Nocturnal Enuresis in Children

Introduction

Nocturnal enuresis (bedwetting) is defined by the National Institute for Health and Care Excellence (NICE) guidelines as the involuntary wetting during sleep without any inherent suggestion of frequency of bedwetting or pathophysiology\(^1\). It is considered normal up to the age of 5 years, and is common up to the age of 10 years.

Children with nocturnal enuresis may have excessive nocturnal urine production, poor sleep arousal and/or reduced bladder capacity. Children with nocturnal enuresis may also have daytime urinary urgency, frequency or incontinence of urine.

Definitions\(^2\)

- **Primary nocturnal enuresis.** This is the recurrent involuntary passage of urine during sleep by a child aged 5 years or older, who has never achieved consistent night-time dryness. This may further be subdivided into:
  - Primary nocturnal enuresis without daytime symptoms: children who have enuresis only at night.
  - Primary nocturnal enuresis with daytime symptoms: those who also have daytime symptoms, such as urgency, frequency, or daytime wetting.

- **Secondary nocturnal enuresis.** This is the involuntary passage of urine during sleep by a child who has previously been dry for at least six months.

Primary enuresis most often represents developmental delay which resolves in time. In secondary enuresis the patient regresses after a period of continence, which requires the exclusion of underlying pathology - eg, a urinary infection.

Three aetiological factors are commonly involved\(^3,4\):

- A disorder of sleep arousal. The child is not wakened by the sensation of a full bladder.
- Bladder factors. There may be a low nocturnal bladder capacity and/or an overactive bladder. Emptying reflexes are not inhibited during sleep.
- Nocturnal polyuria. Affected children have been found to have low overnight vasopressin levels, and excessive production of dilute urine during the night.

Constipation may be an additional aggravating condition.

Epidemiology

Prevalence is reported as follows\(^3,5\):

- 8-20% of 5-year-olds.
- 1.5-10% of 10-year-olds.
- 0.5-2% of adults.

2.6% of children aged 7½ years wet their bed on two or more nights a week.
Risk factors\textsuperscript{[2, 3]}

There are a number of factors that predispose to persistent nocturnal enuresis.

- More common in males.
- More likely to persist if bedwetting is frequent.
- Common association with daytime incontinence, faecal incontinence and constipation. Association with delay in gaining daytime bladder control.
- Family history. Strong association with parental history of enuresis.
- Associated with sleep apnoea and upper airway obstructive symptoms (present in 30% of children with sleep-disordered breathing).
- More common in obese children (present in 30% of obese children).
- Enuresis is to be expected as a manifestation of developmental delay, in those with global developmental delay, with or without an associated syndrome such as Down's syndrome. Even without gross developmental delay, there is more likely to be persistent bedwetting in children with delayed developmental milestones, premature delivery or behavioural disorders such as hyperactivity or inattention deficits and autism spectrum disorders.
- There may be neurological problems such as spina bifida or cerebral palsy. Those with physical problems are more likely to have daytime enuresis or trouble with encopresis. Physical problems are a rare cause of nocturnal enuresis \textit{per se}.
- Stresses in the child's life, such as an admission to hospital with separation from the mother, or bullying, are more likely to cause secondary enuresis. The older the child, the more likely it is that psychological problems are the result of enuresis and not the cause.

Assessment\textsuperscript{[2]}

Identify the type. Establish whether it is primary or secondary, ie whether the child has previously been dry at night without assistance for six months.

- If primary, establish if there are daytime symptoms:
  - Abnormal frequency of urination - either too frequent (more than seven times/day) or infrequent (less than four times/day).
  - Urgency.
  - Daytime wetting.
  - Difficulty (straining) with poor stream.
  - Pain on urination.
  - Whether symptoms occur only in some situations - eg, avoidance of toilets at school.

- If secondary, ask about any medical, physical or environmental, social or emotional causes or triggers for the change (eg, bereavement, bullying, parental separation, etc)\textsuperscript{[1]}.

Primary nocturnal enuresis

Ask the following:

- How many times a night and how many nights a week?
- Do there seem to be large quantities of urine in the bed?
- Is there any pattern - what time does bedwetting occur?
- Does the child wake after wetting the bed?
- What is the daytime pattern of toilet use?
- Is there also constipation or soiling?
- Is there adequate fluid intake during the day?
- Does the child have easy access to a toilet at night? (Consider lighting, stairs, shared room, etc.)
- Are there developmental, attention or learning difficulties, or behavioural or emotional problems?
- What is the reason for the consultation? Is there a school trip or sleepover, or is long-term management required? Is the child troubled by the bedwetting?

Consider asking parents to keep a diary of symptoms.
In addition, for children with day time symptoms:

- Establish pattern of daytime symptoms. Consider whether they are situational (eg, avoiding going to the toilet at school).
- Assess for chronic constipation
- Assess for chronic/recurrent urinary tract infection (UTI).

**Secondary nocturnal enuresis**

- Ask when it started/how long it has been going on and whether it relates to a specific change/problem/event.
- Establish pattern of bedwetting as above:
  - How many times a night and how many nights a week?
  - Do there seem to be large quantities of urine in the bed?
  - Is there any pattern - what time does bedwetting occur?
  - Does the child wake after wetting the bed?

- Assess for underlying cause:
  - Constipation.
  - UTI.
  - Diabetes mellitus.
  - Behavioural and emotional difficulties.
  - Child maltreatment (especially if bedwetting is reported as deliberate or the child is being punished for bedwetting).

- Establish if the child considers this to be a problem and what they think to be the cause.

**Investigations**

Urinalysis is not recommended unless bedwetting is of recent origin, there are daytime symptoms, or symptoms are suggestive of possible infection or diabetes mellitus[^1].

Investigate (and treat) daytime symptoms before addressing enuresis - eg, symptoms suggestive of diabetes, UTIs or constipation.

Consider asking parents to keep a diary of the child's bedwetting patterns, daytime symptoms, toileting pattern and fluid intake.

**Management[^2, 3]**

First-line management of children with primary nocturnal enuresis without daytime symptoms is generally carried out in primary care: education, reassurance, advice on simple behavioural strategies, and prescriptions for short-term management for sleepovers and trips. For these children, referral to enuresis clinics may be required where treatment with alarms is being considered, or where first-line treatments have not been helpful. Once constipation and UTI have been excluded and treated, children with persistent daytime symptoms or secondary enuresis will need referral to secondary care for further investigation.

**Referral criteria**

Indications for a child to be further assessed in secondary care include:

- Children with nocturnal enuresis if they have severe daytime symptoms.
- Children with persisting secondary nocturnal enuresis in whom constipation and UTI have been excluded or treated.
- History of recurrent UTIs.
- Abnormal renal ultrasound results (not indicated as an investigation for isolated nocturnal enuresis).
- Known or suspected physical or neurological problems.
- Comorbid conditions (eg, faecal incontinence, diabetes, and attention, learning, behavioural, or emotional problems), or family problems.
- Those who have not responded to treatment in primary care after six months.
Management guidelines below refer to children who have primary nocturnal enuresis without daytime symptoms, and no criteria for referral.

**Conservative therapies**
- **Explanation and reassurance.** Explain that it is not the child's fault, it is a developmental stage for most and out of their conscious control, and there should not be any punishment for bedwetting. Explain that the vast majority eventually become dry at night, even without treatment.
- **Advise children to avoid caffeine-containing drinks before bedtime.**
- **Manage constipation where it is present.**
- **Children should pass urine every 2-3 hours during the day and be advised to avoid holding on when they feel the urge to pass urine.**
- **Simple behavioural therapies:**
  - More children become dry when rewarded, when lifted during the night or both.
  - Potentially ineffective and even harmful strategies, such as fluid restriction, retention control training (encouraging the child not to void for as long as possible to expand bladder capacity), should be avoided.
  - Rewarding agreed behaviour (eg, drinking adequately, voiding before sleep, and engaging in management) may be more effective than rewarding dry nights, which are out of the child's conscious control.
  - Although simple behavioural therapies are better than no active treatment, they are inferior to confirmed effective treatments.[6]

If the child is aged under 5 years, reassure parents that this is normal and usually resolves over time, without treatment. Some things may help:
- **Ensure adequate but not excessive fluid intake during the day (1000-1400 ml per day in a child aged 5 years), healthy diet and avoidance of caffeine-based drinks before bed.**
- **Encourage the child to empty their bladder before bed, and ensure there is access to the toilet at night. A potty by the bed may help.**
- **If the child has been dry during the day for >6 months, a trial without nappies can be tried (waterproofing of the mattress will be required). Trial needs to be for at least two nights, longer if a reduction of wetness is achieved and the circumstances allow it.**
- **If the child wakes at night, encourage them to use the toilet before returning to sleep. Planned waking at regular times may have practical short-term success but there is no evidence it promotes long-term dryness.**
- **If there are some dry nights, a positive reward system may be tried (reward for drinking the right quantities during the day, toilet before bed, helping change sheets, but not taking rewards away for wet nights).**

Children over the age of 5 years:
- **Reassure children and parents that this is common and that most resolve over time. Treatment may not be required and a wait-and-see approach is one option.**
- **Elicit the child's view on the problem and whether they feel it needs treatment.**
- **Again, ensure adequate but not excessive fluid intake during the day:**
  - Age 4-8 years: 1000-1400 ml per day.
  - Age 9-13 years: 1200-2100 ml per day (girls); 1400-2300 ml per day (boys).
  - Age 14-18 years: 1400-2500 ml per day (girls); 2100-3200 ml per day (boys).
- **Advise regular use of the toilet during the day and before bed.**
- **If the child wakes at night, encourage them to use the toilet before returning to sleep.**

**Alarm training**

Alarm training is a first-line treatment for nocturnal enuresis and is the most effective long-term strategy[1].

A systematic review comparing alarm training with desmopressin (see below) found that overall, alarm training was more effective; several studies found that there was no difference between desmopressin and enuresis alarm during treatment for achieving dryness, but that the chance of relapse after treatment stopped was higher following desmopressin[7]. Adding alarm training to pharmacotherapy is also an effective second-line strategy for children with pharmacotherapy-resistant nocturnal enuresis[8].
Alarms can be borrowed through a local enuresis advisor or clinic, or bought from the children's bowel and bladder charity Education and Resources for Improving Childhood Continence (ERIC). Alarms are usually not suitable for children under the age of 7 years. Assess response after four weeks; stop only if there are no early signs of response. Continue until a minimum of 14 dry nights have been achieved. Assess and consider alternative treatment after three months unless still improving.

Desmopressin
Desmopressin should be offered first-line to children aged over 7 years where rapid control is needed (eg, for a sleepover or school trip) or where an alarm is inappropriate. Otherwise it should be used second-line after an alarm has been tried. It may be used in children aged 5-7 years if treatment is required under the same circumstances. If used following a trial with the alarm, desmopressin may be used initially with the alarm, unless the alarm is no longer acceptable.

- Desmopressin should be given orally or sublingually for the treatment of children with nocturnal enuresis. Start with Desmotabs® 200 micrograms at bedtime (increasing to 400 micrograms if there is no improvement after 1-2 weeks) or the sublingual DesmoMelt® 120 micrograms, increasing to 240 micrograms if there is no improvement after 1-2 weeks).
- Advise fluid intake should be restricted from an hour before taking the tablet, until eight hours afterwards to sips only. (Total intake during this time period should be a maximum of the equivalent of a regular glass of water.) This is to reduce the risk of fluid overload and hyponatraemia. Further measures to reduce this risk include avoiding non-steroidal anti-inflammatory drugs (NSAIDs) and not using desmopressin during an episode of diarrhoea and vomiting.
- Assess success after four weeks and continue for three months if there is some response.
- Desmopressin can be given 1-2 hours before bedtime in resistant cases (same rules about fluid restriction).
- If desmopressin is being used long-term, withdraw for one week every three months to see if dryness has been achieved.

Other medications
A 2016 Cochrane review found tricyclics to be effective at reducing the number of wet nights during treatment, but that the effect is not sustained after treatment stops, with most children relapsing, and that alarm therapy in comparison has better short- and long-term outcomes. Imipramine is approved for use in treating nocturnal enuresis in children aged 6 years and above but is reserved for treating resistant cases, due to the potential for severe side-effects and risks associated.

There was some evidence in the Cochrane review that tricyclics combined with anticholinergics may be more effective than tricyclic treatment alone. Anticholinergics have not been found to be effective alone. However, there is some evidence to suggest that combination therapy with anticholinergic therapy increases the efficacy of other established therapies such as imipramine, desmopressin and alarm training by reducing the relapse rates by about 20%.

Complementary and alternative therapies
Complementary and alternative therapies can be used but evidence of their effectiveness is limited by low-quality studies.

Options include hypnosis, acupuncture, herbal remedies, psychotherapy and chiropractic treatment.

Complications
- Bedwetting can be very distressing, especially for older children. It may lead to social isolation, bullying and low self-esteem. Whilst an expectant approach is appropriate for younger children, older children need a more active approach.
- Children may avoid social events or school trips
- If enuresis persists into adult life, there may be severe psychosocial problems affecting self-esteem, careers, social life and personal relationships. It is unpleasant to sleep with a bedwetter.
- Parents have extra work and cost of extra laundry and pull-up pants, along with the additional stress of caring for a child with enuresis. This may have an adverse effect on family finances. There is a risk that the child may be punished and subject to maltreatment.
Prognosis

The majority of children who do not have a serious neurological defect or severe learning difficulties can expect to achieve nocturnal continence sooner or later. Primary enuresis without daytime symptoms resolves in approximately 5-10% of children each year. Even after dry nights have been reliably achieved, the occasional ‘accident’ is still to be expected and is no cause for concern unless there is apparent regression. Those with a family history of late nocturnal continence, those with behavioural disorders and those with developmental delay will take longer. Boys tend to take longer than girls but all cases are highly variable.

In 1% of those affected, enuresis will persist into adulthood. One study found that children with the most severe form of bedwetting are likely to persist with the problem.

Further reading & references

- Bedwetting in children and young people; NICE Quality Standard, September 2014
- Bedwetting in under 19s; NICE Clinical Guideline (October 2010)
- Bedwetting (enuresis); NICE CKS, October 2014 (UK access only)
- ERIC (Education and Resources for Improving Childhood Continence)

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