

# Nocturnal Enuresis: An Approach to Assessment and Treatment

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## Educational Gap

Although approximately 15% of children will have primary monosymptomatic nocturnal enuresis (PMNE) at age 6 years, only 1% to 2% of adolescents will continue to have wetting by the late teen years. Treating PMNE involves accurate diagnosis and an in-depth understanding of the multiple factors that cause children to wet. Failure to recognize causes of PMNE or nonmonosymptomatic nocturnal enuresis (also known as nonmonosymptomatic enuresis) will lead to treatment failure in many children.

## Objectives After completing this article the reader should be able to:

1. Know the difference between primary monosymptomatic nocturnal enuresis (PMNE) and nonmonosymptomatic nocturnal enuresis.
2. Understand how to use a good history to guide treatment for PMNE.
3. Know the different treatments for PMNE as first-line therapy and understand why they are effective.
4. Be aware that children with secondary PMNE may not have an organic source for their wetting.
5. Recognize the psychological effect of PMNE on the child and family.

**AUTHOR DISCLOSURE** Drs Bayne and Skoog have disclosed no financial relationships relevant to this article. This commentary does contain a discussion of an unapproved/investigative use of a commercial product/device.

### ABBREVIATIONS

EBC	expected bladder capacity
ICCS	International Children's Continence Society
ICS	International Continence Society
NE	nocturnal enuresis
NMNE	nonmonosymptomatic nocturnal enuresis
NP	nocturnal polyuria
PMNE	primary monosymptomatic nocturnal enuresis

### CASE

Brittany is a 9-year-old girl seen in the pediatrician office for concerns about bedwetting. The family reports that the child has never been dry for more than a few nights in her entire life. The child is rather uncomfortable with the conversation, and the parents answer most of the questions. The family states they have "tried everything." They report trying to wake the child up at night to have the child void and did not have success with this. They state that the child is not allowed to drink any fluid within an hour before going to bed. The child voids immediately before going to sleep but seems to wet the bed 2 to 3 hours later.

The family states they are frustrated with the wetting because they are tired of doing laundry and that nighttime undergarments are becoming prohibitively expensive. They also worry about the child's development because she is

embarrassed to sleep at friends' houses for fear of wetting and being teased. When asked about bladder and bowel habits, the family states she is "normal" and has no daytime wetting incidents and no problems with constipation. Further questioning, however, reveals that the child's normal stooling pattern is one large bowel movement every 5 days that frequently clogs the toilet. The mother reports that this is normal for the child since toilet training. During a family history taking, the mother discloses that she wet the bed until age 12 years. The family reports the child is a profoundly deep sleeper who does not wake to alarms. They deny any other history of physical problems or any other traumatic physical or emotional events. They state that she has never had urinary tract infections in the past.

## CLINICAL DESCRIPTION

Nocturnal enuresis (NE) is defined in accordance with the International Children's Continence Society (ICCS) as "intermittent nocturnal incontinence." (1) Primary monosymptomatic nocturnal enuresis (PMNE) is defined as lifelong continuous "enuresis without any other history of lower urinary tract symptoms and without a history of bladder dysfunction." (1) For all other children who do not fit these criteria, the broad term nonmonosymptomatic nocturnal enuresis (NMNE) is used. Children with NMNE may have a variety of different reasons for their enuresis, which should not be thought of as homogenous in cause or treatment. Reasons can include urinary tract infections, diurnal enuresis, and known anatomical or neurologic bladder dysfunction. A subset of children with NE who previously have had a dry period for 6 months or longer are characterized as having secondary NE. The need for differentiation of these terms is important because it is clear that treatment and success of treating these conditions vary greatly among the different categories. This review focuses on helping the clinician differentiate in a clinical setting the different subgroups of NE and initiate therapy appropriate for the subgroup identified.

## PHYSIOLOGY

Children with PMNE can have a variety of different and overlapping physiologic variants that cause them to have incontinence. Central to PMNE is an inability of the child to awaken to the stimulation to void. Nearly every family will tell you that their child is a very heavy sleeper and that they do not wake to many types of physical or audible stimulation at night. Although sleep studies have been conflicting at finding a single type of sleep problem in these children, the lack of arousal is what characterizes these children and

separates them from children with nocturia in which the child awakens to void. It is therefore important to understand that difficulty with sleep arousal is central to virtually all children with all types of NE.

Another group of children with PMNE will have nocturnal polyuria (NP) as part of their condition. This condition is defined as urine production greater than 130% of the child's expected bladder capacity (EBC). The EBC is defined using the following equation:  $EBC = 30 \text{ mL} + (\text{age in years} \times 30 \text{ mL})$ . It is important to evaluate children with NP for conditions that raise the likelihood of nocturnal diuresis, such as sleep disordered breathing, heart abnormalities, metabolic conditions, and/or excess nocturnal fluid and solute intake. Sleep disordered breathing in particular has been the subject of many studies and is well known to cause or be associated with PMNE.

Some children with PMNE will have small bladder capacities. Bladder capacity can be determined by using the voiding diary and maximum voided volume to look for a pattern of frequent small volume voids during the day and should be considered especially likely when the maximum voided volume on the voiding diary is less than 50% of the EBC. Another group of children may have overactive bladders that do not manifest during the day or are not elicited by the history and voiding diary. Conditions in these children can be difficult to diagnose without using urodynamics, but prior studies have clearly found that this can be an important reason for the PMNE in a small subset of children.

Although sleep arousal abnormalities, NP, sleep disordered breathing, small bladder capacity, and overactive bladder can be independent causes of PMNE, in most children these factors can occur in combination, with many children having 2 or even 3 of these factors. In many cases, there is a strong genetic or familial cause that can further complicate this and can be elicited by taking a thorough family history. In our case presentation, it would seem that Brittany has a clear genetic component to her enuresis, sleep arousal difficulty, and possibly NP complicated by constipation.

## EPIDEMIOLOGY

NE is a common condition in early childhood that decreases in prevalence as children approach adolescence. NE is ubiquitous in the newborn and is part of the infantile voiding pattern. A total of 10% to 15% of children will still wet the bed by age 6 years. Up to 15% of children will outgrow the condition annually in the teenage years so that only 1% to 2% of people will still have PMNE into adulthood. (2)(3) The condition is more common among boys and in children with a first-degree relative with a history of PMNE. If one parent

has a history of PMNE, then up to half of their children will have it. If both parents had PMNE, then up to three-fourths of the children will have it. PMNE is seen more commonly in children with attention-deficit/hyperactivity disorder, which frequently represent challenging cases for treatment.

## EVALUATION OF NE

The evaluation of the child with NE starts with a complete history and physical examination. Although a complete history is ideal, not every pediatrician has the time on the initial visit to address all the clinical history details associated with enuresis. A rapid screening series of questions can accurately categorize most children with NE. These questions are listed in Table 1. The main goal of the questions is to accurately characterize the type of NE that should in turn guide a more efficacious treatment plan.

If the pediatrician has the time to perform a more thorough history, then the following components should be addressed. How many nights per week does the child wet? What is the perceived volume of nocturnal leakage? What is the child's bedtime routine, and what is the evening fluid consumption? Has the child been dry for 6 months or longer? Does the child have a history of urine control problems during the day, including daytime incontinence, significant urgency or frequency, or urinary tract infections? Although classic voiding dysfunction that involves abnormal pelvic floor muscle control during voiding is difficult to discern on a history, certain specific questions focused on posturing or other physical behaviors to suppress urination should be elicited. A history of straining to urinate, urinary retention, feeling of incomplete emptying, and/or a start-stop pattern of voiding should raise suspicion for an underlying voiding problem.

Constipation is commonly associated with NE, and many families may not be aware that their child is constipated. Directed questions about fecal elimination habits must be elicited. How often does a child have bowel movements? Are

the bowel movements associated with pain or bleeding? Does the child have stools of large enough caliber to clog the toilet? Does the child have unintentional fecal voiding? Because the visit is focused on the urination problem, some families may not be aware that their child has concomitant constipation, and the recognition and treatment of constipation are important if the child hopes to resolve the NE.

Does the child have sleep apnea, snoring, or other types of sleep disordered breathing? Is there a family history of NE? At what age did the affected relative resolve his/her enuresis? Many parents will tell you they have tried everything as in the case study, but it is important to ask specifically what has been tried and what the outcome was. It is important to identify significant psychological stressors in the child's life and specific questions about birth of new siblings, death of relatives, trouble in school, abuse, divorce, and other major life stressors should be asked.

The final questions should focus on the degree to which the child is interested in treatment and the degree to which the child is bothered by the problem. The family and not the child are frequently most affected by NE, and treatment that involves behavior modification is unlikely to be successful when the child is not motivated to participate. The greatest effect to the child with PMNE is psychological, and it is important to ask specifically whether the NE affects the child. Does it limit going to friends' houses or camps? Does it cause the child social isolation? Does the child feel that there is something wrong with him/her? Children with NE should never be punished for the incontinence because it is not consciously controlled and punitive therapy has no basis in the treatment of this condition.

The physical examination of a child with NE should focus on the identification of findings that would identify underlying disorders in children with NMNE. A genital examination should focus on identifying labial adhesions in girls and meatal stenosis in boys. Girls with continuous leaking of fluid from the vagina or perineum should make the

TABLE 1. **Rapid Screen to Determine Type of Enuresis**

QUESTION	IF RESPONSE IS POSITIVE, THEN CONSIDER
Previously dry for 6 months	NMNE or SNE
Associated with daytime urine control issues	NMNE
Constipation or fecal soiling	NMNE
Severe recent stress	SNE
If responses to all above questions are negative, then consider	MNE

MNE=monosymptomatic nocturnal enuresis; NMNE=nonmonosymptomatic nocturnal enuresis; SNE=secondary nocturnal enuresis.

examiner concerned for an ectopic ureter as the source of the enuresis. The clinician should be able to identify the anus, vaginal opening, and urethral opening. If the vaginal and/or urethral opening is not seen, then labial adhesions might be present. Checking the skin of the genital area may help identify children who have skin changes from chronic wetness or irritation. It is important to check the underwear of the child to assess for wetness and stool streaking. Stool around the anus may be a product of poor wiping but might be indicative of encopresis or constipation. Perianal tears or fissures may suggest longstanding constipation.

A neurologic examination checking for perineal sensation will help identify underlying spinal cord disease. It is also important to closely examine the sacrum and lumbar spine. Sacral dimples, tufts of hair over the midline, and abnormal or asymmetric gluteal cleft should raise the examiner's suspicion of an underlying spinal cord problem, such as tethered cord, cord lipoma, or persistent dural sinus. An abdominal examination to check for a palpable bladder and for significant palpable stool in the left lower quadrant should be performed. When indicated by the history, an evaluation of the oropharynx should be performed to determine the location and size of the tonsils.

In all children with NE, according to the International Continence Society (ICS), the only mandatory screening laboratory should be urinalysis. (4) This is useful to identify renal disease in cases where proteinuria or hematuria is present and to rule out urinary infection as the cause of the NE. Occult cystitis may not be elicited by a history or physical examination, and a urinalysis should be able to detect this. If the child has a low specific gravity, then diabetes insipidus or other causes of polyuria should be considered.

In most cases, it is appropriate for the pediatrician and certainly the enuresis specialist to have the family complete an elimination diary. This diary should consist of a stool and bladder diary that documents the timing and volume of voids, number and type of stools during the day, and characterization and documentation of any urine or stool leakage. A diary should also be kept to document fluid intake. Documentation of the volume of nocturnal urine production by weighing nighttime undergarments or sheets should be attempted in hopes of identifying children with NP. This is difficult and rarely achieved or performed correctly. For the voiding diary, it is important for families to have a urinal or receptacle to measure the volume of the voids. Measurement of the urine volume outside the house is not recommended, but on a weekend when the family is at home it is useful to record the actual voided volume for the day and for each void. By establishing the child's maximum voided volume during the day, it gives an estimate of the child's bladder capacity.

This should be mandatory for all specialist evaluations of children with NE and especially those who have had treatment failure because this helps identify children who have small bladder capacity or excessive urine production. The fluid intake will help identify children with increased solute or fluid intake. Although not mandatory, recording the type of fluids the child is drinking can be important, especially if the child is consuming large volumes of caffeinated beverages because these may have a diuretic effect and create overactivity in the bladder. These types of beverages should be reduced or eliminated from the child's diet and especially eliminated before bed.

## TREATMENT OF PMNE

### Lifestyle

Treatment for PMNE depends greatly on factors identified in the history, physical examination, and elimination diaries. The ICCS outlined 2 first-line treatments for children with PMNE. The 2 treatments are desmopressin and the bed alarm. Each of these 2 treatments is supported by Level I evidence from randomized clinical trials and has been subjected to Cochrane reviews and should be initiated in children only after careful evaluation to eliminate other psychological or physical causes of NE. Although the 2 first-line treatments deserve careful discussion, there are a few guidelines to which all children with PMNE should adhere. All children with PMNE should attempt to limit their fluid and solute consumption during the evening hours only. It is important that children have adequate hydration during the day and at school so that excessive thirst or dehydration is not occurring by the end of the day, causing the child to need more fluid intake in the evening. Some children with bladder dysfunction or bathroom-related anxieties will limit their fluid intake at school and will consume most of their fluid for the day in the few hours before bed. This is problematic in that it makes the NE difficult to treat and covers up what may be a more significant daytime problem. A good rule of thumb is for the child to consume two thirds of their fluid before the end of the school day and then one-third of the fluid in the evening with no further fluid consumption in the last hour before bed. This plan ensures adequate daytime hydration and attempts to limit NP. For children with PMNE who have activities in the evening, such as sports or other physical activities, this routine can be tricky to accomplish. In general, limiting fluids should never supersede adequate hydration for a child. Children with PMNE should try to establish a stable and reliable bedtime routine. Stable sleep patterns that result in a well-rested child lessen situations of excessive fatigue where the child is more difficult to arouse to internal and external

stimulation. Finally, all children with PMNE should empty their bladder before going to sleep and should void again whenever they wake up at night as well. (2)(4)(7)(8)

### The Alarm

The bedwetting alarm is 1 of 2 first-line interventions recommended by the ICCS for children with PMNE. (4) The bedwetting alarm is focused on altering the sleep arousal associated with voiding. Bed alarms can be effective using vibratory or auditory stimuli or both. In the authors' experience, the auditory alarms seem most effective because they alert the parents that the child has had a wetting event. Use of the alarm can involve the whole family. The alarm should be used consistently, and the child should be motivated to participate. The child may not awaken initially, so the parents should awaken the child when the alarm sounds. On awakening, the child should void in the bathroom and then assist their parents in changing their bedding before returning to bed. Use of the alarm can take many weeks to months to work. Although the exact mechanism of action of the alarm is not completely understood, the effects are not limited to sleep arousal alone. Many studies have found that bladder capacity at night increases with use of the alarm.

Of all the treatments for PMNE, the alarm is one of the most effective and has the best long-term cure rate. The alarm is the most durable treatment for children with PMNE. In children who have a good response while using the alarm, only a small percentage will have a relapse after discontinued use of the alarm. In a Cochrane Review of randomized trials, the alarm was associated with a positive response in up to two-thirds of patients. (9) A number of clinical guidelines from multiple countries recommend the alarm as first-line therapy. (2)(4)(7) According to the ICCS, the alarm should be tried for at least 2 to 3 months. If treatment is effective, then it is recommended to continue use of the alarm until at least 14 consecutive dry nights are achieved. If a relapse occurs, then a second trial of alarm therapy can be successfully used.

### Desmopressin

Desmopressin is a vasopressin analogue that reduces the amount of urine produced at night. In a Cochrane Review of clinical trials, the use of desmopressin compared with placebo desmopressin led to dryness in 20% to 30%, and up to 40% of patients may have had a partial response. (2)(5) Desmopressin is particularly useful in children with NP. Although success with desmopressin is favorable, the relapse rate is higher than the alarm but wide ranging in the literature.

Families and patients should be counseled about the risk of hyponatremia associated with desmopressin. It is especially important to limit fluid intake at night when the medication is used. The risk of this complication is higher when the nasal spray is used. Because of this, the nasal spray is not recommended, and instead the oral preparation is preferred. A number of guidelines recommend limiting fluid consumption starting 1 hour before the medication is given and until the child wakes the next morning. The ICCS guidelines recommend limiting a child's evening intake to 200 mL. (4) The tablet dose ranges from 0.2 to 0.4 mg. The effect is usually seen shortly after starting use of the medication. Long-term use does not seem to be harmful, but many of the guidelines suggest withdrawal of the medication every 3 months as a way to check and see whether the child still needs desmopressin and to allow the child a brief period of not taking the medication. (4)(7)

### Anticholinergics

Anticholinergics, oxybutynin and tolterodine, are not recommended first line treatment in any child with PMNE. There are certain specific instances when their use is justified and recommended. In children with small bladder capacity by voiding diary or history consistent with over-activity anticholinergics can be very effective as adjunctive therapy. The ICCS recommends its use only after DDAVP or the alarm therapy has failed. (4) There is randomized data showing that combination therapy with DDAVP and anticholinergic medication is superior to DDAVP alone in children with small bladder volumes and refractory enuresis. Recommended starting dose is 5mg of oxybutynin or 2 mg of tolterodine at bedtime. Since these medications decrease bladder activity it is important for children to be instructed in proper voiding techniques and frequency to limit post-void residual urine volume. A common side effect of anticholinergic medications is constipation and this may also impact the success of this therapy. Any child being treated with anticholinergic medication should be routinely monitored for constipation and treated when indicated.

### Imipramine

Imipramine and other tricyclic antidepressants have been used in children with PMNE with reasonable success. They are not considered first-line agents based more on their risk than on their benefit. Their benefit has been established with many clinical trials, and a Cochrane Review found that approximately 20% of children will achieve dryness (similar to desmopressin). (10) The relapse rate for imipramine is high, with more than 90% of children experiencing PMNE recurrence when use of the medication is stopped. The dose

TABLE 2. Potential Reasons for Treatment Failure of Enuresis

CAUSE	NEXT STEP
Constipation or retained fecal burden	Bowel regimen
Occult voiding dysfunction	Behavioral therapy, postvoid residual volume, uroflowmetry
Treatment compliance failure	Family goal discussion and assessment of child's interest in participation
Neurologic condition	Detailed neurologic examination and consider lumbar magnetic resonance imaging
Psychological stressors	Psychological evaluation and counseling as needed
Metabolic concerns	Laboratory evaluation and consider endocrine referral
Sleep disorders	Sleep laboratory referral with polysomnography
Sleep disordered breathing	Sleep specialist referral or otolaryngologist referral

of imipramine is 25 to 50 mg at bedtime. Similar to desmopressin, the medication should be tapered or withdrawn every 3 months to check for resolution of the PMNE and to allow the child some time not taking the medication.

Imipramine has seen a decrease in use secondary to its safety concerns. Imipramine has been found to have a risk of QT prolongation in children, and a careful cardiac history for the child and the family should be obtained before starting use of the medication. Sudden cardiac death in a family history should raise concern for QT prolongation. Imipramine has other adverse effects, but these are milder and less serious. Some data suggest that imipramine might be useful in children with refractory PMNE and attention-

deficit/hyperactivity disorder in whom first-line treatments with either desmopressin or alarm therapy have failed. Current guidelines suggest that use of imipramine be limited to specialty centers with extensive experience treating PMNE. (4)

#### Other Treatments

A recent Cochrane review of alternative therapy, including hypnosis and acupuncture, had insufficient data to recommend their use in children with PMNE based mostly on the poor quality of the data available for analysis. (11)(12) It is not recommended that these therapies be tried as first-line therapy but may be incorporated in a more complex treatment

TABLE 3. Possible Treatment Protocols in MNE

TYPE OF MNE	TREATMENT
All cases	Limit fluids before bed ( $\leq 200$ mL)
	Void before bed
	Regular sleep and wake schedule
Classic PMNE	Alarm (first)
	Desmopressin (second)
Nocturnal polyuria	Desmopressin
Sleep disordered breathing	Sleep study or referral to an otorhinolaryngologist
Small bladder capacity	Alarm
Overactive bladder (suspected)	Desmopressin and oxybutynin
	Alarm and oxybutynin
Small bladder and nocturnal polyuria	Desmopressin and alarm (consider oxybutynin as well)

MNE=monosymptomatic nocturnal enuresis; PMNE=primary monosymptomatic nocturnal enuresis.



plan for refractory children. A recent review summarized the available data and found that hypnotherapy in a case series could have effects similar to imipramine with a lower relapse rate. (13) Hypnotherapy involves placing the child in a trance-like state and making a suggestion to the child to awaken when he/she needs to void at night. Optimal number of treatments and duration of treatment are not known.

Acupuncture data vary greatly in the literature, with few quality randomized trials allowing for direct comparison to other forms of treatment. In the limited number of series available, success rates have ranged widely, with some reported success rates higher than with the alarm therapy and some with rates far below. These treatments, although promising, need more data from quality randomized trials before recommending them for use in children with PMNE.

## REFRACTORY CASES OF NE

For children with therapy-resistant NE, it is important for the primary care physician or specialist to investigate possible causes for this. Table 2 outlines potential causes of treatment failure and offers suggestions for the next step in management. Because constipation is difficult to diagnose, it can be a frequent cause of treatment failure and deserves special mention. A number of studies have reported that in children with both constipation and PMNE, a significant number would resolve their PMNE through treatment of constipation alone. Constipation may limit the bladder's ability to expand and contribute to bladder overactivity, thereby decreasing the likelihood of success with first-line treatments for PMNE. Direct questioning about type, size, and frequency of stool and possibly using a stool diary should be encouraged in these children with refractory NE.

## Secondary Enuresis

Secondary enuresis exists when the child with bedwetting has been previously dry for more than 6 months consecutively. The evaluation and management are essentially the same as for any child with a history of PMNE, but special attention should focus on possible underlying psychiatric or emotional problems. (14) Questions directed toward major life events (birth of a sibling, death of a relative, parental divorce, or a recent move), school problems, or psychologically stressful situations should be investigated.

## NMNE

For children with NMNE the ICCS recommends that the daytime elimination problem, either voiding or stooling, be addressed before starting any therapy for the NE component. (4) Typically, this involves regimented stooling and voiding

patterns and may involve referral to a specialist. These children may benefit greatly from urotherapy (biofeedback, timed voiding, pelvic floor training, double voiding, and/or anticholinergic medications) and behavioral modification and frequently require renal bladder ultrasonography, non-invasive uroflowmetry, and measurement of a postvoid residual. Although this article makes the clear distinction between PMNE and NMNE, the reality of clinical diagnosis is less clear. There is likely a large overlap between these conditions, and only by in-depth evaluation can some of these subtle voiding and stooling conditions be elicited.

## Summary

- On the basis of strong evidence, although primary monosymptomatic nocturnal enuresis (PMNE) is common and most children will outgrow the condition spontaneously, the psychological effect to the child can be significant and represents the main reason for treatment of these children.
- On the basis of international consensus panels, treatment of PMNE should be targeted toward the specific type of bedwetting patterns the child has, using bladder diary, sleep history, and daytime elimination concerns as a guide (Table 3).
- On the basis of international consensus panels, it is important for the primary care physician to be able to differentiate children with PMNE from children with nonmonosymptomatic nocturnal enuresis (NMNE) and secondary nocturnal enuresis.
- On the basis of international consensus panels, children with NMNE should have their underlying voiding or stool problem addressed before initiation of therapy for the nocturnal enuresis.
- On the basis of strong evidence, both the bedwetting alarm and desmopressin are considered first-line therapy for children with PMNE.

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## Parent Resources from the AAP at HealthyChildren.org

- English: <http://www.healthychildren.org/English/health-issues/conditions/genitourinary-tract/Pages/Nocturnal-Enuresis-in-Teens.aspx>
- Spanish: <http://www.healthychildren.org/spanish/health-issues/conditions/genitourinary-tract/paginas/nocturnal-enuresis-in-teens.aspx>



## PIR Quiz

1. An 8-year-old girl has bedwetting almost nightly. A voiding diary reveals that the maximum amount of urine voided during the day is 150 mL. You are MOST likely to recommend:
  - A. Abdominal upright radiology.
  - B. Magnetic resonance imaging of the lumbar spine.
  - C. Psychological evaluation.
  - D. Sleep study.
  - E. Urodynamic studies.
2. A 7-year-old boy has nightly bedwetting. His parents would like to implement both behavioral and pharmacologic interventions. You counsel them to wait to implement these strategies. The historical information MOST likely to cause you to make this suggestion is:
  - A. Both parents having a history of primary monosymptomatic nocturnal enuresis.
  - B. Boy being diagnosed as having attention-deficit/hyperactivity disorder (ADHD).
  - C. Boy's lack of interest in being continent at night.
  - D. Boy's symptoms of constipation.
  - E. Boy's symptoms of sleep apnea.
3. A 5-year-old girl was continent both day and night at age 3 years. She is now bedwetting at night. She has a daily bowel movement, not observed by parents. She sleeps heavily but wakes with a nightmare a few times per month. She is the oldest of 3 children with a 3-year-old sister and a newborn brother. She is doing well academically in her kindergarten classroom. On physical examination, height and weight are at the 50th percentile, and she has no skin lesions on her lower back. She is talkative and fidgety during the examination and asks to go to the bathroom when the visit is finished. The MOST likely cause of her recent bedwetting is:
  - A. ADHD.
  - B. Birth of her brother.
  - C. Constipation.
  - D. Sleep disorder.
  - E. Small bladder capacity.
4. A 6-year-old boy has never been continent at night. Both he and his parents are interested in intervention to help him stay dry at night. He has no constipation, sleeps well, and is performing well academically in school. Both of his parents wet the bed until they were 8 or 9 years old. The intervention you are MOST likely to recommend is:
  - A. Bedwetting alarm.
  - B. Bowel regimen.
  - C. Desmopressin at bedtime.
  - D. Imipramine at bedtime.
  - E. Psychological evaluation.
5. A 5-year-old boy has voiding incidents during the day and night and has never been dry. He has no skin lesions of his lower back, and his neurologic examination findings are normal. He has a daily bowel movement and has no bowel voiding incidents. His bladder capacity is 300 mL. He sleeps through the night. You are MOST likely to recommend:
  - A. Magnetic resonance imaging of the lumbar spine.
  - B. Psychological evaluation.
  - C. Scheduled daytime voiding.
  - D. Sleep study.
  - E. Urodynamic testing.

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