



Voiding school as a treatment for daytime incontinence or enuresis: Assessing the effectiveness of intervention by measuring changes in wetting episodes

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Summary

Background

Most urotherapy interventions are planned for children with daytime incontinence or symptoms, and are based on individual education. This study conducted a voiding school (VS) program with groups of 4–6 children with daytime incontinence or enuresis with or without daytime symptoms.

Objective

The aim of this quasi-experimental study with a one-group pretest–posttest design was to assess the effectiveness of the VS intervention for treating children's daytime incontinence or enuresis.

Materials and methods

Sixty-nine 6–12-year-old children with incontinence classified as treatment resistant participated in the VS at an outpatient clinic. Based on a power analysis, a sample of 52 participants was required. The VS involved two whole-day group visits 2 months apart. The educational content of the intervention was based on the International Children's Continence Society's standards for urotherapy, and was delivered with child-oriented teaching methods, including group discussions with peers. The primary outcome measure was the number of dry days and nights. The amount of wetting was also estimated, and the frequency of voiding measured. Data were collected with 1-week voiding diaries before and after each visit. Changes in

dependent variables between four measurement points was measured by using repeated measures variance analysis. The long-term effectiveness was evaluated from patient records concerning 3-month follow-up phone calls or other contacts 8–18 months after the VS.

Results

Fifty-eight children, 34 girls and 24 boys, completed the study. Twelve children had daytime incontinence, 18 had enuresis, and 28 had both. The number of dry days increased from a mean of 3.5–5.3 ($P < 0.001$), and the number of dry nights increased from a mean of 2.4–3.9 ($P < 0.001$) (Summary table). Thirteen (22%) children became completely dry. Three of them had daytime incontinence, five enuresis, and five both. Twenty-four out of 40 (60%) children with daytime incontinence, and 23 out of 46 (50%) children with enuresis showed $\geq 50\%$ decrease in wetting episodes. The amount of wetting reduced, but the voiding frequency remained unchanged based on the voiding diaries. Twenty-two (45%) of the children were completely dry (six had daytime incontinence, nine enuresis, and seven both), and 16 (39%) showed further improvement, but eight (16%) children remained unchanged 8–18 months after the VS.

Conclusions

Voiding school (VS) was an effective intervention for treating both daytime incontinence and nocturnal enuresis in children who had not benefited from standard treatment and were classified as treatment resistant.

Summary table. Changes in the number of dry days and dry nights in four measurement points. The other measurement points are compared with the first.

Dependent variable	Measurement point	Mean (SD)	Significant <i>P</i> -value
Dry days of children with daytime incontinence ($n=40/58$)	M1*	3.50 (2.03)	
	M2**	4.53 (2.18)	0.003
	M3***	4.95 (1.93)	<0.001
	M4****	5.30 (1.94)	<0.001
Dry nights of children with enuresis ($n=46/58$)	M1	2.43 (2.34)	
	M2	2.54 (2.13)	0.637
	M3	2.94 (2.63)	0.027
	M4	3.87 (2.78)	<0.001

M1* = 1 week before the first VS day.

M2** = 2 weeks after the first VS day.

M3*** = 1 week before the second VS day.

M4**** = 2 weeks after the first VS day.

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Introduction

Involuntary wetting during the daytime or while asleep without any organic cause is a common and distressing problem in otherwise healthy children. Depending on the study, the prevalence of daytime incontinence at 7 years of age varies between 4.9 and 11.7%, and nocturnal enuresis between 5.1 and 17.9% [1].

The first-line treatment is standard urotherapy, and patient education that highlights general lifestyle advice based on proper history taking and using a voiding diary [2,3]. Since the late 1980s, different urotherapy interventions for children with incontinence have been reported to have success rates of 60–90% [4–8]. The different measures and definitions of successful treatment outcomes make it challenging to compare the effectiveness of interventions. According to the International Children's Continence Society (ICCS) recommendations, treatment is considered successful if the symptoms are reduced by $\geq 50\%$ [2,9].

Most bladder training programs or voiding schools are planned for children with daytime incontinence or symptoms, and are based on individual education [5,8,10]. Patients with enuresis without daytime symptoms are treated with alarms during the intervention [5] or excluded from the studies [8,10]. In the study by Mattsson et al. [7], voiding school was provided to groups of two to five children and was found to be a good and cost-effective alternative for individual urotherapy. Heilenkötter et al. [11] applied a training program to groups of two children. In both studies, the overall success rate was 65%. The current study conducted a voiding school (VS) program with groups of four to six children, based on standard urotherapy. According to the children's experiences the VS provided child-oriented education and peer support, which helped them to achieve better bladder control [12].

The aim of this study was to assess the effectiveness of the VS intervention by measuring changes in wetting episodes. The following hypotheses were tested. After the VS, children: 1) had more dry days and/or nights; 2) had fewer and smaller wetting episodes, and 3) went to the toilet during the day more often than before the VS. It was hypothesized that improvement continues, and the number of wetting episodes decrease further after VS.

Material and methods

Participants and study design

Sixty-nine children who participated in the VS during May 2014 and June 2015 in a Finnish university hospital were recruited for the quasi-experimental intervention study. To assess the effectiveness of VS, a one-group pretest–posttest design was used (Fig. 1). The participants were children who had received a referral to a urotherapist from a physician in the primary care, special health care, or private sector.

According to the referrals for the children participating in this study, they did not have constipation, UTIs, and no reason to suspect post void residual. A routine ultrasound and post-void residual was investigated in 21 children with

severe daytime symptoms. No structural abnormalities were seen and residual urine was also normal (<20 ml residual or $<10\%$ of expected bladder capacity) in all cases.

Besides physical examination and urine analysis, some intervention was attempted in all patients before the referral. In addition to instructions on regular voiding habits and the reduction of fluid intake in the evening, 38 out of the 46 children with enuresis had unsuccessfully tried medication or/and alarm treatment (10 received desmopressin, four alarm and 24 children both). Four out of 12 children with daytime incontinence and clear urgency had tried anticholinergic drugs without success before attending the VS.

Children who met the inclusion criteria were asked to participate in the study after at least one visit to an outpatient clinic. The inclusion criteria were: being aged 6–12 years, having daytime incontinence and/or enuresis without any organic cause the reason for referral, speaking Finnish or Swedish, and attending a normal preschool or school. The exclusion criteria were: having neurological or structural reasons for incontinence, having medication for incontinence at the time of inclusion, having been diagnosed with a learning disability, or diagnosed with constipation. The sample size was determined with a power analysis. Using the results of a previous study [11] and 80% power, a sample of 52 participants was required to achieve a $\geq 50\%$ change in dry days or nights. Fig. 2 shows the formation of the final sample.

The participating children provided verbal consent, and their parents provided written informed consent for participation. The ethical committee of the hospital approved the study.

Intervention

The VS included two 1-day group visits 2 months apart, and two urotherapists led it. Children were divided into groups of four to six participants according to their age and sex. The educational approach was based on the ICCS standards for urotherapy [2], Banduras social learning theory, and Piaget's developmental theory [13].

The VS day began with a short discussion with the parent regarding the assessment of the child's situation with incontinence. When all of the children had arrived and the parents left, the children were encouraged to talk to one another about their incontinence problems and learning goals one by one. During the first day, the children were educated about the kidneys, bladder and bowel function, the importance of regular voiding and drinking habits, and the avoidance of constipation. Balloons, books, videos, animations, and illustrative pictures were used to exemplify the function of the urinary and defecation systems. The children were instructed go to the toilet regularly at certain times, drink 1.5 L during 1 day (five glasses of water and three glasses of milk; to avoid juices, fruit syrups and soft drinks; and after six o'clock in the evening only one glass of water). They were also advised to try to defecate every day after some meals. During toilet visits children were given advice about an adequate and relaxed toilet posture with the help of a little bench under the feet. The avoidance of hurry was practiced by asking children to

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