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# Office Management of Pediatric Primary Nocturnal Enuresis: A Comparison of Physician Advised and Parent Chosen Alternative Treatment Outcomes

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**Purpose:** We compared the remission of pediatric primary nocturnal enuresis in groups of children who used a physician advised practice plan vs a parent chosen alternative.

**Materials and Methods:** Between January 2004 and January 2006 there were 119 patients with primary nocturnal enuresis enrolled in this prospective, nonrandomized study. For this study primary nocturnal enuresis was defined as wetting at night during sleep during any 6-month interval without any known causative problem. A total of 76 children received the physician advised treatment plan and used an alarm, oxybutynin, desmopressin, an elimination diet and a bowel program, as indicated. A total of 43 children received a parent chosen alternative treatment plan, which consisted of any single or combination of treatments involving an alarm, oxybutynin, desmopressin and an elimination diet or bowel program. Parents from each group completed an intake survey that measured functional bladder capacity using a 3-day home diary and they identified demographic variables. Followup occurred at 2 weeks and then monthly for 12 weeks to study end.

**Results:** We found that the probability of remission by the end of the study for the physician advised treatment group was significantly higher than that of the parent choice group (88% vs 29%, Kaplan-Meier curve  $p < 0.0001$ ).

**Conclusions:** The group of children who followed physician advised treatment for primary nocturnal enuresis showed significantly earlier remission of primary nocturnal enuresis than children who followed the parent choice treatment (25th percentile 2 vs 10 weeks).

*Key Words: bladder, nocturnal enuresis, deamino arginine vasopressin, parents, questionnaires*

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While PNE is a common pediatric urological diagnosis, surprisingly its treatment has not yet become standardized. Currently therapy usually involves single modal treatment, such as an enuresis alarm for sleep arousal failure, desmopressin for nocturnal polyuria or oxybutynin for small bladder size. Such single treatment plans have low remission rates, and so they are fraught with dissatisfaction, leading to treatment abandonment. While the moisture alarm treatment yields the highest remission rate of 70%, the associated high 40% rate of dropout and noncompliance<sup>1</sup> restricts wide use of this treatment method. Medication such as desmopressin may provide remission sooner than alarm treatment but relapse is frequent and immediate after the medication is discontinued.<sup>2</sup> Treatment combining the enuresis alarm and pharmacotherapy shows a higher number of dry nights at the end of a treatment period compared to the alarm alone.<sup>3</sup> This combined approach may produce earlier positive results, which may increase compliance with treatment.<sup>4</sup>

Our treatment plan advises primary use of an enuresis alarm along with supplemental treatments, such as oxybu-

tynin for small functional bladder capacity or a bowel program for constipation. The personal attitudes, home affairs and/or social circumstances of parents may cause them to resist accepting the physician advised treatment plan. Thus, parents may make alternative treatment choices to meet their needs. We believe that office management of PNE could be improved if we could inform parents of the outcomes of the 2 treatment plans. In this way parents could choose their treatment plan and yet be forewarned regarding differences in the probability of dryness acquisition. We compared the remission results of PNE treatment in groups of children who used a physician advised practice plan vs a parent chosen alternative.

## MATERIALS AND METHODS

### Study Design

In this prospective, nonrandomized study we compared the effectiveness of treatment for PNE using a physician advised treatment plan based on medical evaluation vs a parent chosen alternative treatment plan based on parent needs. All families using the enuresis alarm received personalized instruction on its use by our nurse practitioner. Parents completed an intake survey that identified the status of certain demographic variables, including parent education level, family history of bedwetting, with whom the child lives, the number of siblings, motivation of the child, mother

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Study received Children's Memorial Hospital institutional review board approval.

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and father, deep sleep, snoring, nightmares, teeth grinding, sleepwalking, attention deficit disorder with/without hyperactivity, allergies, physical and/or emotional developmental delays, and asthma. All families completed a 3-day bladder diary measuring urine output. The largest single output during this interval was considered functional bladder capacity.

### Inclusion Criteria

From January 2004 to January 2006 all children referred to our division of urology for PNE management were prospectively enrolled in the study. In this study PNE was defined as wetting at night during sleep during any 6-month interval without any known causative problem. Bedwetting was defined as greater than 2 nights wet per week. Remission was defined as dry for 14 consecutive nights. Relapse was defined as bedwetting occurring twice weekly after being dry for 6 months. Cure was defined as dry for 1 year or greater.

### Exclusion Criteria

Children with nighttime wetting and coexisting anatomical urological problems (vesicoureteral reflux or posterior urethral valves), dysfunctional elimination syndrome or urinary tract infection within a year before evaluation were excluded. Children with daytime wetting were also excluded.

### Medical Evaluation

At the initial visit a history was obtained and physical examination was performed. Radiological studies were not done in this group of children other than the occasional plain x-ray of the kidneys, ureters and bladder to assess for occult constipation. Flow rates were not determined routinely.

### Treatment for PNE

Physician treatment plan(s) were advised based on clinical evaluation of the child. Treatments were offered according to the plan developed by our program, Try for Dry.<sup>5</sup> This is a multimodal plan which, as an algorithm, includes a moisture alarm to address sleep arousal failure, age appropriate inducements to reward dryness, an elimination diet to address possible underlying food sensitivities (avoiding beverages that are carbonated or contain artificial colors, or citric, heavily sugared or dairy products for 2 weeks), oxybutynin to address small functional bladder capacity using a 3 times daily dose when functional bladder capacity is decreased according to the home diary, oxybutynin at a nightly dose based on our empirical clinical experience (although functional bladder capacity is normal), desmopressin prescribed at a low dose of 0.1 mg at bedtime for children 8 to 13 years old and at 0.2 mg at bedtime for children older than 13 years, and lastly a bowel program consisting of prescribed Senekot® or MiraLax® if there was constipation (fig. 1).

### Parent Chosen Alternative Treatment Plan(s)

Parents who rejected the physician advised treatment plan, eg did not want pharmacotherapy and did not want to use the moisture alarm, were permitted to choose a treatment plan that best fit their needs. These parent chosen plans included the personalized choice of single or combined use of a moisture alarm with age appropriate inducements, oxybu-

Physician Advised Treatments	AGE OF CHILD								
	< 8yrs old			8 - 13yrs old			> 13yrs old		
ALARM	YES			YES			YES		
OXYBUTYNIN DOSE	AM	PM	HS	AM	PM	HS	AM	PM	HS
Bladder capacity reduced	½	½	½	½	½	1	½	½	1½
Bladder capacity not reduced	-0-	-0-	½	-0-	-0-	1	-0-	-0-	1½
DESMOPRESSIN DOSE	-0-	-0-	-0-	-0-	-0-	0.1 mg	-0-	-0-	.2mg
ELIMINATION DIET	YES			YES			YES		
INDUCEMENTS	YES			YES			YES		
BOWEL PROGRAM	YES			YES			YES		

FIG. 1. PNE treatment algorithm. AM, 8:00 a.m. PM, 4:00 p.m. HS, before bedtime.

tylin/desmopressin according to the presented dose scheme (fig. 1), an elimination diet and/or a bowel program.

### Followup of Treatment

Followup of PNE treatment for all patients was done at 2-week intervals for month 1 and then monthly until the child acquired 14 consecutive dry nights or up to a total of 12 weeks of treatment. PNE treatment was gradually tapered and then discontinued after the child achieved 14 consecutive dry nights or at the end of 12 weeks of treatment (study end). First alarm use was tapered by 1 night weekly for 7 weeks. After alarm use was discontinued medication use was similarly tapered.

This study was approved by the Children's Memorial Hospital institutional review board. Statistical analysis was performed using SAS®, version 9.1.

### RESULTS

There were 119 children, including 85 males and 34 females, enrolled consecutively in the study. The age range was 5 years to 19 years (mean  $\pm$  SD  $10 \pm 3$ , median 9). The frequency of dry nights for 2 weeks before treatment was 0 to 12 (mean  $1.9 \pm 3.4$ , median 0). PNE was treated using physician advised therapy in 76 children and parental chosen therapy in 43. The table shows treatment components in these groups.

The 2 groups did not show significant differences in demographic composition for any variables examined. Demographic information was available on 30% of the patients. There was a trend toward a difference in the maternal level of education, in that the incidence of some college education in the physician advised group was higher than in the parental chosen group (88% vs 60%, trend toward significance  $p = 0.07$ ).

Figure 2 shows the probability of dryness acquisition by treatment group. Time to PNE remission using physician advised treatment was significantly sooner than by parent chosen therapy (25th percentile 2 vs 10 weeks). At the end of 12 weeks the probability of remission for the physician advised treatment group was significantly higher than for the parent chosen alternative treatment group (88% vs 29%, Kaplan-Meier curve  $p < 0.0001$ ).

### DISCUSSION

Treatment for PNE in children currently lacks an established protocol for physicians and families to follow. There are many therapeutic options for treatment (an alarm, an elimination diet, pharmaceuticals, etc) and many times par-

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