

In collaboration with Cebam, Cochrane Belgium  
(<http://belgium.cochrane.org>)

# Alarm interventions for nocturnal enuresis: possibly effective but uncertainty as to best treatment remains

Anne-Catherine Vanhove<sup>1,2</sup>, Trudy Bekkering<sup>1</sup>, Filip Cools<sup>1</sup>

<sup>1</sup> Cochrane Belgium, Belgian Centre for Evidence-Based Medicine (Cebam)

<sup>2</sup> Centre for Evidence-Based Practice (CEBaP) of the Belgian Red Cross-Flanders

## Question

Is alarm training an effective treatment for nocturnal enuresis in children?

## Context

Nocturnal enuresis (bedwetting) is common in childhood and affects up to 20% of five-year-olds. It is defined as involuntary loss of urine at night at an age when a child could reasonably be expected to be dry (usually 5 years of age). It is thought that bedwetting occurs if there is a defective arousal response to the sensation of a full bladder, a lack of inhibition of bladder emptying during sleep, a low capacity or overactive bladder or excessive nocturnal urine production. Although bedwetting usually resolves spontaneously, it can affect children's quality of life and self-esteem.

Treatments for bedwetting include alarms, behavioural interventions and drugs. This Cochrane review assessed the effectiveness of alarm treatments. In alarm treatments, urine coming into contact with a sensor will trigger an alarm waking up the child. The sensor is either located in a pad placed on the bed under the child or is placed in the child's underwear in case of a body-worn alarm. The alarm will wake the children each time they wet the bed and eventually they learn to wake up in response to a distending bladder or they learn to contract their urethral sphincter to avoid bedwetting.

## Criteria for study selection

The Cochrane review included studies using enuresis alarms for treating bedwetting in children between 5 and 16 years old. The alarms were either used as monotherapy or in combination with other interventions and compared to no treatment or other treatments. The main outcomes of interest were the mean number of wet nights per week and the proportion of children achieving 14 consecutive dry nights at the end of treatment.

## Summary of the results

The review identified 74 trials with 5983 children in total. The duration of the alarm training ranged between 2 weeks and 6 months. Most trials included a follow-up period after the end of treatment. Only a few studies used a body-worn alarm. The alarm was most often an audio stimulus but vibration and electric shock were used too. Studies varied also in the different alarm stimuli (loudness, delayed triggering etc), in whether parents were also woken up, the reward systems, etc. The alarm was compared to no treatment or waitlist (18), a non-functioning alarm (1), placebo drugs or active drug treatment (24), behavioural interventions (10) or another version of the alarm treatment (13).

### Alarm training as monotherapy

Compared to no treatment, alarms may reduce the number of wet nights with 2.68 fewer wet nights a week (95% \* CI: 4.59 fewer to 0.76 fewer; 4 studies, 127 participants, low-certainty evidence). It may increase the proportion of children achieving 14 consecutive dry nights by the end of treatment (control: 133 per 1000 vs alarm: 958 per 1000 (95 CI 186-1000)); 18 studies, 827 children, low-certainty evidence) and more children may remain dry post-treatment (control: 18 per 1000 vs alarm: 177 per 1000 (95% CI 87-361)); 10 studies, 366 children, low-certainty evidence). Compared to placebo drugs, alarms may

increase the number of children that are dry at the end of treatment (2 studies, 181 participants, low-certainty evidence). Whether it also increases the number of dry nights a week remains uncertain (1 study, very low-certainty evidence).

Code-word alarms (in which children hear a pre-recorded personalised message when woken up that they are encouraged to remember in the morning) probably have little or no effect compared to control alarms on the number of dry nights or on the number of children becoming or remaining dry and there was insufficient evidence regarding adverse events to draw any conclusions (1 study, 353 children, moderate-certainty evidence). We are uncertain about the effects of the other types of alarms compared to each other (very low-certainty evidence).

The evidence suggests that alarm training compared to behavioural interventions (waking, bladder training, ...) or to desmopressin results in little or no difference in the number of wet nights a week and in the number of children that are dry at the end of treatment or at follow-up (low-certainty to moderate-certainty evidence). However, alarm treatment probably reduces the number of children with adverse events compared to desmopressin (desmopressin: 212 per 1000 vs alarm: 81 per 1000 (95% CI: 42-150); 5 studies, 565 children, moderate-certainty evidence). We are uncertain of the effects of alarm treatment compared to tricyclics, cognitive behavioural therapy, psychotherapy, hypnotherapy and restricted diet (very low-certainty evidence).

### Alarm training as adjuvant therapy

Alarm plus desmopressin compared to desmopressin alone may reduce the number of wet nights a week and increase the number of children successfully dry at the end of treatment and remaining dry at follow up (low-certainty evidence). Alarm plus dry-bed training versus dry-bed training alone may increase the number of children who become dry but there may be little to no difference in the number that remain dry (low-certainty evidence).

## Conclusion

Alarm therapy seems to be effective to treat bedwetting, but it remains uncertain whether it is more effective than other active interventions. Adding alarm treatment to treatment with desmopressin or dry-bed training may be more effective than desmopressin or dry-bed training alone.

## Implications for practice

As parents are often reluctant to start medication due to the potential risk of side effects, alarm therapy continues to be an important option to treat nocturnal enuresis.

### REFERENCE:

Caldwell PHY, Codarini M, Stewart F, Hahn D, Sureshkumar P. Alarm interventions for nocturnal enuresis in children. Cochrane Database of Systematic Reviews 2020, Issue 5. Art. No.: CD002911.

DOI: 10.1002/14651858.CD002911.pub3. Access the full text of these reviews via the Cebam Digital Library for Health ([www.cebam.be/nl/cdlh](http://www.cebam.be/nl/cdlh) or [www.cebam.be/fr/cdlh](http://www.cebam.be/fr/cdlh))

\* CI: confidence interval