TREATMENT OF PERSISTENT ENURESIS WITH THE ELECTRIC BUZZER

BY

IAN G. WICKES

From the North Middlesex Hospital and South-East Essex Group

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The treatment of enuresis has largely defeated physicians in the past. Some have readily acknowledged this and have pinned their faith on the child growing out of it. Others have used numerous drugs with varying success; since there is a tendency towards spontaneous improvement, and since inert pills are partly effective by suggestion, it has been difficult to assess what specific effect, if any, a particular drug possesses. Psychiatrists have tended to attribute the disorder to infantile regression and have sought, by child guidance techniques, to readjust the child's interpersonal relationships; they have turned a blind eye to the symptom itself, a wise move since it so seldom disappears with such therapy. Nevertheless there is a widespread belief that enuresis is purely psychogenic, a belief which is illustrated by a common mis-spelling 'eneuresis'—as if the condition were a neurosis. Undoubtedly nervous factors influence enuresis (as with epilepsy and asthma) but it is equally true that the cure of bedwetting will often greatly improve the child's emotional state, indicating that the anxiety is secondary, in part at least.

The treatment of enuresis was revolutionized when it was discovered by chance that an apparatus for signalling to the parents that their child had a wet bed and needed changing also had the property of training the child to become dry. Pfaundler (1904) used a quilted pad for the purpose, Mowrer (1938) improved the apparatus by including a relay, and Seiger (1946) first described a metal and rubber pad that could be dried. Subsequently Davidson and Douglass (1950) reported 20 cases in deprived children with 15 cures; Seiger (1952) reported a series of 106 cases, 94 becoming dry for two months or longer, in the majority of cases after less than one month's treatment. Geppert (1953) reported a series of 42 cases with 38 successes using a similar method. Crosby (1950) used the conditioning method but instead of a bell or buzzer he used electrodes attached to the genitalia and loin so that at the start of micturition 'a stimulus, capable of

variation to any devised intensity, is applied to the patient'. His results were successful in 52 out of 58 cases.

In view of the intractable nature of enuresis the above results seem almost too good to be true. It is certainly surprising that the medical profession has not adopted the method to any extent in Great Britain, but commercial firms have exploited the treatment on a large scale offering it direct to the public without the supervision of a physician. Only one small series (in deprived children) has been reported and occasional letters (Gillison, 1956) have appeared in the medical press supporting the method. In some quarters there is considerable resistance to it as evidenced by the reply in the *British Medical Journal* (1957) in which the writer, after describing many largely ineffective and blunderbuss remedies goes on to refer to the conditioning method as 'rather a crude type of therapy'. Since ignorance and prejudice envelop the subject it seemed desirable to collect a series of persistent intractable enuretics to observe how they responded to this form of treatment.

The Apparatus and its Use

One of the reasons why this treatment has not been popular amongst doctors is because of the lack of availability of sets. For some years one firm has been hiring sets for a sum which far exceeds that which the average hospital patient can afford. Recently another manufacturer has begun to produce one which sells at less than half that sum. I have been fortunate in that the father of a former patient has been producing efficient sets which have been sold at less than one-fifth the cost of hiring. Furthermore, through the generosity of the Chamberlain Foundation, I have been able to lend a similar set free of charge to those parents who were unable to buy one.

The apparatus consists of an alarm unit containing a buzzer, light, relay and 6-volt battery together with two flexible leads that can be clipped on to two fine metallic rectangular gauze mats about 16 × 20 in. The mats are best secured on the bed by slipping each into a pocket obtained by sewing a pillowcase to a drawsheet along

its three closed sides to make a double open-ended pocket. The child, preferably devoid of pyjama trousers, lies above the linen sandwich containing the mats. The alarm unit stands on a table or chair close to the bed and is switched on at bed time. The alarm is actuated when the circuit is completed by urine that has soaked through the layers to reach the lower of the two mats. Occasionally a 'dry ring' is obtained if the mats inadvertently touch (frayed ends of wire may traverse the intervening material) or if the patient sweats profusely. Conversely, the alarm may fail to sound if a clip becomes dislodged by a restless sleeper. Normally, however, a teaspoonful of urine will suffice to start the buzzer and this, by awakening the child, will bring an end to micturition and will eventually, in favourable cases, prevent the act starting at all. The size of the wet patch indicates how quickly the child has awakened. In a typical response the size of the patches diminishes as the training takes effect but sometimes the child is such a heavy sleeper that all the patches remain large because he is not awakened by the buzzer (another member of the family may have to switch it off). In such cases a louder bell can be plugged into the set or dexamphetamine can be prescribed as well but these additional measures are seldom required. When the alarm sounds and the child awakens he is instructed to switch it off, get up and finish passing urine. In very bad cases it is desirable to re-set the apparatus using a dry drawsheet ensemble but in the majority one alarm per night is sufficient.

The Series

In the past five years over 500 enuretic children have been referred to my out-patient clinics. Many of them have responded to simple forms of therapy and many others have recovered spontaneously but gradually a hard core of resistant cases accumulated. They were treated with the electric buzzer, the only criteria for selection being that they were old enough, sufficiently severe, and resistant to other forms of therapy. There were only nine omissions from a consecutive series of 109 cases selected for treatment and provided with an apparatus: in four the parents refused to report progress, in two the children (aged 10 and 12) refused to use the apparatus, in two the parents were too stupid to be able to work it and in one the boy stopped wetting before the set was put into use.

The series therefore consists of 100 persistently enuretic children consecutively supplied and treated with a conditioning apparatus. It is important to emphasize that inclusion was by enrolment rather than by completion of treatment. Since the successes are usually rapid, a better rate of cure could have been obtained by discarding those in whom the treatment is incomplete.

Age. There has been a tendency to provide older children with this treatment partly because they have

usually resisted many others and partly because they are more likely to cooperate. A few young ones have been included, usually because they had inherited a set after an older sibling had completed treatment. In general, however, the use of an apparatus under the age of 7 has not been recommended and it will be seen from Table 1 that 74 fall within the 7-13 bracket, 14 being younger and 12 older than this group.

Sex. There is general agreement that males predominate in any series of enuretic children and this has been the case here. Only 19% were girls.

TABLE 1
AGE AT START OF TREATMENT AND SEX

Age in Years	Total	5-7	-9	-11	-13	-15	-17	17+
Male ..	81	12	18	19	22	7	2	1
Female ..	19	2	4	8	3	2	—	—
Total ..	100	14	22	27	25	9	2	1

Onset. In the vast majority enuresis had been present since birth and the longest dry spells (if any) before treatment had seldom exceeded one week. In five cases enuresis had begun, after a long period of dryness, at the age of 4 years or older; in two others it had been very infrequent until the age of 5. Four mothers stated that there had been a dry spell at least six months long between the ages of 1 and 3 years—a difficult fact to explain. Two boys had been dry for four and five months respectively after treatment with a conditioning apparatus obtained elsewhere; they were therefore relapses but entered this series as new cases because their parents could not afford to hire a second apparatus.

Family History. For the purpose of this enquiry, enuresis was regarded as having been present if bedwetting had occurred above the age of 5 years. A positive history in a close relative (parent or sibling) was obtained in 47 cases (one or both parents in 30, one or more siblings in 17, parent and sibling in ten). The history relating to enuresis in the patients' parents was not complete in 18 cases but in six a more distant blood relative had been affected. A negative history in near relatives was obtained in 35 cases with complete records but in 22 of these it was positive in more distant relatives (aunts, uncles and first cousins). These findings indicate that about 50% of cases have a positive family history and a further 30% have blood relatives affected by the disorder.

Intelligence. In this series the great majority were of average intelligence. Eight were above, nine were below and one was educationally subnormal.

Nervous State. Parents were asked if the child had any other nervous troubles. In 30 they were absent and in 70 they were present, being very severe in five. (In an unselected series of children starting school 50% were stated to be nervous, but this is a younger age group.)

Investigations. All the children were medically examined and their urine tested. Twenty-eight of the first 50 cases in the series and 17 of the second 50 had been fully investigated by means of micturating cysto-urethrograms, cysto-urethrosocopy, pyelography, etc. This falling off in zeal for investigation was due to a change of policy whereby latterly only failures were investigated. In two cases this was refused.

Previous Treatment. Almost every patient had failed to respond to weeks or months of drug therapy which had extended for over one year in 29 and was continuous for five years in one. Three were referred from child guidance clinics and one other had failed to respond to that kind of treatment. One successful case had previously attended a faith healer for many months. As already stated, two had relapsed following this form of therapy.

Results

It soon became apparent that successful cases usually responded rapidly. This led us to use the total number of wet nights during the third month as a criterion of early response which subsequently proved to be a reliable index of the final outcome.

TABLE 2
EARLY RESPONSE CORRELATED WITH SEVERITY OF ENURESIS

Total No. Wet Nights During 3rd Month	Total	Severity of Enuresis Before Treatment (Approximate Proportion of Wet Nights)			Group	
		<50%	50%-75%	75%-100%	Charity	Private
Nil ..	44	5	15	24	25	19
1-3 ..	10	2	1	7	6	4
4-6 ..	14	2	3	9	10	4
7+ ..	17	1	3	13	12	5
Abandoned ..	7	1	3	3	5	2
Not known ..	8	2	2	4	4	4
Total ..	100	13	27	60	62	38

In Table 2 the early response is correlated with the frequency of wetting when treatment was first started. Infrequent wetting means that the training

effect is seldom applied. Hence children who were wet appreciably less than 50% were not treated in this way and those in this group did rather less well than the average. In the worst group the results are also suboptimal because concealed within it were several children who were wet more than once each night and hence had further to go to become dry. The best results were therefore obtained in the group with 50 to 75% wet nights at the outset, for 59% had fewer than four wet nights in the third month compared with 54% and 50% in the other two groups.

Also in Table 2 a distinction is made between those who bought an apparatus and those who borrowed one free of charge. The latter group included many with very low social standards which perhaps explains why they achieved less good results. Taking all the cases which were wet fewer than four times during the third month, there were 23 out of 38 (60%) who bought their own sets compared with 31 out of 62 (50%) who borrowed one.

TABLE 3
LATE RESULTS CORRELATED WITH EARLY RESPONSE

Total No. Wet Nights During 3rd Month After Starting Treatment	Total	Final Assessment (4 mth.-2 yr.)			
		Dry	Occasion-ally Wet	Improved	Failed
Nil ..	44	38	5	—	1
1-3 ..	10	7	3	—	—
4-6 ..	14	3	5	4	2
7+ ..	17	1	1	3	12
Abandoned ..	7	—	—	—	7
Not known ..	8	1	1	2	4
Total ..	100	50	15	9	26

In Table 3 the late results are correlated with early response. The successful 65 cases have been followed up for a period ranging from four months to well over one year; it exceeded six months in 43 cases of which 15 were followed up for more than one year.

Of the 50 cases finally classified as 'dry', 38 became completely dry before the third month of treatment began, whereas only one was ultimately cured when the number of wet nights in the third month exceeded seven.

In addition to the 50 dry cases, 15 children have been classed as 'occasionally wet'. They had on an average one or two wet nights per month after treatment was completed. As might be expected, the early response tended to be less rapid in this group.

The nine classified as 'improved' each showed a marked reduction in the amount of wetting but at the final assessment there was still appreciable

wetting. Thus one child was wet 19 times during the first week of treatment but steadily improved so that in the 32nd week he was only wet twice.

Eighteen of the failures failed to respond appreciably. One responded at first but then relapsed and continued to wet frequently; he lived in a very poor home and had no bed of his own. To these failures must be added seven in whom the treatment was abandoned before the end of the third month, making a total of 26 failures.

Younger children did slightly better than older ones, the average age of the successful cases being 9 years compared with 11 years for the 26 failures.

There were too few children of below average intelligence from whom to draw definite conclusions but the impression has been gained that those with lower intelligence respond less rapidly.

Relapses. There were nine cases in which relapses requiring a refresher course occurred and eight responded rapidly and completely. One had been completely dry for nine months before relapsing. No doubt as further time passes other relapses will require treatment. In most cases the relapse was clearly related to an infection, fatigue or anxiety over examinations at school. Even some of the children classified as 'dry' experienced an isolated wet night in such circumstances but they were very rare.

Pattern of Response

The mechanism of the treatment is clearly one of training; in a favourable case the number of wet nights steadily diminishes and at the same time the size of the wet patch gets smaller indicating that the child is waking up more quickly. This is well illustrated by the following typical case history:

L.C., a boy aged 11 years, had never had a dry night all his life. He was of average intelligence, not nervous, a restless sleeper; his maternal grandmother, mother and brother had all been bedwetters. Drug therapy had not helped him. His response was as follows:

Weeks	Wet Nights	Size of Patch
1st	7 (twice one night)	3 large
2nd	4	All small
3rd	2	Both small
4th	1	Small

The set was then removed from his bed and he has been followed up for eight months but has never since been wet. Occasionally he has to get up in the night to pass urine.

Some children find that they have to get up at night in order to keep dry but as their confidence

increases the necessity diminishes. If, however, they are ill or tired they may fail to do so and wet the bed. Forty-one successful cases replied to a questionnaire which revealed that 27 never got up in the night, eight occasionally did and six usually or always did. Some parents who were enuretic in childhood still had to get up to micturate each night indicating that nocturnal frequency persisted.

Failures

It would be tedious to give details of all the failures. Probably lack of cooperation is the commonest cause; thus of the eight in whom no detailed reports for the first three months were available, four were failures. Parents were usually to blame and in a few cases treatment was started in hospital in an effort to avoid this. In one case treatment had to be abandoned because the county M.O.H. forbade us to treat him in the residential home where he lived because a psychiatrist advised against this form of therapy and recommended an alarm clock instead! One juvenile delinquent was responding well in hospital but absconded before treatment was completed because he learned that he was wanted by the police. Two mothers were definitely psychotic. Very heavy sleepers were not awakened but this was sometimes overcome by administering dexamphetamine for a time as well. In one case this failed and so did vibrators attached to his forehead; perhaps an electric shock would have roused him but it was not considered justifiable. Some were awakened but failed to be trained so that the number of wet nights did not diminish though the bed was less soaking. In three cases an initial response was followed by a return to the original frequency suggesting an active resistance to the treatment, probably emotionally determined. We aimed at keeping the child on the set until four consecutive dry weeks had been achieved but one educationally subnormal girl aged 13 refused to use it for more than one week and a boy complained that the neighbours heard the buzzer and he resented the publicity that this entailed.

Conclusion

The fact that a favourable response was rapidly obtained in 65 out of 100 severe enuretics speaks for itself. The marked improvement in the mental outlook of these cases was most gratifying. Several parents reported that their children were happier and more confident now that their enuresis had been eliminated. It is clear that a great deal of the associated anxiety was secondary to the enuresis and disappeared with it. There can be no doubt

that psychological aetiological factors have been greatly exaggerated in this disorder, though they certainly play a part in aggravating it. Probably they are of the same degree of importance in enuresis as in asthma, migraine and epilepsy, disorders, incidentally, with which it is frequently associated. In my opinion it is fully justifiable and very rewarding to tackle the symptom directly by the conditioning method, a triumph for therapeutic behaviourism.

Summary

One hundred intractable severe persistent enuretics have been treated by the conditioning method.

There were 81 boys and 19 girls aged 5-17 years.

Fifty responded rapidly and completely, 15 dried up almost completely, nine improved markedly but slowly and 26 were failures.

The pattern of response and the reasons for failure are described.

A positive family history was obtained in 47 and more distant relatives were enuretic in a further 28 cases but the records were not all complete.

Successful cases frequently showed definite improvement emotionally. The importance of psychological factors in causing enuresis of this type has been greatly exaggerated.

Relapses were mainly provoked by infections, sometimes by fatigue and anxiety.

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