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Factors associated with remission of primary nocturnal enuresis and changes of parental perception towards management strategies: A follow-up study

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Summary

Objective
To understand the remission rates, shifts in treatment methods used by parents, and parents' attitudes towards their children with primary nocturnal enuresis (NE).

Study design
A total of 408 children aged 6–12 years and diagnosed with primary nocturnal enuresis from a 2004 epidemiological study in Taiwan were enrolled. After a 5.5-year follow-up period, the remission rates of the children of each age group were evaluated, and the corresponding treatment methods were employed daily. Furthermore, the major risk factors that influenced the remission rates in these children were investigated.

Results
The overall remission rate was 93.1% among all age groups, and the median age of remission was 9.9 years (95% CI 9.5–10.2 years). Comparing the previous and after results of this study, the treatment methods utilized by the parents in response to enuresis were significantly different. More parents chose combination therapy and sought medical attention as the children grew older, particularly the parents of children with severe NE. Few parents still continued to use punishment method. A Cox proportional hazards regression model revealed that girls, young children, those with low enuresis frequency, and light sleepers had higher remission rates than did their counterparts.

Conclusion
Parents' attitudes towards enuresis influence their choice of therapy for their children. In most cases, parents chose a combination of therapies, particularly combining limited fluid intake and regular voiding. Only 37 (9.1%) children received medicine. The older the enuretic child, the more likely the parents were to seek medical treatment for their children. Enuresis might disappear spontaneously but not always. A small proportion of children will continue to wet till adulthood. The treatment of NE at this age would be challenging. Children who were deep sleepers or affected by severe enuresis had a low probability of achieving dryness. However, girls and young children had a higher probability of achieving remission than did their counterparts.

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Introduction

Nocturnal enuresis (NE) is a common symptom that affects the social life and mental status of a child in several respects. According to a survey of children with enuresis by Van Tijen *et al.*, bedwetting was the third most severe event affecting children after divorce and parental fighting [1]. In Taiwan, the overall prevalence of NE is approximately 8% [2]. A similar prevalence rate has been reported in several nations, and the prevalence of enuresis decreases with increasing age [3,4]. Despite a spontaneous annual cure rate of 15% [5], the belief that NE occurs in only young children is false. Yeung *et al.* reported that 6% of adults have NE, with a higher prevalence in men (7%) than in women (4%) [6].

NE is a multifactorial disorder with a genetic predisposition. Risk factors and correlates of NE include poor arousal from sleep, excessive overnight urine production, delay in attaining bladder control, low socioeconomic status, constipation, fecal incontinence, and sex [7—10]. In addition, NE is associated with psychological disorders. von Gontard *et al.* reported attention deficit hyperactivity disorder in 20% of children with NE [11]. Different pathological etiologies are associated with dissimilar rates of enuresis remission. Therefore, numerous children fail to achieve remission until later in life. Furthermore, these children are also more likely to experience other urological disorders, such as nocturia, despite NE resolution. Therefore, long-term follow-up of children with enuresis is necessary.

Our study is a follow-up of an epidemiological study by Tai *et al.* on primary nocturnal enuresis (PNE) in Taiwan that ended in December 2004 [9]. Tai *et al.* conducted a cross-sectional study on 8496 primary school children, reported the prevalence rates and determined the factors associated with NE. In our study, we continued the investigation and followed children with PNE for approximately 5.5 years. We examined the remission rate and potential factors associated with remission of enuresis in these children. In addition, we investigated the changes in management methods used by the parents and their perception of NE before and after our study.

According to a review of recent research, no longitudinal studies on NE have been conducted in Taiwan. However, in other countries, Ferrara *et al.* [12] followed untreated and treated children with NE and reported that the remission rates increased with age. The remission rates for untreated and treated children were 70.4% and 63.3%, respectively, for a 3-year period, and increased to 85.7% and 75%, respectively, for a 10-year period [12]. In the 6-year follow-up study of Moilanen *et al.* [13] on children with enuresis, the remission rate correlated positively with age, and 97.4% of boys and 96.6% of girls achieved remission at the age of 8 years. Most of the longitudinal studies reported that other urinary tract disorders, such as nocturia and frequency or urgency of urination, continued to affect children after they had achieved remission of bedwetting. Unlike these studies, our primary focus was the changes experienced by these children with increasing age. Therefore, in addition to reporting the remission rates, we investigated shifts in treatment methods used by parents and their perception of NE. We hope that our findings provide an in-depth understanding of the parental perception of NE and how changes in perception may influence enuresis remission in children.

Methods

This study is an investigation that follows up a study by Tai *et al.* in 2004. To correlate with our previous study and observe whether the enuretic children had improved since that time, all the definitions in this study were consistent with those of the previous study. Enuresis was defined if the child had wet at any time during the past 6 months. Primary enuresis was defined as bedwetting at night and had never been dry for longer than 6 months. Severity of enuresis was classified as wetting at least once per day, one to six times per week, one to three times per month, and one to five times per 6 months. Deep sleep was defined if these children have great difficulty being aroused from sleep; regardless of the stimulus even when brought to the toilet to void they cannot be fully awakened.

A total of 8496 children aged 6—12 years from 26 elementary schools in mideastern Taiwan, 560 of whom had PNE, were surveyed in our follow-up study. These children were followed for 5.5 years until June 2010, and the parents of 408 of these children were successfully contacted by telephone. These parents were asked (1) whether the bedwetting experienced by their children had been cured. Furthermore, these parents were asked (2) how they addressed bedwetting in their children and (3) whether they adopted any treatment strategies when bedwetting persisted (Fig. 1). We deemed the children as having achieved dryness only when their parents told us that the children have achieved dryness without receiving any therapy. Otherwise, we would continue to inquired about the therapies being used, and if no therapies were used, what was their frequency of enuresis? Those who could not be contacted were excluded from our data.

The remission rate of enuresis in participants was first calculated. In our report, remission was defined as if the symptom had been cured during the previous 6 months. Chi-square and Fisher's exact tests were performed to compare the remission rates of children with dissimilar characteristics and to determine any significant differences in the treatment methods between those who achieved remission and those who did not. The McNemar test was used to determine whether the treatment received by these children changed significantly before and after our follow-up investigation. Subsequently, a Kaplan—Meier analysis was performed to identify differences in the time required to achieve remission among children with various levels of enuretic severity and arousal from sleep. A Cox proportional hazards regression model was employed to determine the main factors that affected the ability of the participants to achieve dryness. All statistical analyses were performed using SPSS 15.0, and a p-value <0.05 was considered to be statistically significant.

Ethical approval

The study procedures were approved by the Institutional Review Board of the Changhua Christian Hospital in