTION WITH PROFESSIONAL COUNSELLING AND SUPPORT.

PETER (7 years)

7.3.1 Introduction. Peter suffered from secondary, nocturnal enuresis. At the age of five (5), he started bedwetting occasionally, until the frequency increased to once a night. Peter's mother, a high school teacher, listened to a radio programme in which an imported bedwetting alarm was discussed and wanted to know more about it. She had no contact number and happened to hear about the xxxx Alarm from an educational psychologist working at her son's remedial school. This happened during a routine consultation about her son's emotional problems, which included night terrors and anxieties, as well as behavioural problems accompanying his learning difficulties. At that stage Ellen was exhausted from lack of sleep, as the constant waking up at night to prevent Peter from bedwetting was wearing her down. At her request it was decided to introduce the alarm to the family without delay.

7.3.2 Session 1: Historical data and Interview

Historical Data: Questionnaire 1 was completed by Ellen, Peter's mother.

A transcript of Questionnaire 1 appears on the next three pages.

QUESTIONNAIRE 1

CHILD'S PARTICULARS

NAME: *Peter* DATE OF EVALUATION: February *1996*

ADDRESS: TEL: (H) (W)

SCHOOL: *Remedial School* STANDARD: *Sub A*

BIRTHDATE: AGE: *7 years*

HOME CIRCUMSTANCES

PARENTS: FATHER: *John* OCCUPATION: *Businessman*

MOTHER: *Ellen* OCCUPATION: *High School Teacher*

MARITAL STATUS: FIRST MARRIAGE:..... DIVORCED: ..... SINGLE: .....

CHILDREN: 1 *Claire* AGE: *10*

2 *Peter* AGE: 7

3 AGE:

4 AGE:

STATE WHICH IS APPLICABLE:

CHILDREN OWN: ..... ADOPTED:.....FOSTERED:.....

CHILD'S SCHOLASTIC PERFORMANCE: *Coping in remedial school*

EXTRA CURRICULAR ACTIVITIES: *Karate - orange belt*

BIRTH HISTORY AND BACKGROUND INFORMATION (UNDERLINE WHERE APPLICABLE)

PREGNANCY: *Normal*

USE OF SUBSTANCES/ EMOTIONAL TENSION/ BABY WELCOME/ NOT WELCOME

ILLNESS DURING PREGNANCY: *Previous birth stillborn. Husband started new business in Jhb. Left us in Cape to sell the house and await birth. Was very difficult.*

BABY YEARS:

FEEDING PROBLEMS: *None*

SLEEP PATTERNS: *Good*

ANY HEAD INJURIES? *None*

ANY OTHER TRAUMATIC INCIDENCES? *No*

MILESTONES AND PHYSICAL DEVELOPMENT:

BIRTH WEIGHT: *3,9 kg* BREAST/BOTTLE-FED? Please underline

AGE WHEN FIRST CRAWLED: *10 months* SAT: *7 months*

WALK: *12 months* TALKED: *2 and a half years*

MEDICAL CONDITION AND ILLNESSES: Underline where appropriate

Frequent cystitis constipation need to go toilet often during the day

painful micturiction (urination) leaking of urine during the day

encopresis (soiling during the day and at night)

excessive caffeine intake (coffee, tea, coke)

Any other related medical condition that a doctor has established?

Hyperactivity - Ritalin twice daily

GENERAL:

1. Please describe the typical reactions of the following people on your child's problem briefly:

Father: *Concerned* Mother: *Even more concerned*

Brothers:

Sisters: *Accepting.*

Grandparents: *The family is very supportive and assist where they can. His aunt is very supportive.*

Friends: *Peter's friends do not know about his bedwetting. Careful not to reveal.*

Teacher: *Peter's teacher knows about his bedwetting.*

Other: *None*

2. How does your child's problem affect the following:

Daily routine: *Not at all.*

School: *No.*

Social activities: *The same.*

Friends: *Not at all. He is careful not to reveal any information about his bedwetting.*

3. Home circumstances

Does somebody else live in the house? *No*

Did mother's or father's working environment change? *No*

Any other domestic changes? *No*

4. Child's emotional state

How do you evaluate your child's emotional state? Underline please

1. Very poor (very depressed, moody, negative, etc..)
2. Poor
3. <u>Average</u>
4. good
5. Very good (very cheerful, co-operative, positive, assertive)

How do you regard your child's motivation and persistence?

1. Very poor 2. Poor 3. Average 4. Good

How do you evaluate your child's independence?

1. Very poor 2. Poor 3. Average 4. Good

How do you evaluate your child's emotional stability?

1. Very poor 2. Poor 3. Average 4. Good

How do you evaluate your child's enthusiasm for new things in life?

1. Very poor 2. Poor 3. Average 4. Good

How do you evaluate your child's sense of task orientation?

1. Very poor 2. Poor 3. Average 4. Good

How do you evaluate your child's courage in new situations?

1. Very poor 2. Poor 3. Average 4. Good

How do you describe your child's attitude towards his/her problem?

1. Very poor 2. Poor 3. Average 4. Good

State why?

Peter co-operates positively. He want his bedwetting to stop.

How do you evaluate your child's co-operation with this problem?

Excellent.

What have you done about this problem sofar?

I have tried medication, motivation, punishment, rewards for dry nights, cutting down on fluids, etc.. It did not really help. Rewarding with stars helps for encouragement, but does not solve the bedwetting problem.

Thank you for completing this form

Background Information: Questionnaire 1 showed that Peter came from a stable family environment, which was also confirmed during counselling. His mother Ellen was a very caring mother and applied strict yet fair discipline at home. She works as a high school teacher. Her husband has his own business and works from home.

Pregnancy and early childhood years. During pregnancy Ellen was very tense and emotional since her previous baby was stillborn (second pregnancy). During this period her husband started a new business in Johannesburg, while she remained in Cape Town to sell the house.

The birth was difficult and as a new-born baby Peter as a new-born baby was very large. Immediately after birth Peter showed signs of an allergy with a swollen face, and bloodshot eyes. It was also noted that he was not an alert baby at birth.

During childhood Peter suffered from allergies, particularly asthma, and had a poor appetite up to the age of six (6). No other serious illnesses or accidents were reported.

Physical development. Milestones were normal, except that Peter could not crawl until he was five. Peter had problems crossing his midline and experienced problems with spatial orientation. His concept of time was not good either. He received occupational therapy for 2 years to rectify these developmental problems.

In addition to this Peter also needed exercises to improve eye control, while physiotherapy was given to improve muscle tone. His speech

developed slowly and as a result he received speech therapy for 2½ years. For the first two years he was seen by a private speech therapist. Afterwards he received speech therapy at a remedial school.

Emotional development. Peter was an active boy. He lacked concentration in the class, was restless, impulsive and had very little self-confidence. He was not particularly fond of school, yet he came across as an alert, inquiring boy who wanted to do well.

Peter was an anxious boy, easily frightened. Watching television had a negative effect on him due to his vivid imagination. According to Ellen it apart that the violent programmes he watched on TV, combined with his Ritalin therapy, caused his frequent night terror attacks. Peter's parents dealt very adequately with his nightmares by consoling him and putting him to bed again. Ellen found that singing lullabies and telling a story calmed him down. This ritual pacified the frightened boy and lulled him back to sleep until his night terror attacks became less frequent.

Scholastic work. Peter was placed in a remedial school, because of his lack of attention and hyperactivity. Knowing that he had problems, he constantly compared himself with his elder sister, Claire, who did very well at school. He fabricated a story that he was *as good as her*. Gradually Peter learned to cope with his sister's achievements. Nevertheless, the feelings of incompetency, coupled with his hyperactivity and lack of concentration made him a very anxious boy. He often felt apprehensive, especially in new situations. This was particularly noticeable on Sunday

evenings when he would wet his bed more than on other nights. This was attributed to the fact that his environment would change the next morning when he returned to school. Once at school he became more relaxed and actually enjoyed school, relating well to his friends and his teacher.

Both parents assisted Peter with homework and reading at night. Peter also participated in karate and enjoyed Sunday School.

7.3.2.1 Interview: The parent's point of view about her son's bedwetting.

Peter, a 7 year old boy, attended a remedial school in Grade 2. Reasons for attending this school were his lack of concentration, impulsiveness, over-dependency and short attention span. Peter started to wet his bed at the age of 5. Ellen was not very surprised to find her son bedwetting since she also had this problem as a child. Initially the bedwetting occurred occasionally, but increased in time. It was noted at this stage that Peter had difficulty in starting to urinate in the toilet and sometimes required up to three minutes to commence urination. According to Ellen, the medical doctor said that this was not significant, and attributed the delay in urination to slow brain processing and not to physiological abnormalities. Tofranil was prescribed. Initially it worked fine, but then bedwetting recurred. As the frequency of bedwetting increased, the dosage of Tofranil was increased to 25mg, yet Peter continued to wet his bed. Something had to be done to stop the bedwetting.

When starting grade one, Peter was given Ritalin to increase his attention span. But, according to Ellen, the intake of medication coincided with the onset of his night terror attacks. She could not afford to leave stop the use of Ritalin as he needed it to improve his concentration at school.

The checklist below summarized the information obtained from Peter's parents. At first glance, one could immediately see that Peter had a significant number of emotional problems, like excessive anxiety, high expectations of himself, a lack of self-confidence, a tendency to be fearful (hence the nightmares) and being shy about his bedwetting. Whether anxiety was the cause or consequence of enuresis is hard to tell. At school, inattentiveness, anxiety and restlessness affected his school work. Luckily Peter received ample support from his family, particularly from his mother who understood him well. It seemed as if she herself needed support and counselling so as to deal with her son's own problems. Although Ellen was a confident (and very competent)mother, she was not so sure whether she handled her son's bedwetting problems adequately enough.

The Checklist: Peter

Physical and organic problems:
Frequent urination during the day
Pain when voiding
Constipation
Did anyone cause you to have pain in your genital area?
Did you see the doctor about your bedwetting problem?
Frequent urination at night
Pain or discomfort in abdomen

Emotional problems related to bedwetting, e.g.:
excessive anxiety
excessive shyness
tearfulness
escapism into indulging habits
does fear make you want to wet yourself?
anyone making child uncomfortable or scared?
high expectations
lack of self-confidence
withdrawal from difficult tasks
"thick skinned" behaviour

Familial problems:
criticism from parent(s) and siblings
too much pressure on the child (by parents or the child herself)
punishment and humiliation from parents and siblings
rebellion against parent(s)
fighting amongst siblings because of teasing
secretive behaviour due to bedwetting, e.g. hiding sheets
and wet bedclothes
signs of sexual or verbal abuse by a parent, family member
or someone else

Environmental circumstances:
does the child sleep in own room
adequate lighting in the room at night
toilet or potty in the house
(poor families without adequate housing do not have indoor toilets)

Social problems
not mixing with friends
not bringing friends home
avoiding certain people who could possibly know about
the bedwetting problem
feeling very guilty amongst friends
not allowing anyone in her room

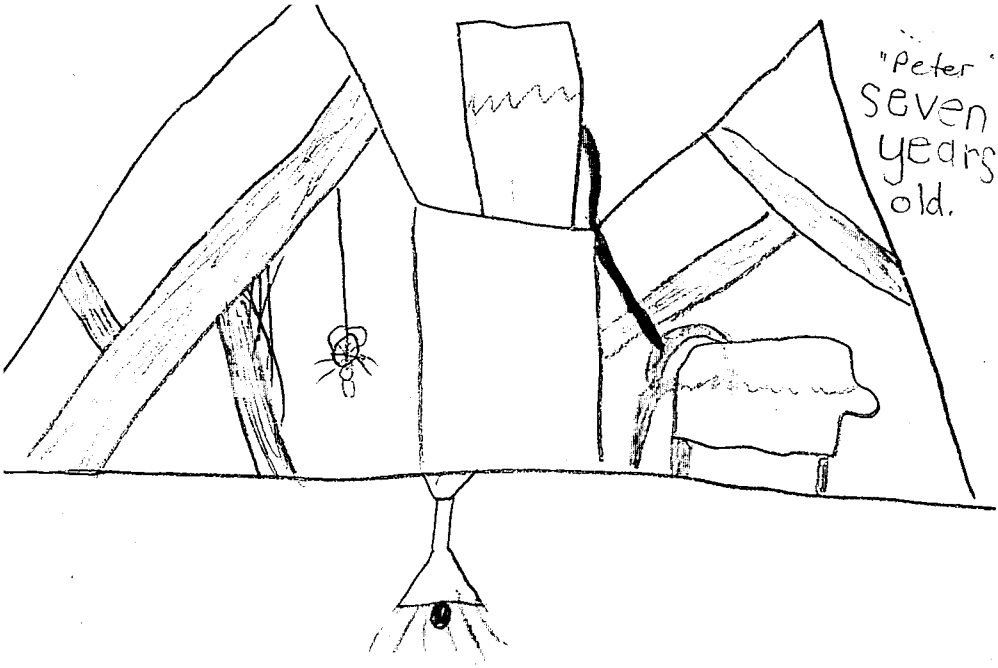
Scholastic problems
declining school performance
avoiding school activities
inattentiveness
shyness at school

7.3.2.2 Peter's viewpoint of his bedwetting

The DAP. Peter was asked to draw himself and how he felt about bedwetting. He drew the picture below, demonstrating how he laid in bed with the alarm next to his bed on a chair and the pad attached to his body. It looked as if Peter still wet his bed in spite of having switched on the alarm. His mother added that the geyser in the roof was noisy and alerted Peter. He could hear the water flowing constantly. On the right of the picture, a basin and a water tap was visible. It seemed as if everything in Peter's room relating to water was captured by the boys' mind.

Peter's picture: "Waking up in a wet bed"
can be seen on the opposite page.

At the first impression, this picture reflected feelings of uneasiness (the open mouth, wide eyes and the large wet patch in which the boy is lying), anxiety (the spider, the bedwetting incident) and overall the water theme (water flowing from the geyser, from the basin in his room and water on his bed, the blue-coloured body filled with water). The large body,


"Peter"
seven
years
old.

compared to the comparatively smaller head, reflected the boy's consciousness and over-awareness of his body, a body that seemed to be filled with water and possibly overflowing, just like the geyser under the roof. The boy on the bed seemed to feel threatened by the water everywhere, especially the water coming from the roof and the wet patch on his bed. His facial expression, his stiff body posture and arms reflected tension and apprehension. Simultaneously, the light from above shone to provide him with comfort.

When asked about the picture, Peter said that he felt very sad and embarrassed about his bedwetting. Pointing to his picture, he said that he often woke up in the middle of the night because his bed was wet. Sometimes, he said, he woke up because of bad dreams. He could not remember what his dreams were about, but the room light in his room always made him feel better. When asked what was happening under the roof of his room, he said that the geyser made noises and that he could hear the water flowing.

Peter expressed the desire to stop bedwetting. He did not want anyone to know about his bedwetting. Luckily his mother did not react harshly to his bedwetting and played a supportive role. She woke him up at least twice a night to assist him going to the bathroom. Sometimes, he said, he had to help wash his pyjamas. He said he did not mind using the alarm, because the tablets he has been given for bedwetting did not help.

7.3.3 The Baseline. Ellen maintained that no baseline study was needed, as Peter wet his bed every night without fail.

7.3.4 Session 2: Introduction of the alarm. As no physical, familial or environmental problems were present, it was agreed by everyone involved that the alarm was to be shown to Peter. He was put at ease by the story of Jasper the bedwetting ghost included in the package. Peter showed an intense interest in the technicalities of the alarm and had fun experimenting with it. He fetched water and poured drops on the dry pad. The sound of the noisy alarm excited him. Peter could not wait to get home, go to bed and try it out. He was in bed early and enjoyed listening to the bedtime story of the little ghost who wet his bed.

No additional therapy for Peter was considered, as he was receiving the necessary attention from the psychologist, speech and occupational therapists at the remedial school. It was also found that as an experienced teacher and mother, Ellen applied her own excellent initiative during therapy. She had a very special relationship with her son, but needed more support and advice on the issue of bedwetting.

It was decided to allow her as much initiative to her as possible and to minimise interference.

Ellen and Peter were informed that the alarm should only be discontinued after 14 dry nights. This was a goal both wanted to work for but they also knew that a relapse after a dry period was possible. Ellen suggested to record the dry and wet nights for motivation. Peter loved the idea of being rewarded with stars and was determined to be successful. Ellen also suggested that Peter had to take as much

responsibility as possible, including changing wet sheets. Everyone agreed to this. Peter was excited by the alarm and expected that his bedwetting problems were nearly over.

7.3.5 Session 3: Follow-up. Only Ellen (Peter's mother) attended following sessions since she was able to provide all the support Peter required and wished to keep it that way. Ellen drew up her own record chart of the first 14 days (next page) and brought it to show the results.

Ellen reported that Peter responded well to the alarm treatment. She gave him stars for the dry nights and let him wash his sheets when wet. He could not wait for the 14 days dry days to pass, as he did not want to wear the alarm any longer. He found it increasingly uncomfortable and felt he could do without it.

Ellen drew up a chart of his bedwetting behaviour in conjunction with the bedwetting device. It reflected the first 14 days, but as Peter was not dry for 14 consecutive days, he had to continue using the alarm until the goal was attained. During the first night, Peter woke up without the aid of the alarm at 2 am. He was probably excited and slept lightly, anticipating the alarm to ring. The alarm rang on 4 other occasions as indicated on the chart. Most of the time, Peter slept through to the next morning and woke up by himself or by the alarm. On the 10th day Peter enquired for how many nights he had to use the alarm. The answer was: Until his bed was dry after 14 consecutive

nights. This goal was achieved two months later and Peter has been dry since then.

Transcript of a chart recording Peter's dry or wet nights

Day	Time	Behaviour
1: Tues.	2am.	woke up self and went to toilet
2: Wed.	6	same as above
3: Thur.	6	bell - up for toilet
4: Fri.	6	woke up self and went
5: Sat.	6	same as above
6: Sun.	6	same as above
7: Mon.	3am.	bell - up for toilet
8: Tue.	6	woke up and toilet
9: Wed.	6	as above
10: Thur.	6	as above.....asking for number of days
11: Fri.	6	bell - up for toilet
12: Sat.	2am.	bell - up himself
13: Sun.	7	woke up himself
14: Mon.	3am.	bed very wet, bell did not ring

Apart from the bedwetting, Ellen was also concerned about Peter's terrible nightmares. She described his behaviour while having the nightmares and the symptoms were similar to those typical of a sleep terror disorder. The symptoms are:

- excessive body movements during sleep;
- the sleep disturbance occurs during the period of deepest sleep (see also 2.5.2.12);
- the child often wakes up with a scream. The child sits up in bed, has a frightened expression, experiences profuse

- perspiration with a steep increase in respiratory rate and profound acceleration in heart rate;
- the age of onset usually occurs between the ages of five and seven, decreasing through early adolescence. More boys than girls are being affected. Onset according to the DSM III R (1987:310) usually begins between the ages of 4 and 12 years.

Peter displayed the same symptoms. Ellen reported for example that Peter had real panic attacks and was not conscious of it. She said that he felt as if people and objects were after him and that he fell back into a blissful sleep after an attack, not knowing about it the following day.

Ellen felt relieved when she learnt what Peter's nightmares were all about. Knowing what they were made her realize that she was not to blame for his sleep terror disorder. She added that these attacks were probably precipitated by the use of Ritalin, but that she could not discontinue his medication. She would rather deal with the consequences. Unknowingly, Ellen already coped well with her sons' nightmares and her husband was also supportive.

Each time, her anxious son had an attack, which she attributed to the violent TV programmes he watched, she sang a certain lullaby and rocked him back to sleep. This regular pattern calmed Peter down. Ellen was advised not to allow Peter to watch any violent scenes on

television and to read him a bedtime story when going to bed. This seemed to have a positive effect on Peter and his sleep terror attacks decreased in frequency and intensity. Although Ellen dealt with his terror attacks appropriately, she was reassured when told that these attacks were not harming Peter and that he would outgrow them. Most part of this session was spent in dealing with Peter's sleep terror attacks.

7.3.6 **Session 4: Follow-up.** After being dry for the required 14 consecutive days, Peter's teacher commented on how much more confident Peter had become. His scholastic work, his attention span and concentration had improved somewhat.

Ellen was still concerned about Peter's over-anxiety, especially on Sunday evenings, before returning to school on Mondays. Although no special event upset him at school, Peter often felt apprehensive for no specific reason. He easily became upset after reading or listening to a sad story or watching a movie with aggressive scenes. Ellen knew that Peter had avivid imagination which sometimes felt "real" to him. This wise mother worked out her own solution, namely to put his mind to rest by discussing these upsetting movie scenes as well as the sad stories and daily events that occurred at school. This had a positive effect on Peter and he calmed down visibly.

7.3.7 **Session 5.** During each visit, Ellen demonstrated a need to tell how she dealt with her problems. She needed confirmation that her efforts were correct. With her needs addressed, she gradually

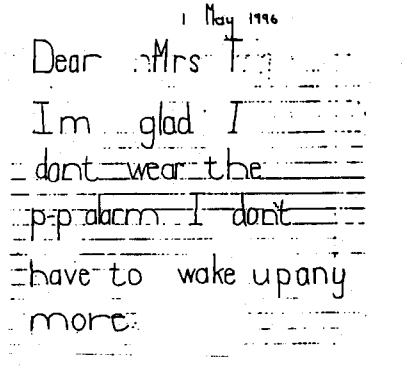
became relaxed and confident in handling the problem of her son's enuresis and anxieties. At each session, she presented her creative solutions.

During the period of therapy the sensor pads had to be replaced on two occasions due to faults that had developed in the pads. By redesigning the layout of the microscopically thin hairlike wires in the pads, a durable design was achieved. The third set functioned without failing.

Finally, Peter has stopped bedwetting. He was very proud of his achievement and felt relieved about putting the alarm away. He called twice to express his gratitude about his achievement.

A short letter from him expressed his view:

Peter's letter, written after treatment.


1 May 1996

Dear Mrs T

Im glad I dont wear the p-p alarm I dont have to wake upany more

Ellen completed questionnaire 2 which is shown on the following pages.

Questionnaire 2 (Transcript of Evaluation Form)

Your assistance is required in refining the alarm, the sensor pads as well as the instructions provided. Would you please be so kind as to complete this short questionnaire and return it to:

xxxxxxxxxxxxx[1] Tel:xxxxxxx[1]

Name of Child: Peter

COULD YOU EASILY UNDERSTAND THE WRITTEN INSTRUCTIONS PROVIDED?

NO: Please tell us where we should improve the instructions? Yes

IS THE LABELLING ON THE DEVICE EASILY UNDERSTOOD ?

NO: Suggestions please? Yes

DID THE XXXX[1] ALARM WORK AS DESCRIBED ?

NO: Details please? Yes

Date of first use: February 1996

Age of child: 7 years

Sex of child: Male

DID OR DOES YOUR CHILD SUFFER FROM ANY MEDICAL CONDITIONS RELATING TO BEDWETTING?

No	YES: Could you please give us more details?

1. The name and details removed for ethical reasons.

HOW DID YOUR CHILD REACT TO THE DEVICE - AT FIRST SIGHT ?

VERY POSITIVE	INTERESTED	RESERVED	ALARMED/ UNHAPPY

AFTER THE FIRST NIGHT ?

VERY POSITIVE	INTERESTED	RESERVED	ALARMED/ UNHAPPY

AFTER FIRST 7 DAYS ?

VERY POSITIVE	INTERESTED	RESERVED	ALARMED/ UNHAPPY

HOW MANY DAYS DID IT TAKE YOUR CHILD TO DEVELOP FULL AND PROPER BLADDER CONTROL ?

3 months

LAST DATE THE XXXXXXX ALARM WAS USED :

April 1996

Any comments or suggestions?

The alarm has definitely worked.

No more visits from Ellen were necessary. She was relieved about her son's progress, not only in bedwetting, but also in his growing self-confidence and assertiveness. Her biggest bonus was to experience a good night's sleep.

CLAIRE (10 years)

7.4.1 **Introduction.** Two months later, Ellen returned. Her daughter Claire, aged ten (10), started bedwetting for unknown reasons. She started to wet her bed towards the end of Peter's bedwetting problem. As soon as Peter's problem was solved, Ellen brought Claire for treatment. By then she was already bedwetting for five months.

7.4.2 Session 1: Obtaining historical data;

Once again, Ellen completed questionnaire 1, as seen as a transcript on the next three pages.

Pregnancy and early childhood. Claire's pregnancy, birth and milestones had proceeded normally. Claire was potty-trained and dry at night when one year old, but at the age of three time she started to wet her bed every night. At that time the family environment was stressed, especially since Ellen was in hospital after having lost a full-term baby. It is believed that tension and anxiety resulted in Claire's bedwetting. This condition lasted for 6 months. When life at home settled down, Claire stopped bedwetting.

QUESTIONNAIRE 1

CHILD'S PARTICULARS

NAME: *Claire* DATE OF EVALUATION: *March 1996*

ADDRESS: TEL: (H) (W)

SCHOOL: *Primary School* STANDARD: *2*

BIRTHDATE: AGE: *10*

HOME CIRCUMSTANCES

PARENTS: FATHER: *John* OCCUPATION: *Businessman*

MOTHER: *Ellen* OCCUPATION: *High School Teacher*

MARITAL STATUS: FIRST MARRIAGE:..... DIVORCED: ..... SINGLE: .....

CHILDREN: 1 *Claire* AGE: *10*

2 *Peter* AGE: *7*

3 AGE:

4 AGE:

STATE WHICH IS APPLICABLE:

CHILDREN OWN: ..... ADOPTED:..... FOSTERED:.....

CHILD'S SCHOLASTIC PERFORMANCE: *Very good*

EXTRA CURRICULAR ACTIVITIES: *Sport: netball, girl guides*

BIRTH HISTORY AND BACKGROUND INFORMATION (UNDERLINE WHERE APPLICABLE)

PREGNANCY:

USE OF SUBSTANCES / EMOTIONAL TENSION / BABY WELCOME / NOT WELCOME

IILLNESS DURING PREGNANCY: *None*

BABY YEARS:

FEEDING PROBLEMS: *None*

SLEEP PATTERNS: *Good*

ANY HEAD INJURIES? *None*

ANY OTHER TRAUMATIC INCIDENCES? *No*

MILESTONES AND PHYSICAL DEVELOPMENT:

BIRTH WEIGHT: *3 kg* BREAST/BOTTLE-FED? Please underline

AGE WHEN FIRST CRAWLED: *7 months* SAT: *6 months*

WALK: *13 months* TALKED: *One year*

MEDICAL CONDITION AND ILLNESSES: Underline where appropriate
Frequent cystitis / constipation / need to go toilet often during the day / painful micturiction (urination) / leaking of urine during the day / encopresis (soiling during the day and at night) / excessive caffeine intake (coffee, tea, coke)

Any other related medical condition that a doctor has established? *No*

GENERAL:

1. Please describe the typical reactions of the following people on your child's problem shortly

Father:	*Concerned*	Mother: *Even more concerned*
Brothers:	*Understanding, as he has the same problem*	
Sisters:	*Claire has no sister*	
Grandparents:	*Claire's aunt knows about this and she is very understanding and helpful. The rest of the family does not know about her bedwetting.*	
Friends:	*Claire's friends do not know about this*	
Teacher:	*She does not know, but was informed about Claire's emtotional problems that accompany her bedwetting*	
Other:	*None*	

2. How does your child's problem affect the following

Daily routine:	*Claire became disorganised, confused, forgetful and untidy. She used to be the opposite.*
School:	*Her scholastic performance dropped greatly.*
Social activities:	*Did not change so much.*
Friends:	*Claire started to feel very self-conscious about her bedwetting. Afraid that this will leak out.*

3. Home circumstances

Does somebody else live in the house? *No*
Did mother's or father's working environment change? *No*
Any other domestic changes? *No*

4. Child's emotional state

How do you evaluate your child's emotional state? Underline please

1. Very poor (very depressed, moody, negative, etc..)
2. Poor
3. <u>Average</u>
4. good
5. Very good (very cheerful, co-operative, positive, assertive)

How do you regard your child's motivation and persistence?

1. Very poor 2. Poor(at this stage) 3. Average 4. Good

How do you evaluate your child's independence?

1. Very poor 2. Poor 3. Average 4. Good

How do you evaluate your child's emotional stability?

1. Very poor 2. Poor 3. Average 4. Good

How do you evaluate your child's enthusiasm for new things in life?

1. Very poor 2. Poor 3. Average 4. Good

How do you evaluate your child's sense of task orientation?

1. Very poor 2. Poor 3. Average 4. Good, *usually*

Presently not good. Claire is forgetful and cannot plan her activities properly anymore.

How do you evaluate your child's courage in new situations?

1. Very poor 2. Poor 3. Average 4. Good Excellent

How do you describe your child's attitude towards his/her problem?

1. Very poor 2. Poor 3. Average 4. Good Excellent

State why?

Claire seems to ignore her problem, pretending that it does not exist.. She feels very embarrassed about it.She became careless and regressed to baby-talk.

How do you evaluate your child's co-operation with this problem?

Claire does not co-operate in solving her problem and does not even want to discuss this .

What have you done about this problem sofar?

We've tried medication, motivation, punishment, rewards for dry nights, cutting down on fluids, etc.. It did not really help.

Thank you for completing this form

Physical and emotional development. This was normal. With the onset of Claire's bedwetting problem, she gained weight and her dress size increased from a 10 year old size to a 14 year old dress size. Adding to the problem, Claire suffered from psoriasis which flared up on her back. According to Ellen, Claire suffered from a psoriasis attack occasionally, probably when she was under stress. Psoriasis is known to be a chronic skin disorder characterized by frequent remissions and recurrences. The causes of this disorder are not known, but are probably caused by an auto-immune disorder (Griffith 1985:508). Claire's psoriasis was treated by the family's practitioner.

Emotionally, Claire displayed behavioural problems which were not related to any form of discipline at home or at school. Ellen reported that since her bedwetting started, Claire became unmotivated, confused, lethargic, restless, dreamy, untidy and very forgetful. She also regressed to baby-talk. Ellen added more behavioural problems (see list in 7.4.2.1).

Scholastic work. Claire liked school and usually obtained high grades and participated actively in sports. With the simultaneous onset of the bedwetting, Claire's academic work dropped by 20%. This was unacceptable for Ellen.

At school, Claire related well with her friends and her class teacher, although she felt shy and embarrassed about her bedwetting problem.

7.4.2.1 Parent's viewpoint of the bedwetting.

Although the family's support was encouraging, Claire continued bedwetting for no apparent reason. Ellen could only guess that the pressure of school work caused a great deal of anxiety in her daughter. She also added that Peter received so much attention from family members when he stopped bedwetting that Claire might subconsciously be wetting her bed to receive similar attention. Possible reasons for her to have such beliefs appear in her recordings of events reproduced on subsequent pages.

Claire would not always listen to her mother's suggestions. Ellen became irritated with her daughter's "thick-skinned behaviour" and brought her in for therapy, hoping that it would motivate her daughter to deal with her problems effectively. Ellen recorded every event and action that she took and brought it in to show. It is as follows:

MAIN PROBLEMS SINCE MARCH 1996

Our observations of Claire's behaviour was her:

1. *Bed wetting (5 months to date).*
2. *Overeating and weight gain (size 10 year old to 14 year old).*
3. *Psoriasis flared up (back on her body).*
4. *Serious drop in academic work (20% in some subjects).*
5. *Wetting her bed.*
6. *Not able to get down to her work.*
7. *Losing clothing, books and generally forgetful.*

8. *Not motivated to take her medicine, wear the bedwetting alarm or do things around the home.*
9. *Became untidy and hap-hazard.*
10. *Deceitful and lying.*
11. *Difficult to talk to and very quiet, sulky.*
12. *Baby talking, some sort of accent "funny talk".*

COMMENTS TERM TWO (after a 20% drop in academic work):
We contacted Claire's school teacher about our daughter's drop in academic work. The teacher's comments were as follows:

(None of these teachers' comments pertained to the first term).

1. *Forgetful, confused.*
2. *Losing, misplacing books/work.*
3. *Last to leave classroom every day.*
4. *Mess all around her desk (incredible).*
5. *Pupil sitting next to her struggles, and often has to be moved around, away from being directly next to her because Claire moves around too much and uses all the space.*
6. *Dreamy, dilly headed, planning seems to have gone.*
7. *No discipline problem, a wonderful child.*

Similarly, Claire's piano teacher was consulted and enquiries were made as to Claire's progress. She reported the following:

1. *A change in her dedication to her piano work.*
2. *Cannot sit still on the piano stool, never before been a problem (taken piano for four years).*

As a result of these behavioural problems, I took the following actions:

MY ACTIONS	*RESULTS TO DATE*
1. Consulted Mrs T. about the alarm	*Claire agreed to use it with success, can't go without it.*
2. Discussed all problems with Claire	*She agrees to work at the problems with our help.*
3. Consulted her teachers at school.	*Confirmed our worries, cannot find a reason for changes.*
4. Put her into after-care for better homework supervision.	*Initially situation worsened. By the end of 2nd term a tighter control and separation from a few friends with much better results.*
5. Cut out excess sugars/sweets.	*Co-operation of Claire stemmed weight gain.*
6. Withdrew privileges.	*Claire started working for privileges.*
7. Caring but very firm discipline at home.	*Good response after a time.*
8. Check-up with Dr R.	
9. Appointment Neurologist Dr S. 14/8/96	

Considering the actions Ellen took to solve her problems with Claire, it seemed as if Ellen acted correctly. She put Claire on a diet, into an After Care Centre for proper supervision and assisted Claire in

drafting a time-table for organizing her schoolwork , as well as her sports activities.

During the following therapy sessions, Ellen depended on reassurance that she was acting correctly. However, it was necessary to speak to Claire about her bedwetting and related problems.

7.4.2.2 Claire's viewpoint about her bedwetting

Claire was hesitant at first, but she did not mind talking about her embarrassing problem. She did not know why her bedwetting started and mentioned her poor school report. She admitted to being lazy and to becoming lax and sloppy in her work (similar symptoms mentioned in 3.2.1.1). Her mother was very displeased by her standard of work and put her in the After-School Care Centre for better homework supervision. Claire said she liked it there and was determined to work harder. When asked who put pressure on her to work harder, Claire emphasized that she herself wanted to improve, as she had always excelled at school.

The Sentence Completion test. The sentence completion test was administered because Claire liked writing and was too young for the EPI. The sentence completion test provided the following information:

I like ***my dogs.***
The happiest time ***was when we first went to our holiday house.***
I want to know ***why I wet my bed.***
Back home, ***it is different to our holiday house.***

I regret *not working very hard at school.*
At bedtime *I think of what is going to happen the next day.*
The best.. *sport is my best thing.*
What annoys me... *my brother sometimes annoys me.*
A mother *understands you.*
I feel *bad when I wet my bed.*
My greatest fear *would be getting lost in a shopping centre.*
In high school...*I will have to work hard to get there.*
I can't *fly to America.*
Sports...*I love doing sports.*
When *I am older I want to go and see snow.*
My nerves...*I am nervous of doing exams.*
Other people *aren't the same.*
I suffer *from wetting my bed.*
I failed *to do what I wanted to do.*
Reading...*I like reading sometimes.*
My mind *gets confused sometimes.*
The future.....*I am unsure what will happen tonight.*
I need *to stop wetting my bed.*
I am best *when playing sports.*
Sometimes I *am naughty.*
What pains me...*I suffer from wetting my bed.*
Sometimes *I think of strange things.*
I hate *getting up early.*
This school *is a very nice one.*
I am very *good at my work.*
The only trouble *is wetting your bed.*
I wish *that every wish I make comes true.*
My father *cares about me.*
I like *doing karate.*
Dancing.....*I want to know how to dance.*
My greatest worry is *people knowing I wet my bed.*
Most girls *are my friends.*

While discussing the sentence completion test, it became apparent that Claire set very high standards for herself regarding her school grades. She obtained high marks throughout her school years. Although her mother was strict about her school work and her

untidiness, her confidence about her scholastic performance was indicated by her admission: "**I am very** ***good at my work***". But unknowingly she placed enormous pressure on herself and maybe also wanted to come up to her mother's expectations, although she denied that her mother put pressure on her. Sentences 14, 18, 25, reflected her fears, confusion and the pressure she put on herself, for example: "**I failed** ***to do what I wanted to do***" (school); "**My nerves....*****I am all nerves of doing exams***"; " **My mind** ***gets confused sometimes***"; "**In high school** ***I will have to work hard to get there***" and "**The future.....*****I am unsure of what will happen tonight***" (regarding the bedwetting). Claire also knew that she had become sloppy with her school work and her room. Reacting to her statement in sentence 3, "**I want to know** ***why I wet my bed***", Claire said that her bedwetting placed a lot of pressure on her and made her feel she was losing control. She felt extremely embarrassed about it, as she was ten years old. Sentence 39 clearly expressed this fear: "**My greatest worry is** ***people knowing I wet my bed***". Not a single friend knew about this, but she could not invite anyone over.

In addition to the above information, the checklist was taken into consideration during further discussions with both mother and daughter. Claire displayed the typical behavioural problems of an enuretic child as reflected in the responses to the questions on the checklist (as in 2.5.1).

In view of the information gathered, it seemed as if Claire needed her mother's attention (as her mother focussed a great deal on Peter's enuresis). Claire may have become lazy, sloppy and an underachiever at school in a subconscious - and possibly successful - attempt to gain her mother's attention. This may also have led to the bedwetting behaviour, which in turn led to the associated emotional, social and scholastic problems. She admitted that she felt very ashamed of being unmotivated and out of control. The checklist summarized all these findings:

The Checklist: Claire

Physical and organic problems:
Frequent urination during the day
Pain when voiding
Constipation
Did anyone cause you to have pain in your genital area?
Did you see the doctor about your bedwetting problem?
Frequent urination at night
Pain or discomfort in abdomen

Emotional problems related to bedwetting, e.g.:
excessive anxiety
excessive shyness
tearfulness
escapism into indulging habits
does fear make you want to wet yourself?
anyone making child uncomfortable or scared?
high expectations
lack of self-confidence
withdrawal from difficult tasks
"thick skinned" behaviour

Familial problems:
criticism from parent(s) and siblings
too much pressure on the child (by parents or the child herself)
punishment and humiliation from parents and siblings
rebellion against parent(s)
fighting amongst siblings because of teasing
secretive behaviour due to bedwetting, e.g. hiding sheets
and wet bedclothes
signs of sexual or verbal abuse by a parent, family member
or someone else

Environmental circumstances:
does the child sleep in own room
adequate lighting in the room at night
toilet or potty in the house
(poor families without adequate housing do not have indoor toilets)

Social problems
not mixing with friends
not bringing friends home
avoiding certain people who could possibly know about
the bedwetting problem
feeling very guilty amongst friends
not allowing anyone in her room

Scholastic problems
declining school performance
avoiding school activities
inattentiveness
shyness at school

The Checklist shown above provided a summary of Claire's problem. Although Claire was physically healthy, she experienced some emotional problems. She had high expectations of her school work (and maybe her mother too!) and felt embarrassed about her bedwetting. Claire indulged in bad habits, like overeating (and maybe drinking excessively, hence the frequent micturition at night),

neglecting school- and homework, withdrawing from difficult tasks and adopting a "thick-skinned" approach. Claire was not always honest and open about her bedwetting problem towards her mother. Her sloppiness and noncompliant attitude could be seen as a form of rebellion towards her mother. Claire's scholastic work also deteriorated and she was anxious that her bedwetting problem might leak out. Her relationship with her friends was good, although she told nobody about her problem.

7.4.3 **The baseline.** Claire wet her bed every night, therefore recording a baseline was not necessary.

7.4.4 **Session 2: Introduction of the alarm.** Ellen preferred to use the alarm for Claire as it proved effective with Peter. She also did not want to use medication (Tofranil) for Claire as it had been ineffective in Peter's case. Claire was given the option of using the alarm or washing her own linen every morning. She chose the alarm. Not much introduction was needed, as Claire had already seen her brother using it.

7.4.5 **Session 3: Follow-up.** The alarm worked well. Claire woke up and went to the bathroom herself, sometimes twice a night. When visiting family during a long weekend, Claire took the alarm with her, quietly hiding it in the bed in the dark and switching it on. Fortunately the alarm never went off and her bed remained dry.

The issue of high expectations was again discussed with Claire. She realized that her own expectations need not be unrealistically high and that her high standards could be the cause of her anxiety which resulted in her bedwetting. Her temporary lack of self-discipline and sloppiness could have contributed to her poor performance at school and added pressure to improve, leading to bedwetting. She undertook to work harder, stop her sloppiness and try her best without putting too much pressure on herself. On the positive side, Claire admitted to having a good relationship with her parents and to sometimes being irritated by her teasing brother. She loved her dogs, school and sport.

7.4.6 Session 4. Ellen returned with Claire, clearly not feeling very happy about her daughter's progress. Claire did not want to use the alarm and hid her wet knickers. Her reason for not using it was that it woke her up at night. Ellen gave in and washed her daughter's linen again.

When asked why Claire was unco-operative, she claimed that her mother became too involved in her bedwetting problem. She wanted to accept responsibility herself, even if this meant that her bed would be wet in the morning. It was then mutually decided that Claire would take full responsibility for her own bedwetting problem and would take action - either to wash her own linen or use the alarm. Claire did not like either option, but chose the alarm once more. Her mother had to withdraw from this responsibility and Claire looked very pleased with this decision.

To motivate Claire she was allowed to chose a sticker from the motivational sticker selection which she would receive after fourteen (14) dry nights. This delighted her and she chose the one that stated: "Well done!"

7.4.7 **Session 5.** Claire and her mother returned. This time, Ellen looked unimpressed with the alarm. Claire had started to use the alarm regularly, but did not wake up from the alarm bell any longer. She slept right through and her mother had to wake her to prevent her from bedwetting. It seemed as if she was quietly rebelling against her mother, but she never admitted this. The suggestion that Ellen leave her daughter alone to face the consequences of her actions, made Ellen uneasy. The only other option was to obtain Tofranil from the pediatrician to reduce the level of deep sleep. Ellen accepted this.

At the same time, Claire was taught some cognitive self-statements, such as "I **will** wake up from the alarm bell at night" and "I **can** control my bedwetting all by myself". She was also told that she was the only person who could really make the difference between success and failure, and that others were only there to assist. Claire looked very relieved, as if she had needed this motivation.

To summarize the events, Ellen recollected the past events shortly:

BED WETTING

Early March: *Wet knickers at night. Got up herself to go to toilet.*
End March: *Wetting bed constantly. Need to take her to toilet at 11:00 pm.*
Contacted her teacher: No problems, would watch her.

Claire is asked to wear the alarm: She refuses and hides any wet knickers or pajamas.

Bed wetting more frequent; struggle to wake her to go to the toilet; need to take her twice a night. Large amounts of urine when she is taken to the toilet at 11pm and 1am.

The need to take her earlier as 11 o'clock became too late.

I was changing the bed and often Claire couldn't even remember wetting the bed the night before.

The alarm works well but Claire sleeps so deeply that she is not hearing the alarm when it goes off between 10:30 and 11:00. Once she has been to the toilet at this time, she holds her bladder well even if she sleeps to 08:30 in the morning.

All efforts seemed to pay off and Claire was co-operating.

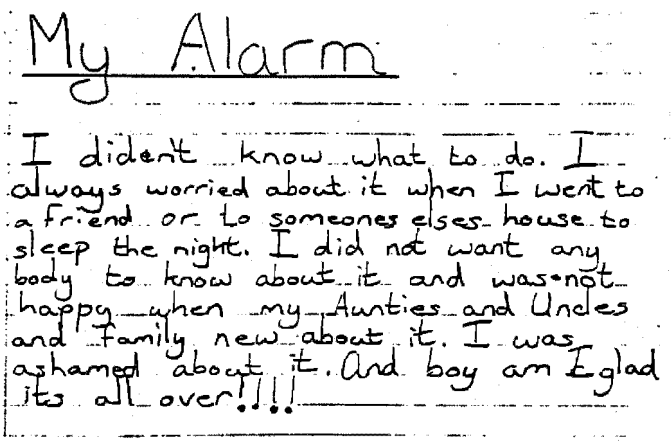
7.4.8 Session 6. Ellen and her daughter returned, this time with positive news. Claire only wet her bed occasionally and was responding to the alarm again. She had also lost some weight. Ellen also took Claire to a paediatric neurologist. No Tofranil was prescribed (reasons not known), but he suggested that Ellen grant her daughter responsibility since she was doing too much for her. He suggested that Ellen give Claire a little puppy to instill in her a sense of responsibility. This seemed to have a positive reinforcing effect on her motivation not to wet her bed any longer.

7.4.9 Session 7. Claire came for the last time. She felt very proud of the fact that her problem was something of the past. Nonetheless, she had been warned that she could relapse into bedwetting and that the same treatment procedure would have to be repeated after a relapse.

Claire declared confidently that it would not be necessary and that she had tucked the alarm safely away in the back of her cupboard. She did not draw a person, as requested, but drew the cupboard and the alarm hidden in it, tucked far away. That was all that mattered. The sense of relief in putting the unpleasant past behind her was clearly visible in the picture she drew (next page).

Her relief was illustrated by the letter she wrote:

Claire's Letter



My Alarm

I dident know what to do. I always worried about it when I went to a friend or to someones elses house to sleep the night. I did not want any body to know about it and was not happy when my Aunties and Undes and family new about it. I was ashamed about it. And boy am Eglad its all over!!!!

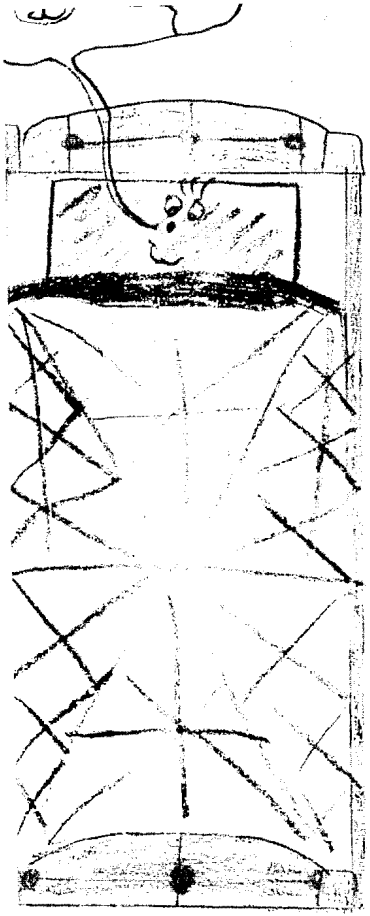
The letter reflected her feelings of helplessness when she could not hide her bedwetting problem. She was very worried what her family and friends would think of her problem. The burden of worrying about others' opinions of her was also raised in the Sentence Completion Test. Her relief was immense!

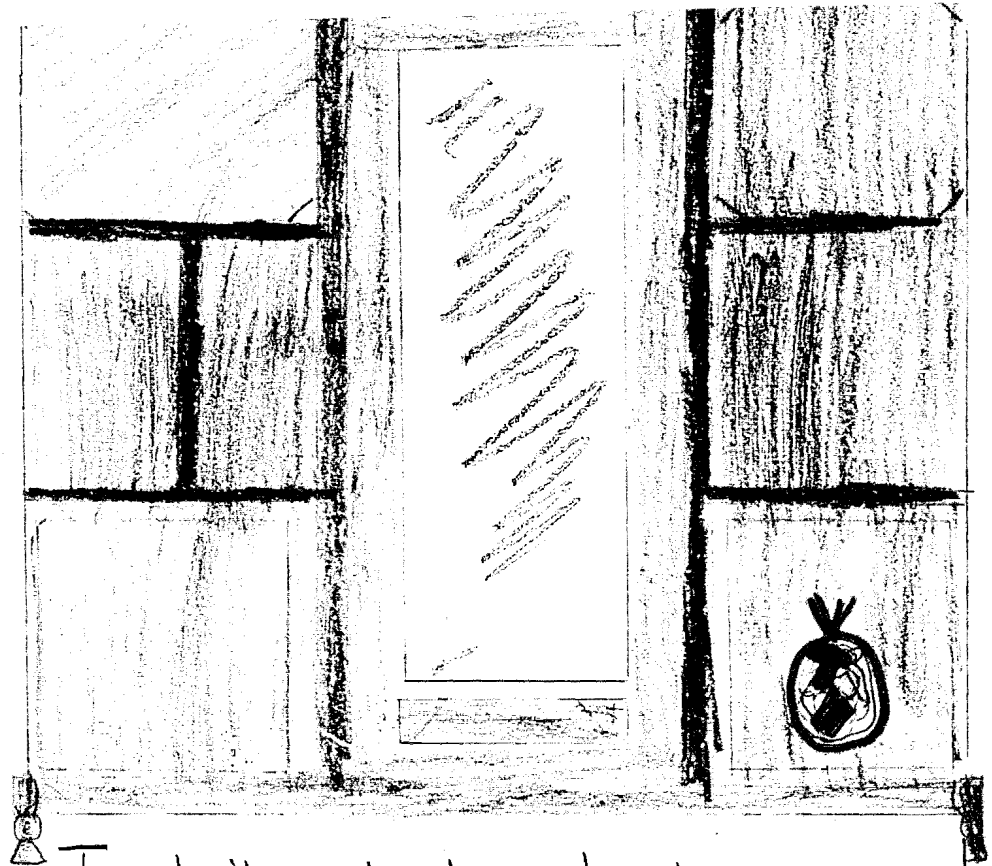
The DAP (Draw A Person). To demonstrate her relief, Claire drew a picture of herself. Her theme was "Waking up in a dry bed" . Claire drew herself while lying in bed with the bedwetting alarm put far away in the cupboard. She had no need to think of bedwetting alarms any longer, instead she was dreaming of her cat and dog that she adored!

Her mother, Ellen completed questionnaire 2 and handed it over. She too, was relieved that her daughter's bedwetting was solved. A transcript of this questionnaire can be seen on pages 233 and 234.

On the opposite page:

Claire's drawing: Her theme was "waking up in a dry bed"





I don't think about my alarm

anymore

Questionnaire 2 (Transcript of Evaluation Form)

Your assistance is required in refining the alarm, the sensor pads as well as the instructions provided. Would you please be so kind as to complete this short questionnaire and return it to:

xxxxxxxxxxxxx[1] Tel:xxxxxxx[1]

Name of Child: Claire

COULD YOU EASILY UNDERSTAND THE WRITTEN INSTRUCTIONS PROVIDED?

NO: Please tell us where we should improve the instructions? Yes

IS THE LABELLING ON THE DEVICE EASILY UNDERSTOOD ?

NO: Suggestions please? Yes

DID THE XXXX[1] ALARM WORK AS DESCRIBED ?

NO: Details please? Yes

Date of first use: April 1996

Age of child: 10 years

Sex of child: Female

DID OR DOES YOUR CHILD SUFFER FROM ANY MEDICAL CONDITIONS RELATING TO BEDWETTING?

No	YES: Could you please give us more details?

1. The name and details removed for ethical reasons.

HOW DID YOUR CHILD REACT TO THE DEVICE - AT FIRST SIGHT ?

VERY POSITIVE	INTERESTED	RESERVED	ALARMED/ UNHAPPY

AFTER THE FIRST NIGHT ?

VERY POSITIVE	INTERESTED	RESERVED	ALARMED/ UNHAPPY

AFTER FIRST 7 DAYS ?

VERY POSITIVE	INTERESTED	RESERVED	ALARMED/ UNHAPPY

HOW MANY DAYS DID IT TAKE YOUR CHILD TO DEVELOP FULL AND PROPER BLADDER CONTROL SINCE THE ALARM USE?

3 months

LAST DATE THE XXXXXXX ALARM WAS USED :

June 1996

Any comments or suggestions?

Family support outside immediate family, with interest (e.g. Aunt) and encouragement.

Karen (14)

7.5.1 Introduction:

Karen, a 14 year old girl, was referred by a doctor who was treating her for secondary enuresis. When her parents expressed their wish to use something other than medication, he suggested the use of the bedwetting alarm.

If Karen had a choice, she would have preferred not to use the alarm. Her mother had, however, lost patience with her bedwetting and was determined to try it. She also had to deal with Karen's emotional and social problems, which probably resulted from her enuresis. The questionnaire, as attached in the addendum, supplied the information summarized in 7.5.2.

7.5.2 Session 1: Background information - Birth History.

At the first visit, Karen's mother Anne, completed the questionnaire 1(in Afrikaans), providing the historical data of her daughter Karen. A transcript of the completed form is included on the next 3 pages.

The questionnaire provided the following information:
After experiencing difficulty to fall pregnant for 2 years, Anne was delighted at the news that she was expecting a baby. Pregnancy was not easy and Anne nearly miscarried twice. Labour lasted 12 hours and Karen was delivered blue due to a shortage of oxygen and slightly jaundiced.

Karen weighed 4 kilograms and slept through at the age of two and a half years.

VRAELYS 1

KIND SE BESONDERHEDE

NAAM: *Karen* TOETSDATUM: *Desember 1995*
ADRES: TEL: (H) (W)
SKOOL:: *Hoërskool* X STANDERD: *7*
GEBOORTEDATUM: OUDERDOM: *14*

HUISLIKE OMSTANDIGHEDE

OUERS: VADER *Jan* BEROEP: *Besigheidsman*
MOEDER: *Anne* BEROEP: *Bankteller (half dag)*
HUWELIKSTAAT:
EERSTE HUWELIK:..... GESKEI:..... ENKEL: .....
KINDERS: 1. *Karen* OUDERDOM: *14*
2. *Annemarie* OUDERDOM: 12
3. *Pieter* OUDERDOM: 7

EIE OF AANGENOME KINDERS: *Eie*
KIND SE SKOLASTIESE VORDERING: *Goed*
BUITESKOOLSE AKTIWITEITE: *Sport: netbal. Christelike jeuggroep.*

GEBOORTE - AGTERGRONDSINLIGTING (ONDERSTREEP WAAR NODIG)
SWANGERSKAP: GEBRUIK VAN VERDOWINGSMIDDELS / EMOSIONELE SPANNING / BABA WELKOM / NIE WELKOM

ENIGE SIEKTES GEDURENDE DIE SWANGERSKAP?
Tydens swangerskap - 2 keer gedreig om af te kom. Geboorte te lank. Suurstoftekort..blou baba. Geen drukpyne ondervind.

BABAJARE:
VOEDINGSPROBLEME: *Geen*
SLAAPPATROON: *Goed*
ENIGE KOPBESERINGS *Geen*

ENIGE ANDER TRAUMATIESE GEBEURE? *Op drie jaar het 'n hartspesialis 'n kamera in haar lies geplaas weens 'n moontlike hartdefek. Ons was nie by in die teater nie, maar die dokter het baie vertroue ingeboesem en sy is gek na hom. Daar was toe geen groot probleem met haar hart nie. Ons het al van die probleem vergeet.*

MYLPALE EN FISIESE ONTWIKKELING:
GEBOORTEGEWIG: *8 lb en 13 onse* BORS-OF BOTTELVOEDING?
BEGIN SIT: *5/6 maande* BEGIN KRUIP: *7 maande*
BEGIN LOOP: *11 maande* BEGIN PRAAT: *eerste woorde op plus minus 1 jaar*

SIEKTES: Onderstreep waarvan toepassing
Herhaalde blaasinfeksies / behoefte om dikwels toilet te besoek / pynlike blaaslediging/ inkontinensie gedurende die dag / hardlywigheid / enkoprese (ontlasting per ongeluk gedurende dag of nag) / drink van baie vloeistowwe, soos koffie, tee. *Geen*

Enige ander verwante mediese toestande?
Karen kry as tiener baie karkatjies. Die afgelope maande drie maal.
Oorontstekings: Het as baba, veral gedurende tandekry stadium dikwels oorpyn gekry. Sy het haar eerste tande op die ouderdom van 3 maande gekry.

ALGEMEEN:

1. Beskryf die tipiese reaksie van die volgende persone op u kind se probleem

Pa:	*Bekommerd*	Ma: *Angstig en krities*
Broer/s:	*Te jonk om daarop te reageer*	
Suster/s	*Haar sussie terg haar*	
Grootouers:	-	
Vriende:	*My vriendin is aanvaardend, warm. Haar eie maats weet nie hiervan nie.*	
Onderwyseres:	*Weet niks*	
Ander:	-	

2. Hoe beïnvloed u kind se probleem die volgende aspekte?

Daaglikse roetine:	*Glad nie.*
Skool:	*Geen noemenswaardige verskil nie.*
Sosiale aktiwiteite:	*Geen verskil nie. Karen neem oral deel waar sy kan.*
Vriende:	*Geen probleme hier nie.*

3. Huislike omstandighede

Leef iemand anders ook in die huis behalwe die gesinslede?	*Nee*
Het enige ouer se werksomstandighede verander?	*Nee*
Enige huislike veranderinge?	*Nee*

4. U kind se gemoedstoestand oor hierdie probleem

Hoe evalueer u die kind se huidige emosionele toestand? Onderstreep die toepaslike asb.

1. Baie goed (baie vrolik, samewerkend, positief)
2. Goed
3. <u>Gemiddeld</u>
4. Swak
5. Baie swak (baie neerslagtig, onbehulpsaam, negatief)

Hoe evalueer u die kind se motivering en deursettingsvermoë?

1. Baie swak 2. Swak 3. Gemiddeld 4. Baie goed

Hoe evalueer u die kind se onafhanklikheid?

1. Baie swak 2. Swak 3. Gemiddeld 4. Baie goed

Hoe evalueer u die kind se emosionele stabiliteit?

1. Baie swak 2. Swak 3. Gemiddeld 4. Baie goed

Hoe evalueer u die kind se entoesiasme in die algemeen?

1. Baie swak 2. Swak 3. Gemiddeld 4. Baie goed

Hoe evalueer u die kind se taakgeoriënteerdheid en verantwoordelikheidsin?

1. Baie swak 2. Swak 3. Gemiddeld 4. Baie goed

Hoe evalueer u die kind se waaghouding in nuwe situasies?

1. Baie swak 2. Swak 3. Gemiddeld 4. Baie goed

Hoe beskryf u die kind se houding teenoor die probleem?

1. Baie swak 2. Swak 3. Gemiddeld *Kan beter!* 4. Baie goed

Hoe evalueer u die kind se samewerking ten opsigte van haar probleem?

1. Baie swak 2. Swak 3. Gemiddeld *Kan beter!* 4. Baie goed

Wat het u aan die problem sover gedoen?

Medikasie

Motivering, straf, saans minder vloeistowwe drink.

Dankie dat u die vorm ingevul het.

Physical development and milestones. Karen's childhood development and milestones were normal. She said her first words at one year of age, was potty-trained at 14/15 months and stayed dry at night. Her mother emphasised that Karen appeared mature enough toilet training. She copied everybody else's behaviour at home and fully understood what being dry was all about. Occasionally during her childhood years, she wet her bed.

Emotional development. Karen was a highly sensitive girl, quiet and shy, but well-balanced, friendly and polite. At school, she became very upset if she was not selected for the school team or choir in spite of all her efforts. Yet she had a few good friends with whom she got on well.

In spite of her shyness and embarrassment about her problem, Karen was described by her mother as a motivated, independent, stable and conscientious girl. She rated her daughter's self-confidence as low, especially in new circumstances and situations, but was unsure how much could be contributed to her problem. However, Karen's co-operation regarding her bedwetting problem was rated as good.

Scholastic development. Karen was an average achiever in primary school. In high school her marks improved and was proud of her achievements. Karen studied hard in order to do well. She was very concerned about her selection of subjects in std 6. This problem was addressed when she had to complete a SAT (aptitude test) and 19 VBV (Interest questionnaire). The discussion of the results lessened her concern and she knew that with the exception of one subject, her

subject choices were correct. As this information had no direct impact on or relation to Karen's bedwetting, it was not included in this research.

7.5.2.1 Karen's bedwetting from the mother's point of view.

Anne regarded Karen as an emotionally balanced, independent and goal-oriented girl. Her only setback seemed to be her lack of confidence to confront new challenges. Her bedwetting problem had a negative effect on her self-esteem and she needed help.

According to Anne, the bedwetting problem seemed to be familial. Her husband had also wet his bed as a young boy. To aggravate his problem, the toilet was situated outside. Getting up at night in the dark could be quite frightening for a young child and wetting the bed was a safer option.

At the age of 12, Karen started to wet her bed infrequently and for no apparent reason. Her mother had no idea what caused her bedwetting. At that point in time, her daughter experienced a stressful time at school due to unsuccessful attempts to be selected for the school's netball team and choir. Karen often came home crying. Her mother was saddened by these events, but could only try to console her daughter. In retrospect, Anne attributed her daughter's bedwetting to the frustrating and disappointing events at school, but could not be certain that these circumstances caused her to regress.

The bedwetting worsened until Karen wet her bed at least once a night. Anne did everything a mother could do. She cut down on Karen's fluids, rewarded her for dry nights, scolded her the following morning and even ignored the matter, hoping that this temporary problem would disappear. Unfortunately it did not and Anne wondered if the problem lay with her as a mother. She noticed that Karen was a very deep sleeper and attributed the bedwetting to her inability to wake herself when she had a full bladder.

In due course it became necessary to take more drastic action and obtain outside help. Karen was taken to an educational psychologist who applied hypnosis to treat the root of the problem, namely her lack of self-esteem. According to Karen's mother, this treatment improved Karen's self-image. But instead of experiencing the joy and relief of a dry bed, Anne had to deal with what she described it as a cocky daughter.

The next step was to take Karen to their general practitioner. He referred them to a urologist who recommended tests and X-rays. It was found that Karen had a thicker bladder wall than other children of her age. No operation was performed, but Tryptanol was prescribed.

However, even after taking Tryptanol, she was still wetting her bed and again consulted the family doctor. He then prescribed a higher dose of Tryptanol (25 mg.), to be taken at night. This had no effect on the bedwetting and the dose was doubled to an evening dose of 50

mg, with Ditropan added. This was successful, but the medication had an adverse effect on Karen. According to her parents, Karen started to suffer from side-effects shortly after starting the medication. The symptoms noted were dizziness, irritability, tearfulness and temper tantrums. To add to the problem, she also started to suffer from night terror attacks and a lack of orientation on waking. This was uncharacteristic of her and the medication was discontinued.

Coincidently their doctor was shown the bedwetting alarm at this time. He found the device to be practical and effective and he considered advising the family to use it, as both parents had become anxious and critical about Karen's condition.

7.5.2.2 Bedwetting from Karen's point of view. During the first interview it became apparent that Karen was very embarrassed about her bedwetting. She was not keen to talk about it.

Naturally shy and quiet, she became increasingly reserved about her problem and her mother provided most of the information.

Karen was receiving medical treatment for nocturnal enuresis (secondary) at the time of this study. As she was 14 years old, she was desperate to solve her bedwetting problem. The problem had become embarrassing and annoying to her as well as her family. Karen was particularly perturbed about sleeping over at her friends' houses, since the risk of bedwetting was high. Her 12 year old sister also teased her about her bedwetting. Although Karen related well to her friends, she

was tense and reserved about her bedwetting and the possibility of others discovering this information. Her self-esteem was poor and Karen was painfully shy. It concerned her mother greatly.

Therefore the EPI was chosen to evaluate the level of anxiety, introversion and shyness which could possibly be leading to enuresis.

Results of the measuring instruments:

The EPI (Emotions Profile Indexes). The finding of the EPI was consistent with her mother's and Karen's observations:

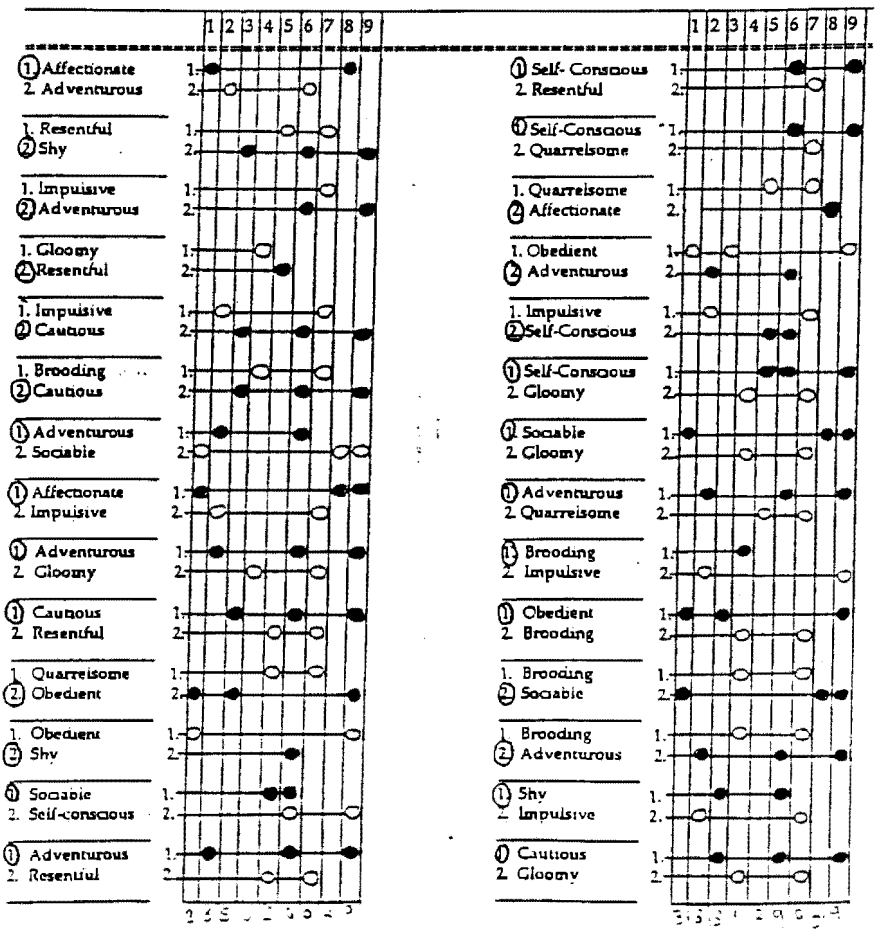
The EPI revealed that Karen was probably a very cautious, controlled and introspective person with a very strong sense of duty and good perseverance. These character traits could be very valuable to her in her school and working environment, but placed her under a lot of pressure. Karen scored high on self-control and caution, but very low on aggression. This could be indicative of an internal locus of control and the inability to externally release her tension and stress. The low aggression score showed that Karen was possibly not assertive enough. These factors may have led to anxiety and the resulting bedwetting problems. It could not be ascertained whether these personality traits played any role in bedwetting at all. If these personality traits were the cause of bedwetting, why did the problem only appear when she was 12?

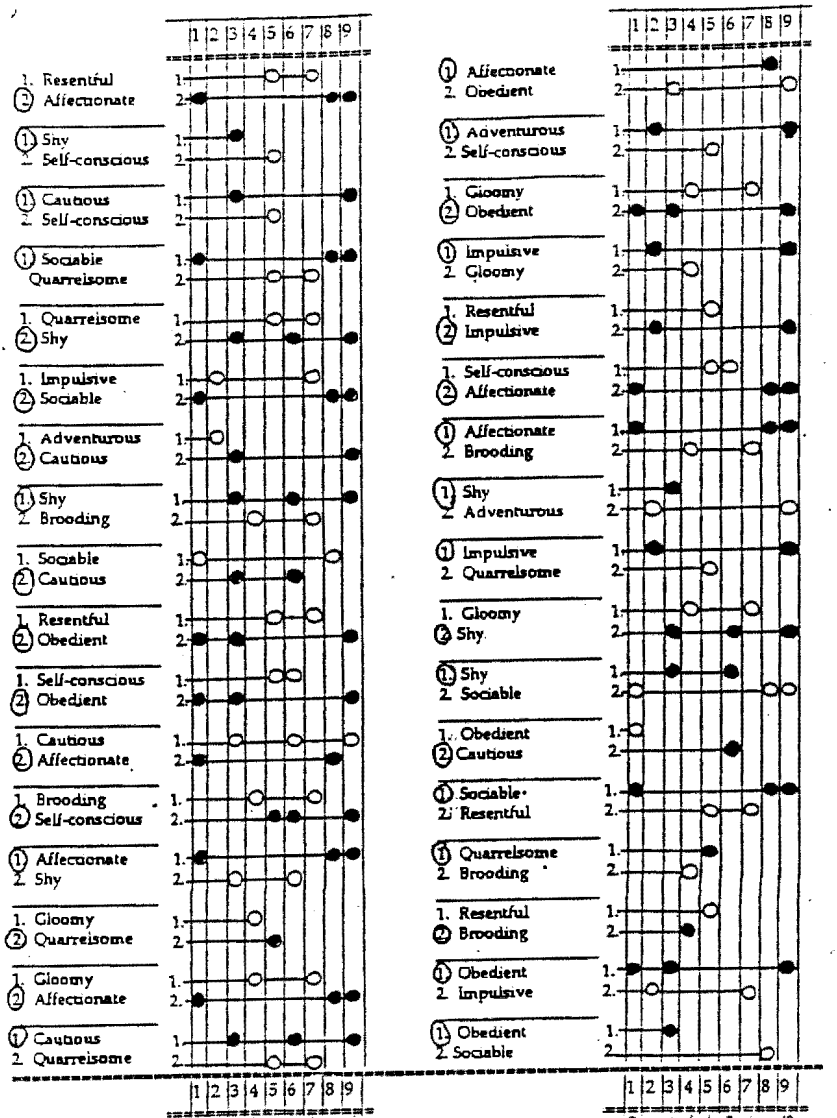
The next three pages show the EPI test and results:

EPI

Definitions;

Adventurous:	Someone who often tries new activities for excitement.
Affectionate:	Someone who often shows his warmth and love for others.
Brooding:	Someone who silently stews with anger and keeps it to himself.
Cautious:	Someone who is usually careful because he is afraid of what might happen to him.
Gloomy:	Someone who mopes around and feels in a sad and dark kind of mood.
Impulsive:	Someone who usually acts on the spur of the moment because of an urge, without thinking of the consequences.
Obedient:	Someone who will usually do what he is told without objecting.
Quarrelsome:	Someone who often starts an argument.
Resentful:	Someone who walks around with a "chip on his shoulder" and is easily made angry.
Self-conscious:	Someone who usually worries about other people's opion of him when he is with them.
Shy:	Someone who usually feels timid with other people and in new situations.
Sociable:	Someone who is friendly and who usually likes to be with other people.





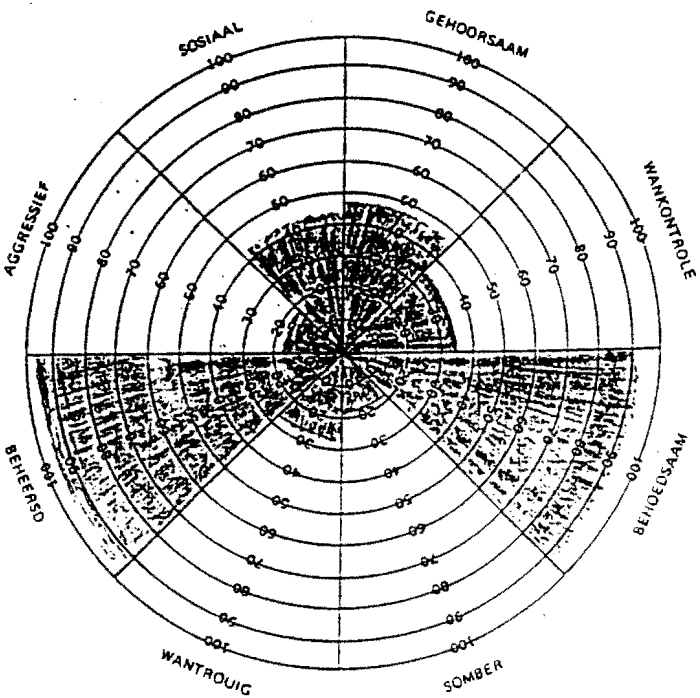
	Column 1-Tr	Column 2-Dv	Column 3-Ti	Column 4-De	Column 5-Di	Column 6-Co	Col. 7-Ag	Col. 8-Gr	Col. 9-Bi
Raw Score	19	10	23	2	7	37	0	15	41

THANK YOU FILLING IN THIS FORM

EPI

Naam	Karen
Datum	9 Des. 1995
Ouderdom	14 Geslag Vr.
Huwelikstaat	/
Huidige opvoedkundige peil	Sm 6
Beroep	Skolier
Kommentaar	
	/

DIMENSIES	RUU PUNT	PERSENTIEL
1 - Gehoorsaam	19	46
2 - Wankontrole	10	35
3 - Behoedsaam	23	95
4 - Somber	2	18
5 - Wantrouig	7	28
6 - Beheersd	27	96
7 - Aggressief	0	7
8 - Sosiaal	15	42
9 - Vooroordeel	41	80



The Incomplete Sentence Test: As the EPI was a structured test that did not reveal Karen's personal feelings about her bedwetting, the **Incomplete Sentence Test** was administered to address the bedwetting problem directly. These methods encouraged Karen to express her feelings about her problem.

As expected, Karen's answers revealed how she felt about the bedwetting:

1. I like ***drawing, music and TV.***
2. My happiest moment ***was when I received my first bike.***
3. I feel ***happy at the moment.***
4. In the evenings, ***I read in my bed!!***
5. Even my best friend ***does not know about my bedwetting.***
6. I would like ***to stop bedwetting.***
7. One day, if I can afford it, ***I would like to go to America or an island.***
8. My friends know ***nothing about my secret!***
9. I regret ***that I didn't learn so hard for my exam.***
11. The best feeling ***is when I wake up and my bed is dry.***
12. People who do not understand me ***make me angry!!***
13. I get angry ***when my mother doesn't allow me to do something.***
14. A mother is ***valuable to me!!***
15. My biggest fear ***is to go on the "looping star"***
16. I could never ***understand why I wet my bed.***
17. I am disgusted ***to wake up and find that my bed is wet.***
18. When I was a child ***I was naughty.***
19. I suffer ***from bedwetting.***
20. I will never forget ***when I was on the "Logs" at Gold Reef City.***
21. My nerves ***are frayed when my sister becomes so reckless.***
22. My biggest worry ***is that I will die prematurely.***
23. My thoughts ***are what I will do next.***
24. The future ***is vague!***
25. I can't wait ***for my birthday.***
26. Sometimes ***I wonder how God could have been on Earth before us!***
27. People who don't like me, ***I also do not like.***

28. I have no time to ***read, it is often boring.***
29. I feel like ***getting a Bomber Jacket.***
30. I enjoy ***shopping, even only window shopping.***
31. I hate ***to fight/to come late.***
32. I am very ***quiet, I do not talk much.!!***
33. My biggest obstacle ***is that I do not know how to solve my problems.***
34. I wish ***I have never wet my bed.***
35. My father ***is important.***
36. Secretly I ***have lied that my bed was dry and not wet.***
37. Most girls ***are my friends!***
38. I have decided ***that I must stop to wet my bed.***
39. Sometimes ***I imagine that I am mature enough to make my own decisions.***
40. There is nothing that could upset me so much, ***than seeing somebody dying.***
41. To my regret ***I have done poorly in my exam.***
42. Most boys ***are childish, but not all.***
43. My biggest shortcoming ***is my shyness.***
44. I strive ***to be successful in everything.***
45. My biggest wish ***is to get a good job one day.***

This semi-structured test revealed Karen's sincere and honest feelings about her bedwetting problem. Her shyness seemed to be a bigger stumbling block than the bedwetting problem. The major part of the discussion focussed on her shyness and how to deal with it. Gradually, Karen opened up with relief at the opportunity to speak freely about the topic she had been avoiding. In spite of her apparent shyness, Karen came across as a quiet, stable teenager. She revealed great insight into her problems, her shortcomings and her strong points.

All factors playing a role in Karen's problem were noted on the checklist for later use:

The Checklist: Karen

Physical and organic problems:
Frequent urination during the day
Pain when voiding
Constipation
Did anyone cause you to have pain in your genital area?
Did you see the doctor about your bedwetting problem?
Frequent urination at night
Pain or discomfort in abdomen

Emotional problems related to bedwetting, e.g.:
excessive anxiety
excessive shyness
tearfulness
escapism into indulging habits
does fear make you want to wet yourself?
anyone making child uncomfortable or scared?
high expectations
lack of self-confidence
withdrawal from difficult tasks
"thick skinned" behaviour

Familial problems:
criticism from parent(s) and siblings
too much pressure on the child (by parents or the child herself)
punishment and humiliation from parents and siblings
rebellion against parent(s)
fighting amongst siblings because of teasing
secretive behaviour due to bedwetting, e.g. hiding sheets and wet bedclothes
signs of sexual or verbal abuse by a parent, family member or someone else

Environmental circumstances:
does the child sleep in own room
adequate lighting in the room at night
toilet or potty in the house
(poor families without adequate housing do not have indoor toilets)

Social problems
not mixing with friends
not bringing friends home
avoiding certain people who could possibly know about the bedwetting problem
feeling very guilty amongst friends
not allowing anyone in her room

Scholastic problems
declining school performance
avoiding school activities
inattentiveness
shyness at school

The checklist above indicated that there were no relevant physical or organic problems. There were no visible indications of any scholastic, social or environmental difficulties. It was possible that Karen set high standards on herself, especially on an academic level. At home Karen was teased by her sister for wetting the bed and rightfully reprimanded by her parents for wetting her bed. Solving her bedwetting problem added to Karen feeling pressurized additionally. She felt embarrassed and a joint decision was made to introduce the alarm. Karen agreed.

7.5.3 **Baseline:** No baseline was used since Karen wet her bed every night.

7.5.4 **Session 2: Introducing the alarm.** At this stage it was decided to introduce the alarm without delay. Karen was not very enthusiastic at the idea of using the alarm. However, she agreed to the request as a step in perhaps overcoming her bedwetting problem.

The alarm was demonstrated and the programme explained to Karen and her mother. They found the directions and guidelines clear and easy to apply. During the first week, the bedwetting alarm went off twice a night. Karen woke up before she wet her bed and went to the toilet. During the second week the alarm went off less often. Gradually, the frequency of bedwetting decreased, until it stopped two months after the introduction of the alarm. After the required dry period the use of the alarm was discontinued. The family was warned that a relapse could occur.

7.5.5 Session 3: Follow-up. Two months later, Karen returned as she was again wetting her bed. She was still somewhat reluctant about discussing her bedwetting. Karen drank a lot of coffee after supper. This factor could have contributed to the alarm ringing at 11 'o clock and again early in the morning. It was harder to wake and get up the second time and this was when Karen failed to respond properly. She emphasized though that the alarm worked properly. Since caffeine had a diuretic effect, she was advised to avoid any caffeine drinks.

7.5.6 Session 4. Anne called. She was very annoyed and said that Karen stopped using the alarm any more and often wet her bed. Anne was tiring of washing Karen's sheets. Her reason for doing the washing was that Karen had to go to school. Moreover, one of her friends could come into the room and notice the smell.

Both parents were very angry and resentful. In spite of their efforts, Karen rejected the only method that worked. She was not co-operating and her mother was still washing the wet bed linen every morning. Karen had a dry, comfortable bed to sleep in at night.

Karen's father wanted to forbid her to go to the school dance as punishment. The researcher advised that she be allowed to go, as the dance was not relevant to the bedwetting problem at all. She should rather suffer from the direct consequences of her bedwetting. Consequently Anne was advised not to wash Karen's bed linen any longer and to allow her to choose for herself: use the alarm or face the consequences. Karen probably did not realise the far-reaching effects of wet linen and a smelly room. The following morning her bed was wet yet again. Her mother did not change the sheets.

It was reported that Karen forgot about her room and invited a friend over that afternoon. Both girls sat down on the bed. Much to Karen's embarrassment, the plastic sheeting under the sheets made an awkward sound. Karen's friend insisted on being told what it was. Much to Karen's relief, her younger sister came to the rescue with the quick explanation, that it was only a standard protective sheeting fitted around the mattress. The afternoon's shock was enough to motivate Karen into action.

Needless to say, she used the alarm for the next two night. It never went off. Karen was dry again! The use of the alarm was discontinued. The bedwetting has stopped completely without any further relapses.

Like Claire, the successful approach was to allow Karen the choice of using the alarm or washing all her bedding before school. Karen chose to use the alarm.

Karen was very relieved that she no longer wet her bed. She was also grateful for the help she had received.

The following letter speaks for itself:

Liewe Lizaan

Hello my niggie! Hoe gaan dit nog met jou en almal tuis? Met my gaan dit nou baie baie goed en dit kan nie beter met my gaan nie!

Jy wonder seker hoetom dit so goed met my gaan, dis alles te danke aan 'n "klein wonderwerkie"! Jy weet mos van my "probleempie", wel dit is iets van die verlede Ek het geen kommernisse nie! Maar laat ek jou meer van die wonderwerk vertel! Dit kan jou lewe ook lekkerder maak.

Toe my pa een aand by die huis aankom, het my pa my alles van die "Dry-by-Night" alarm vertel, ek was verstom maar wou dit nie glo nie! Ek het gedink hoe kan so masjientjie my van my probleem genees? En sê nou maar net hy skok my? Ek het toe gesê ek sal hom probeer, dit sal my nie dood maak nie!

Die eerste paar aande was aaklig en ek wou nie meer die masjien dra nie! Maar ek het onthou dat my ma en pa ongelukkig was as ek my bed natgemaak het en dat ek ook ongelukkig en geïrriteerd gevoel het! Ek moes net oprou! Maar die probleem was altyd dat ek nie geweet het as ek die bed natgemaak het nie.

Na amtient 'n weet was ek tonne beter! My probleem was uiteindelik iets van die verlede, Dit was die beste ding wat nog ooit met my gebeur het. My ouers was baie gelukkig en ek was baie trots op myself

En dit was nie eers so moeilik nie, die masjientjie het 'n lap t-vormige strokie, wat jy aansit! dit is verbind met 'n masjientjie wat 'n verstrikkie geraas maak as daar net 'n druppel op kom en glo my jy sal glad nie aanhou slaap as daai alarm afgaan nie! Jy gaan dan badkamer toe en maak jou blaas leeg, dan sit jy 'n nuwe strokie aan en sit die masjientjie aan! Maklik nê?

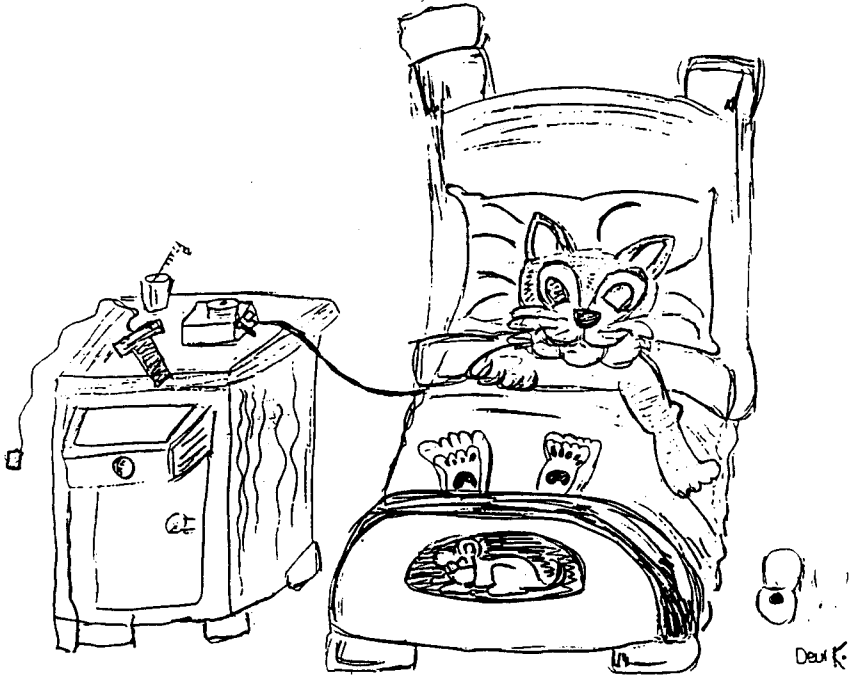
Toe na 'n paar dae het die tannie wat my hiermee help 'n persoonlikheidstoets met my gedaen en gevra of ek sal help met 'n Tesus wat sy moet doen! Ek het ingestem!

As jy die wonderwerkie gebruik sal jy ook beter voel Vra jou ma om ook vir jou een te kry dan is jy ook ontslae van jou aktiige "probleampie"

Met liefde
Jou niggie
Kalen.

When discussing the letter, it came as a surprise to hear about Karen's anxiety about using the alarm. She had never raised the fear that it could shock her. Karen told how her father had taken great pains to explain to her exactly how it functioned. Reassured that the alarm could not shock her, Karen agreed to use it. For fun, she drew a picture of a cat using the alarm:

"The cat using the alarm"



After discontinuation of the alarm and achieving dryness at night, Karen became more confident, relaxed and contented with her life. Her parents agreed that their daughter's emotional outbursts and general unhappiness had come to an end and family stability had returned. Anne completed questionnaire 2, as shown below. A year later, Karen has remained dry, although she wet her bed on two separate occasions.

Her mother completed questionnaire 2 on request which is on the following two pages.

The questionnaire provided the necessary answers, although no further recommendations were added. It indicated that the family was satisfied with the alarm.

Questionnaire 2 (Transcript of Evaluation Form)

Your assistance is required in refining the alarm, the sensor pads as well as the instructions provided. Would you please be so kind as to complete this short questionnaire and return it to:

xxxxxxxxxxxxx' Tel:xxxxxxx'

Name of Child: Karen

COULD YOU EASILY UNDERSTAND THE WRITTEN INSTRUCTIONS PROVIDED?

NO: Please tell us where we should improve the instructions? Ja

IS THE LABELLING ON THE DEVICE EASILY UNDERSTOOD ?

NO: Suggestions please? Ja

DID THE XXXX[1] ALARM WORK AS DESCRIBED ?

NO: Details please? Ja

Date of first use: Oktober 1995

Age of child: 14 jaar

Sex of child: Vroulik

DID OR DOES YOUR CHILD SUFFER FROM ANY MEDICAL CONDITIONS RELATING TO BEDWETTING?

Nee	YES: Could you please give us more details?

1. The name and details removed for ethical reasons

HOW DID YOUR CHILD REACT TO THE DEVICE - AT FIRST SIGHT ?

VERY POSITIVE	INTERESTED	RESERVED	ALARMED/ UNHAPPY

Karen het gedink dat die alarm haar sou kon skok, maar haar pa het dit weer verduidelik.

AFTER THE FIRST NIGHT ?

VERY POSITIVE	INTERESTED	RESERVED	ALARMED/ UNHAPPY

AFTER THE FIRST 7 DAYS ?

VERY POSITIVE	INTERESTED	RESERVED	ALARMED/ UNHAPPY

Na 'n paar weke wou Karen die alarm nie meer gebruik nie, wou daarsonder klaar kom.

HOW MANY DAYS DID IT TAKE YOUR CHILD TO DEVELOP FULL AND PROPER BLADDER CONTROL SINCE ALARM USE?

Na 1 maand

Karen het egter na 'n maand weer bed natgemaak. Sy was ten volle droog gedurende Februarie 1996.

LAST DATE THE XXXXXXXX ALARM WAS USED :

Februarie 1996

Any comments or suggestions?

Ons is baie tevrede met die alarm, dit het gewerk.

7.6 **Conclusion.** The aim of this research was to observe the effectiveness of the urine alarm, with or without supportive therapy and treatment. Information regarding clients who obtained the alarm at the pharmacies and solved their problem independently and with as little help as possible was gathered from questionnaire 2, from feedback through the pharmacists and from personal contact with the clients themselves.

Clients who needed counselling as well as guidance provided valuable information through interviews, questionnaire 2, tests such as the EPI, the Sentence Completion Test, letters and drawings. The checklist was used during interviews to obtain an overall view of the emotional, social, familial and physical manifestations of enuresis. These manifestations together with the families' needs determined the course of treatment and tests used.

The outcome of these findings determined whether the 4 hypotheses could be accepted or not. The outcome also determined the course of future treatment methods.

In the last Chapter the findings and observations from literature research as well as this research study will be discussed. The conclusions made from these findings could serve as guidelines for future research.

CHAPTER 8

SUMMARY, EVALUATION, CONCLUSION AND GUIDELINES FOR FURTHER RESEARCH

8.1 INTRODUCTION

The aim and problem of this research was formulated in chapter one. Enuresis was shown to have many causes and as many methods of treatment. In chapter two the possible causes and reasons for bedwetting were investigated. In chapter three the various methods of treatment were described. They ranged from harsh ways of treating enuretic children to sophisticated and user friendly methods.

Chapter four described the development of electronic alarms and explained why and how the modern alarm was used. Since 1904 each new alarm showed improvements on previous designs. These improvements aimed at providing a more practical and effective bedwetting alarm.

Chapter five provided details of the locally manufactured bedwetting alarm, which was designed and built to compensate for the absence of bedwetting alarms in the country at that time. In the design of this device, an effort was made to keep down the cost while adding a number of new features to make it more user-friendly and effective. in an effort to reduce the professional intervention required. In an effort to reduce the professional intervention required, the package contained the alarm,

control unit, sensor pads, user instructions, a short story and parental guidelines.

This alarm package was made available to two pharmacies and also shown to a number of doctors in the local area.

The method of using the alarm, with or without additional guidance and counselling was described in chapter six. The application of the research method on thirteen bedwetting children was discussed in chapter seven. Ten of the thirteen were able to use the alarm unassisted.

8.2 LITERATURE FINDINGS

Many views have been expressed in the literature. Although the knowledge base has significantly expanded in the last ninety years, there is still no clear, definitive answer to the question as to why some children older than five continue to wet their beds.

Literature provides many treatment methods, ranging from treating the underlying causes of bedwetting (the psychodynamic approach) to treating the symptoms only (the behavioural and pharma-medical approaches).

As far as the environmental causes of enuresis are concerned, it is not known why some children who have to cope with the same stresses as the enuretic child remain unaffected by enuresis. The answer could lie in certain clusters of stresses which precipitate bedwetting and in turn make treatment more difficult. Treatment methods are as varied as the causes.

Recent research has identified ADH components that may indicate a hormonal deficiency which results in bedwetting. This finding is however not conclusive at this stage since it was reported that the cure lasted only as long as complementary hormone therapy was administered. High relapse rates were reported when therapy was discontinued (3.3.2.1c). The successful use of hormone therapy was quoted in American, Australian, and European Journals, but little was known about it in South Africa at the time of this research. With the help of the pharmacist, a South African company called Akromed was contacted to enquire about the use of desmopressin in South Africa. At that time the company was already preparing to launch this product of which the trade name was not available. The price for a monthly treatment was estimated to be about R340.00.

As far as genetic research is concerned (2.5.2.14), the general site of a gene believed to cause bedwetting has been identified. If the genetic theory proves to be valid, it would explain the higher occurrence of enuresis in certain families. This knowledge may alleviate much of the parental blame and the child's embarrassment about bedwetting. Researchers cautioned that there is no certainty that the bedwetting problem is entirely genetic or that more than one gene is involved (2.5.2.14). Research is continuing, but no cure has been found at this stage.

Literature has also shown that the treatment of enuresis can be very successful when applying conditioning methods like the Kimmel and Kimmel method and the drybed training (3.3.3.3a-c). The drybed

training method is, however, very time-consuming and impractical, as most parents would find it almost impossible to apply drybed training throughout the night until bedwetting has ceased. Wagner & Johnson (1988:688) indicated that behavioural conditioning in conjunction with an alarm required considerable effort and patience for both parent and child.

Lovibond stated that the conditioning principle in alarm training was not the real issue. He reasoned that the aversive conditioning principle was more appropriate during alarm treatment. The child tried to avoid being woken up by the alarm's ringing and was conditioned to wake up before the bedwetting alarm went off. Waking up was coupled with the sensation of a distended bladder. Treatment based on the aversive conditioning principle was highly effective (3.3.3.2).

Literature provided information on the development and use of bedwetting alarms in Australia, America and European countries. Many clinics treating clients with bedwetting alarms had long waiting lists. In contrast to South Africa it appeared that there existed an openness amongst professionals and parents about bedwetting in these countries. The bedwetting alarm seemed to be a popular method for treating enuresis. Support groups and societies provided parents with assistance and information, for example the National Enuresis Society (NES Internet 1:1).

Literature has shown that very long-term alarm treatment programmes were not too successful (3.2.3). This prompted the researcher to develop

an alarm that could be used successfully without professional assistance. where possible. Therefore the alarm was supplied with user guidelines, general parental guidelines, a bedtime story about a bedwetting ghost and referral guidelines in case referral became necessary.

Arguments still abound the issue of whether it is wiser to treat the symptoms or the underlying condition first (1.3.2.1). It is believed that combinations of the various treatment methods will satisfy most client's needs.

8.3 FINDINGS FROM THE RESEARCH

Twenty-five alarm units were supplied. Of these, no information was obtained from twelve of the users. These users were unknown to the pharmacists and did not return questionnaire 2 supplied with the package. Three clients required counselling while ten used the package without professional assistance.

The children and parents who needed counselling are tabled below:

Case	Client's	Reasons	Enuresis	Effective ness	Medical Aid
7.3.1	Peter (7)	Medication ineffective	Complete	Yes, pads replaced	Refunded
7.3.2	Claire (10)	Medication not effective	Complete	Yes, pads replaced	Refunded
7.3.3	Karen (14)	Medication not desired	Complete	Yes, pads replaced	Refunded

Children and parents who used the alarm package without professional assistance are tabled as follows:

Case	Client's	Reasons	Enuresis	Effectiveness	Medical Aid
7.2.1	Monica (7)	Medication not effective	Complete	Yes. One pad replaced	Yes
7.2.2	Elizabeth (13)	Medication not effective	No, did not wake up from bell/ no support from mother	Yes. Two pads replaced	Not applied
7.2.3	Rowena (12)	Medicine ineffective	No, did not use it...no tolerance from mother	Yes. One pad replaced	Not applied
7.2.4	Charles(7)	Unknown	Yes	Yes	Yes
7.2.5	Sam (7)	Unknown	Yes	Yes. Didn't wash pads properly	Not known
7.2.6	Tessa (7)	Medication not preferred	Yes	Yes	Not applied
7.2.6 7.2.7	Tessa (5) Greg (7)	Medication not preferred	Yes	Yes	Not applied
7.2.8	Andre (7)	Medication and bladder operation not successful	Yes	Yes, one pad replaced	Yes
7.2.9	Mary (10)	Medication not successful	Yes, avoiding alarm treatment!	NA	NA
7.2.10	Pieter (7)	Medication not desired	Yes	Yes	Yes

Conclusions from the above observations are:

Eight of the ten clients had used medication before the alarm, except for Greg and Tessa (7.2.6/7) whose granny equipped them with the alarm before their bedwetting problem became too serious.

The alarm succeeded in all the above cases except for the two older girls (7.2.2/3), who possibly may have improved with counselling.

Two children (7.2.2 and 7.4.2) had problems waking up at the sound of the alarm. They were advised to go to bed earlier and avoid being overly fatigued or to obtain medication to induce lighter sleep.

The aversive stimulus was seen to be very effective in cases 7.2.8 and 7.2.9 (Andre and Mary) as well as with the older girls (Claire, Karen and Rowena). The girls did not like using the alarm. They found it embarrassing and it interrupted their sleep. When they attempted to avoid the use of the alarm, their bedwetting ceased. This indicated that the alarm served as an aversive stimulus which sub-consciously motivated them to become dry.

It was observed that the gender distribution was similar. Of the thirteen cases, six were boys and seven were girls.

Seven children, one girl and six boys, were seven years old. This is the age group in which regular bedwetting normally becomes a source of concern to the parents.

The three children who received counselling provided more information:

- All three were deep sleepers and could not be woken easily by the alarm.
- They suffered from secondary enuresis.
- They had high self-expectations which created unnecessary anxiety. It was also found that all three children were very sensitive children and lacked sufficient self-confidence, possibly due to bedwetting, too much pressure, or other non-related reasons.
- The three children were very embarrassed and sensitive about their bedwetting. Peter, Claire and Karen explained feelings of anxiety and stress which affected their bedwetting behaviour. The effect of bedwetting on the pride of the child shows in the behaviours that accompanies this problem. Further research would be of great value to determine the relevance of stress and anxiety in many other bedwetting children.
- Both mothers denied pressurizing their children. Both were self-assured mothers who related very well to their children. They exercised strict and firm discipline and tolerated no nonsense except for taking too much responsibility for the child. They were unaware of this and continued to perceive their child's bedwetting problem as their parental responsibility and not the child's. One well-meaning error committed by both mothers was

that they did too much for their children and did not allow them to face the consequences of their bedwetting. Their children subconsciously had the feeling of losing control of their own situation. Their feelings of helplessness were aggravated by their continued bedwetting. In response to this they displayed acting out behaviour (as described in 3.3.1.1 on page 57). Through these actions the children controlled their mothers. It was only when the mothers were advised to change their reactions to the bedwetting and allowed the children to take full responsibility, that the children took control of their own situation. This approach was applied and it worked.

The source of Peter's bedwetting seemed to be his high level of anxiety. His mother observed an increased frequency in bedwetting on Sundays, when Peter felt very wary of going to school after the weekend. Peter did not like school much as he had learning difficulties.

It seemed as if the behavioural approach (including the alarm treatment) was successful with the three children (and their mothers) when their anxieties and problems were dealt with. This supports the psycho-dynamic view that underlying causes should be addressed. When anxiety plays such a large role in enuresis, the source of the anxiety should be determined and dealt with.

To conclude, working within the clients' frame of reference makes counselling easier and more successful. Whether the child wets her bed because of underlying anxiety, ineffective bladder control, stressful

situations or other reasons, such reasons are important to the client and should be addressed. The bedwetting alarm eases off the excessive anxiety and allows the clients to focus on addressing the bedwetting and related symptoms. If combined with medication, hypnosis and other forms of treatment it can be considered as most successful.

Although the alarm was only advertised at one doctor's consulting room and at the two pharmacies. The advert was unassuming and simply contained the story and a picture of Jasper the ghost. Nevertheless, quite a few enquiries were received. Most enquiries did not result in the client purchasing the alarm. Clients did not want to pay R250.00 in advance when the prescription drugs could be obtained from the chemist on medical aid with no advance payment required. Additionally, if they wanted to purchase the alarm, they had to return to their doctor for a letter to obtain a medical aid refund. The assumption was made that only those parents who had enough of the bedwetting problem were motivated to purchase the alarm. Using the alarm requires motivation and effort and it was concluded that clients consider medication an easier option to use. Most of the alarm purchasers were people who wanted a drug-free option or with whom medication had been unsuccessful (see the table on page 263 & 264).

Medical Aids Associations were prepared to refund the cost of the alarms on receipt of a letter of motivation from a doctor. Of the thirteen recorded cases, seven are known to have been refunded for the purchase of their alarms. The only difficulty experienced with the alarm device was that the thin hairlike wires could break during use. Consequently some

pads had to replaced. Each fault was investigated and improvements introduced. The later improved version of the pads even survived frequent cycles in the washing machine (destructive testing introduced).

8.4 ACCEPTANCE OR REJECTION OF THE FOUR HYPOTHESES

8.4.1 Hypothesis 1

The bedwetting alarm is functional and effective;

In all the cases, with the exception of the older girls Rowena and Elizabeth (7.2.2/3), the alarm was functional and effective. Although ten cases are not enough to prove this point, the indication is that the alarm works particularly well with younger children and in cases that are not complicated by additional motivational, circumstantial or behavioural matters. In the case of the two failures the alarm was technically functional, but failed in its function to stop bedwetting: Elizabeth, who slept very deeply, did not wake up from the squeal of the 95dB buzzer and Rowena was not motivated to use the alarm. These variables - deep sleep and lack of motivation- interfered with the effectiveness of the alarm. It is therefore not possible to state that the alarm is 100% effective. In future research these variables ought to be controlled more tightly.

As far as the three therapy cases in 7.3 were concerned (Peter, Claire and Karen), the alarm was functional and effective in conjunction with parental guidance and child counselling.

During the research project, pads had to be replaced frequently, especially in the beginning. The clients knew that they were participating in research and were also informed that any defective pads would be replaced immediately. Each pad that was returned was examined and corrective designs implemented. As the pads improved it was found that the quality of a batch could be tested by repeated washing a few in an automatic washing machine. Their life expectancy could also be evaluated by treatment (destructive testing) of repeated washing. Later versions of pads developed using the destructive test routine proved to be strong and long-lasting in practice as well.

Although every effort was made to produce an alarm that could be used by the patient without any professional assistance, guidance or counselling, the results to date indicated that this was not possible in all cases. The continuing problem of enuresis of the two teenage girls, Elizabeth and Rowena, showed that the alarm treatment alone was not always successful.

It was interesting to note that the development of the locally manufactured alarm very closely resembled the simple logic of alarms found in the literature, although the local alarm was initially developed without reference to literature. The improvements implemented in this alarm unit are believed to be significant and an important contribution to the knowledge base of bedwetting alarms. The successful use of the alarm by the vast majority of clients has shown that it certainly compares favourably in performance with units produced elsewhere in the world.

8.4.2 Hypothesis 2

The guidelines and user instructions provide adequate assistance of the parents and bedwetting child who wish to deal with the bedwetting problem independently of professional assistance;

All parents who used the alarm package without professional assistance clearly understood the instructions and guidelines clearly. One client (7.2.5) pay sufficient attention to the washing instructions and therefore did not rinse the pads well after use. As a result of this, newly manufactured pads were equipped with a sewn on paper note advising each had a paper note advising the user of the correct washing method sewn on.

8.4.3 Hypothesis 3

Some parents and children desire additional counselling and support;

This is true. Of the thirteen monitored cases, three bedwetting children needed additional professional involvement by way of parental guidance and counselling. Of the ten cases who wished to use the alarm independently, two would probably have benefitted from additional guidance and counselling, due to their behavioural and motivational problems. The other eight parents were directly asked by the pharmacists and researcher how they coped with the alarm on their own. They answered positively. They indicated that they needed no help and that their bedwetting child had no behavioural problems. It was observed that

the fathers of Charles and André were very sensitive about this matter. Both parents stressed that their children were normal and well-adapted. All eight parents were very pleased with the alarm treatment method and some added that alarm treatment should have been their first choice in the treatment of their child's enuresis.

8.4.4 Hypothesis 4

The effectiveness of the alarm treatment (apparatus, user instructions and guidelines) will be further enhanced by a holistic approach, in which the three main treatment approaches, as they focus on the client's needs, circumstances, possible causes of bedwetting and emotional/behavioural problems will be taken into account.

This hypothesis is accepted as true. All three bedwetting children with additional behavioural and emotional difficulties were treated successfully with the help of parental guidance and psycho-dynamic, behavioural, medical and cognitive-behavioural treatment methods.

The children, particularly Claire and Karen, benefitted from talking about their bedwetting. They learned that their bedwetting problem was a common one and that there was a good chance of treatment being successful.

Two of the three children (Claire and Karen) were also advised to eliminate the intake of caffeine as much as possible, especially at night, as the caffeine acted as a diuretic agent. Claire reassured herself with the

suggested, cognitive self-statements such as "I **will** wake up from the alarm bell at night" and "I **can** control my bedwetting all by myself". Motivation worked well with her and she thrived on it.

All three children are presently contented and very pleased that their problem is something of the past.

8.5 WEAKNESSES OF THIS RESEARCH

Two problems experienced during the research related to the alarm itself and the research procedure.

8.5.1 The research procedure:

Potential information was lost when only four of the twenty-five clients who obtained the alarm completed questionnaire 2. In the absence of these essential reports it became necessary to obtain the required information by either telephonic contact or feedback from the pharmacists, who saw their clients in their pharmacies. Unfortunately a personal contact was not possible with some of the pharmacists' client's was not possible as they did not desire to participate in the research. Therefore valuable research data could not be obtained. An additional problem was the time span between the date of purchase and the end of the alarm treatment. After treatment, parents lacked the motivation to complete and return the questionnaire in. It could also not be expected of the pharmacists to exert pressure on their clients to complete the forms. In retrospect, less information would have been lost if the research

procedure had included a method of obtaining purchasers' details at the time of sale, a more insistent approach with the pharmacists to record information or using only one source to supply the alarm package.

8.5.2 The Alarm:

The electrodes in the pads caused faults in the pads. All previous researchers experienced the same problem. The local alarm did however have the advantage that it immediately notified the user if the wires broke. The problem could then be rectified before the alarm failed. It was however inconvenient that the faulty pad had to be exchanged. Subsequent redesigning of these electrodes has produced a pad which can tolerate much harsher treatment.

8.6 RECOMMENDATIONS FOR FURTHER RESEARCH

8.6.1 Early intervention:

The question arises if early intervention from the age of seven with the alarm will result in a higher success rate, shorter treatment period and fewer problems related to anxiety, loss of self-esteem and parental stress. Further long-term research into the benefits of early intervention may provide answers to this question.

8.6.2 Reluctance to use the alarm:

In a few instances, particularly with the older children, there was a tendency to dislike using the alarm. This requires further investigation

since clarification could lead to improvement in the design of a better alarm and treatment programme.

8.6.3 Alarm use for geriatrics:

The use of the alarm could assist the elderly and nursing staff with the problems of incontinence in old age homes.

8.6.4 The alarm itself:

The following items have been identified for possible revision and improvement in future designs:

- Currently the buzzer is mounted on top of the control box. It should be incorporated into the box itself.
- The black buzzer and control box would look more attractive in white, pale green, blue or pink.
- the battery life of a standard 9 volt battery is approximately fourteen days. This could be improved by redesigning the circuitry. Long-life alkaline batteries last twice as long as the standard battery but cost at least three times as much.
- Audio or video tape user instructions could be made available. for illiterate users. Instructions could be provided in different languages. The cost of these tapes could, however, be a drawback as illiterate users usually cannot afford such luxuries.

8.6.5 The ideal bedwetting alarm (long-term goal)

Briefly the ideal bedwetting alarm could be described as follows:

The alarm unit and the control circuits :

No wires should link the sensor pads with the control circuits. The size of the control circuit and buzzer unit should be similar to that of an in-ear hearing aid. This "hearing-aid" unit would receive the signals from the sensor pad and trigger an alarm which only the user can hear.

The Sensor Pads :

These should be cheap, disposable sensor pads with a radio transmitter or transponder which would be monitored by the "hearing-aid" control unit. These transponders are already in use in book and clothing stores where they are placed onto items to prevent shoplifting.

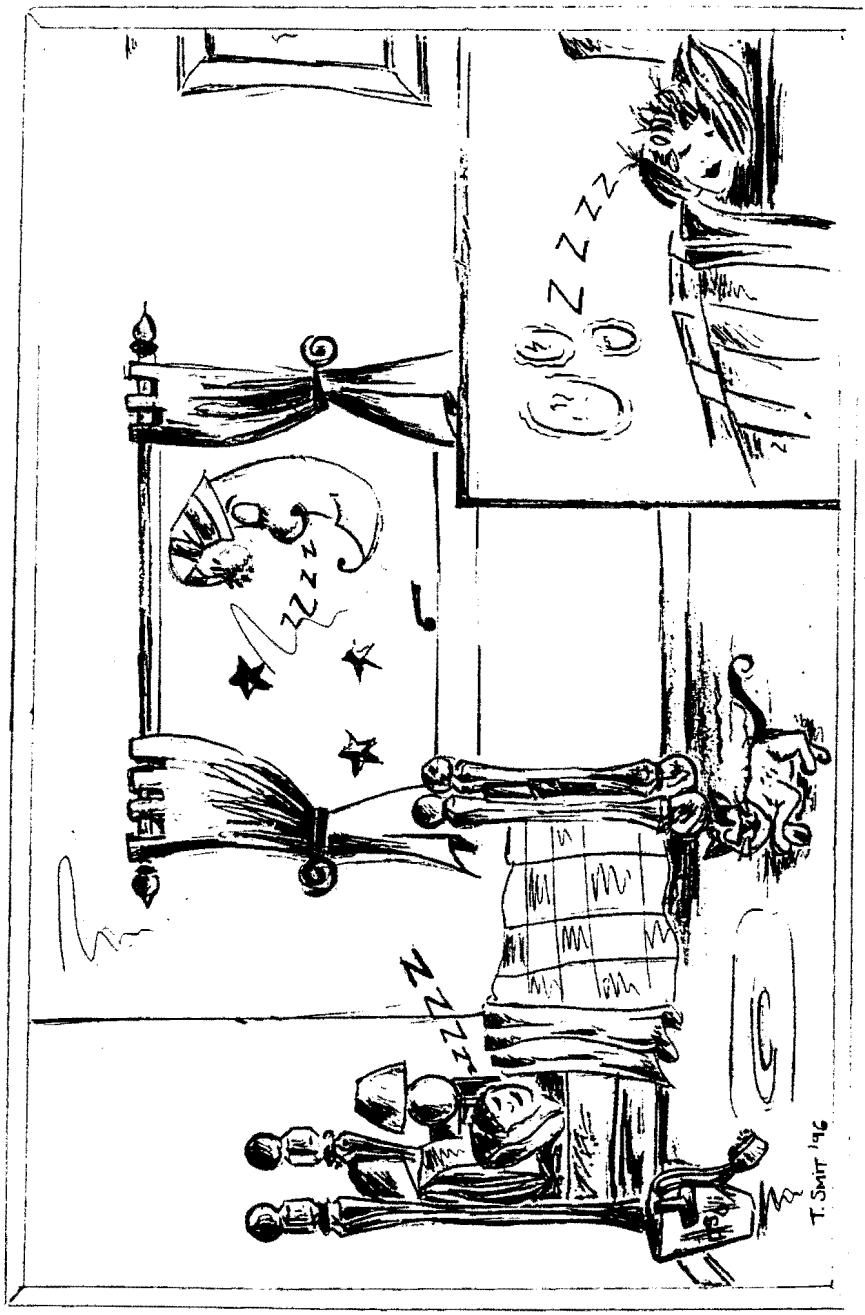
The ideal bedwetting alarm can be manufactured today. The technology is already available. The transponders cost just over one rand each and could be incorporated into a disposable sensor pad. However, the control and monitoring circuits are too expensive and bulky at present for this application to be practical in the immediate future.

8.7 CONCLUSION.

The commitment of the client as well as the availability of professional assistance are essential components for the successful treatment of the enuresis. The bedwetting alarm does work.

The development of a South African alarm facilitates the regular use of the bedwetting alarm as a method of treating enuresis locally. Hopefully this work will encourage other researchers to explore this topic further in the South African context.

"Peace of Mind at Last!"



BIBLIOGRAPHY

Alon, U.S. 1995. Nocturnal Enuresis. *Pediatric Nephrology* 9(3):94-103.

American Psychiatric Association. 1987. *Diagnostic and Statistical Manual of Mental Disorders* (DSM III R) 2nd ed. Washington: APA.

AMI Internet 9. Applied Medical Informatics - Home Page.
Internet = http://www.ami-med.com
(2681 Parleys Way, Ste. 101, Salt Lake City, Utah 84109-1630
Tel: (800) 584-3060 Fax: (801) 464-6201)

Azrin, N.H., Bugle, C. and O'Brien, F. 1971. Behavioural Engineering: Two Apparatuses for Toilet Training Retarded Children. *Journal of Applied Behaviour Analysis* 4:249-253.

Azrin, N.H., Sneed, T.J. and Foxx, R.M. 1972. Dry-Bed: A Rapid Method of Eliminating Bedwetting (Enuresis) of the Retarded. *Behaviour Research and Therapy* 11:427-434.

Baker, B.L. 1969. Symptom Treatment and Symptom Substitution in Enuresis. *Journal of Abnormal Psychology* 74:42-49.

Baller, W.R. 1975. *Bed-Wetting: Origins and Treatment.* New York: Pergamon.

Bornman, M.S. & Du Plessis, D.J. 1983. A New Alarm for Enuretics. *S.A. Mediese Tydskrif* 63:638.

Borrie, P & Fenton, C.B. 1966. Buzzer Ulcers. *British Medical Journal* 2:151-152.

Butler, R.J. 1987. *Nocturnal Enuresis: Psychological Perspectives.* Bristol: Wright.

Butler R.J., Robertson, J. & Forsythe, W.I. 1990. The Body-worn Alarm in the Treatment of Childhood Enuresis. *The British Journal of Clinical Practice* 44:237-241.

Butler, R.J. 1993. Establishing a Dry Run: A Case Study in Securing Bladder Control. *British Journal of Clinical Psychology* 32:215-217.

Coote, M.A. 1965. Apparatus for Conditioning Treatment of Enuresis. *Behaviour Research and Therapy* 2:233-238.

Crosby, N.D. 1950. Essential Enuresis:Successful Treatment Based on Physiological Concepts. *Medical Journal of Australia* 2:533-543.

Davidson, J.R. & Douglas, E. 1950. Nocturnal Enuresis: A Special Approach to Treatment. *British Medical Journal* 1: 1345-1350.

Djurhuus, J.C., Norgaard, J.P., Hjalmas, K. and Wille, S. 1992. Nocturnal Enuresis: A New Strategy for Treatment against a Physiological Background. *Scandinavian Journal of Urology and Nephrology* 143:1-29.

Doleys, D.M. 1977. Behavioural Treatments for Nocturnal Enuresis in Children:A Review of the Recent Literature. *Psychological Bulletin* 84(1):30-34.

Edwards, S.D. & Van der Spuy, H.I.J. 1983. Hypnotherapy as a Treatment for Enuresis. *Journal of Child Psychology and Psychiatry* 26:161-170.

ENURAD Internet 8. *Internet = http://www.mobitec.se/eig/ukeub/index.html* (UKEAB Sweden, Backa Bergögata 8, S-42246 HisingsBacka, Sweden Phone: +46 3158 2710 Fax: +46 3158 5930)

Fauman, M.A. 1994. *Study Guide To DSM-IV.* Washington DC: American Psychiatric Press.

Finley, W.W. & Smith, H.A. 1975. A Life-long, Inexpensive Urine-detection Pad for Conditioning Enuresis Nocturna. *Behaviour Research Methods and Instruments* 7:273-276.

Finley, W.W. & Wansley, R.A. 1976. Use of Intermittent Reinforcement in a Clinical-Research Program for the Treatment of Enuresis Nocturna. *Journal of Pediatric Psychology* 4:24-27.

Fried, R. 1974. A Device for Enuresis Control. *Behaviour Therapy Journal* 5:682-683.

Gillison, T.H. & Skinner, J.L. 1958. Treatment of Nocturnal Enuresis by Electric Alarm. *British Medical Journal* 2:1268-1272.

Greaves, M.W. 1969. Hazards of Enuresis Alarm. *Archives of Diseases in Children* 44:285-286.

Greene, A.R. 1996. *House Calls.*
Internet=ttp://www.drgreene.com/bed_wetting.html
(50 South San Mateo Drive, San Mateo, California 94401
Tel.(415) 579-6500).

Griffith, H.W. 1985. *The Complete Guide to Symptoms, Illnesses and Surgery.* United Kingdom:HP Books Inc.

Gustafson, R 1993. Conditioning Treatment of Children's Bedwetting: A Follow-up and Predictive Study. 72:923-930.

Hamburger, B. 1993. Treating Nocturnal Enuresis. *The Canadian Nurse* 89(4):26-28.

Herreshoff, J.K. 1973. Two Electronic Devices for Toilet Training. *Psychological Reports*: 54-55.

Hjelle, L.A. & Ziegler, D.J. 1981. *Personality Theories: Basic Assumptions, Research and Applications.* Auckland: McGraw-Hill.

Homsy, Y. 1995. Most Children Can Be Successfully Treated for Bedwetting.
Internet = http://www.pslgroup.com/dg951109c.htm
(Health Sciences, University of South Florida Tel: 813-974-3300)

Houts, A.C., Berman, J.S. and Abramson, H. 1994. Effectivenss of Psychological and Pharmacological Treatments for Nocturnal Enuresis 62:737-745.

Hunt, G. 1983. Enuresis Alarms Do Work. *Focus on School Nursing* 31:55-57.

Klackenberg, G. 1981. Nocturnal Enuresis in a Longitudinal Perspective. *Acta Paediatr Scandinavia* 70:453-457.

Kolvin, I., MacKeith, R.C. and Meadow, S.R. 1973. *Bladder Control and Enuresis*. London: William Heineman.

Krause, V. *General Practitioner.* 1996. Personal communication. Alberton.

Lovibond, S.H. 1963. The Mechanism of Conditioning Treatment of Enuresis. *Behaviour Research and Therapy* 1:17-24.

Lovibond, M.A. 1964. *Conditioning and Enuresis.* Oxford: Pergamon.

Mark, S.D. & Frank, J.D. 1995. Nocturnal Enuresis. *British Journal of Urology* 75:427-434.

Meadow, S.R. 1977. How to Use Buzzer Alarms to Cure Bewetting. *British Medical Journal* 2:1073-1075.

Miller, K. 1993. Concomitant Nonpharmacologic Therapy in the Treatment of primary Nocturnal Enuresis. Clinical Pediatrics.

Mishne, J.M. 1993. Primary Nocturnal Enuresis: A Psychodynamic Clinical Perspective. *Child and Adolescent Social Work Journal* 10(6):469-479.

Mohr, C & Sharpley, C.F. 1988. Multi-modal Treatment of Nocturnal Enuresis. *Education and Training in Mental Retardation* 23:70-75.

Monda, J.M. & Husman, D.A. 1995. Primary Nocturnal Enuresis:A Comparison among Observation, Imipramine, Desmopressin Acetate and Bedwetting Alarm Systems. *The Journal of Urology* 154:745-748.

Mowrer, O.H. & Mowrer, W.M. 1938. Enuresis: A Method for it's Study and Treatment. *American Journal of Orthopsychiatry* 8:436-459.

Mussen, P., Rosenzweig, M.R., Blumenthal, A.L., Aronson, E., Elkind, D., Feshbach, S., Geiwitz, J., Glickman, S.E., Harvey, L.O., Murdock, B.B., Wertheimer, M. 1979. *Psychology: An Introduction.* Massachusets: Heath.

Neal, B.W. & Coote, M.A. 1969. Hazards of Enuresis Alarm. *Archives of Diseases in Children* 44:651.

NES Internet 1. National Enuresis Society - Home Page.
Internet = http://www.peds.umn.edu/Centres/NES/
(NES, 7777 Forest Lane Suite C-737, Dallas, TX 75230-2518
Tel: 1-800-NES-8080)

Nytone Internet 7. *Internet = http://www.intel.net/alarm.html*
(Nytone Medical Products, 2424 South 900 West, Salt Lake City,Utah 84119
Tel: 801 973 4090 Fax: 801 973 0176)

OMS Internet 6. *Internet = http://www.cygnus.nb.ca/016/016-012.html*
(Online Medical Services, 14,Site 9, R.R#6, Fredericton, NB, Canada,E3B 4X7
Tel: 506 363 5918)

Palco Internet 5. *Internet = http://www.armory.com/~ricky/palco/ws.html*
(Palco Tel: 408 476 3151)

Peterson, R.A., Wright, R.L.D. & Hanlon, C.C. 1969. The Effects of Extending CS-UCS Interval on the Effect of the Conditioning Treatment for Nocturnal Enuresis. *Behaviour Research and Therapy* 7:351-357.

Pflaundler, M. 1904. Demonstration Eines Apparatus zur Selstattigen Signalisierung Stattgehabter Bettnässung. *Verhandlung der Gesellschaft fuer Kinderheilkunde* 21:219-220.

Plutchik, R. & Kellerman, H. 1974. Emotions Profile Index Manual. Los Angeles: Western Psychological Services.

Regensberg, D. 1988. Objective Social Cotinence. Children-Incontinent or Enuretic? *Nursing RSA* 3:31-33.

Remy-Roux. 1910. A New Electrical Apparatus to Treat Nocturnal Enuresis. *Bull. Soc. Med. Vaucluse* 6:337-340.

Ronen, T., Wozner, Y. and Rahav, G. 1992. Cognitive Intervention in Enuresis. *Child & Family Behaviour Therapy* 14(2):1-7.

Rowan, R.L. 1974. *Bed-wetting: A Guide for Parents.* USA: St Martins.

Schaefer, C.E. 1979. *Childhood Encopresis and Enuresis; Causes and Therapy.* New York: Van Nostrand Reinhold Company.

Seiger, H.W. 1946. A Practical Urine or Wet Diaper Signal. *Journal of Pediatrics* 28:733-736.

Smeets, P.M. & Striefel, S. 1988. Time-Delay Discrimination Training with Implusive Children: Self-Monitoring Nonwait Responses and the Dimensions of Prompts. *Journal of Abnormal Child Psychology* 16:693-706.

Taylor, P.D. & Turner, R.K. 1974. A Clinical Trial of Continuous, Intermittent and Overlearning "Bell and Pad" Treatments for Nocturnal Enuresis. *Behaviour Research and Therapy* 13:281-293.

TIS Internet 2. News: Bedwetting is often Hereditary
Internet= http://village.ios.com/~tis/her_bw.html
(Tri-state Incontinence Support Group. 51 Nassau Ave. Brooklyn, NY 11222 Tel: 718 599-0172)

TIS Internet 3. Fact Sheet #3 Bedwetting
Internet= http://village.ios.com/~tis/her_bw.html
(Tri-state Incontinence Support Group. 51 Nassau Ave. Brooklyn, NY 11222 Tel: 718 599-0172)

TIS Internet 4. If you are thinking about using Desmopressin (DDAVP)
Internet= http://village.ios.com/~tis/ddavp.html
(Tri-state Incontinence Support Group. 51 Nassau Ave. Brooklyn, NY 11222 Tel: 718 599-0172)

Tissier, G. 1993. Bedwetting at Five Years of Age. *National Child Health and Education Survey* 56:333-335.

Turner, R.K., Young, G.C. and Rachman, S. 1970. Treatment of Nocturnal Enuresis by Conditioning Techiques. *Behaviour Research and Therapy* 8:367-381.

Van Den Aardweg, E.M. & Van Den Aardweg, E.D. 1988. *Dictionary Of Empirical Education/Educational Psychology*. Pretoria: E&E Enterprises.

Verhulst, F.C., Van der Lee,J.H., Akkerhuis, G.W., Sanders-Woudstra, J.A.R., Timmer, F.C. & Donkhorst, I.D. 1985. The Prevalence of Nocturnal Enuresis: Do DSM III Criteria need to be Changed? *Journal of Child Psychology and Psychiatry and Allied Disciplines* 26: 989-993.

Wagner, W.G. & Matthews, R. 1985. The Treatment of Nocturnal Enuresis: a Controlled Comparison of Two Models of Urine Alarm. *Developmental and Behavioural Pediatrics* 6: 22-26.

Wagner, W.G. & Geffken, G. 1986. Enuretic Children: How they view their Bedwetting Behaviour. *Child Study* 16:13-18.

Wagner, W.G. 1987. The Behavioural Treatment of Childhood Nocturnal Enuresis. *Journal of Counselling and Development* 76:263-265.

Wagner, W.G. & Johnson, J.T. 1988. Childhood Nocturnal Enuresis: The Prediction of Premature Withdrawal from Behavioural Conditioning. *Journal of Abnormal Child Psychology* 16(6):687-692.

Wiggelinkhuizen, J. 1989. Enuresis in Children. *CME.VMO* 7:551-563.

Wille, S. 1994. Nocturnal Enuresis: Sleep Disturbance and Behavioural Patterns. *Acta Paediatr* 83:772-774.

Young, G.C. & Morgan, R.T.T. 1972. Conditioning Treatment of Enuresis: Auditory Intensity. *Behaviour Research and Therapy* 11:411-416.

Young, G.C. & Morgan, R.T.T. 1973. Conditioning Treatment of Enuresis: Auditory Intensity. *Behaviour Research and Therapy* 11:289-297.