

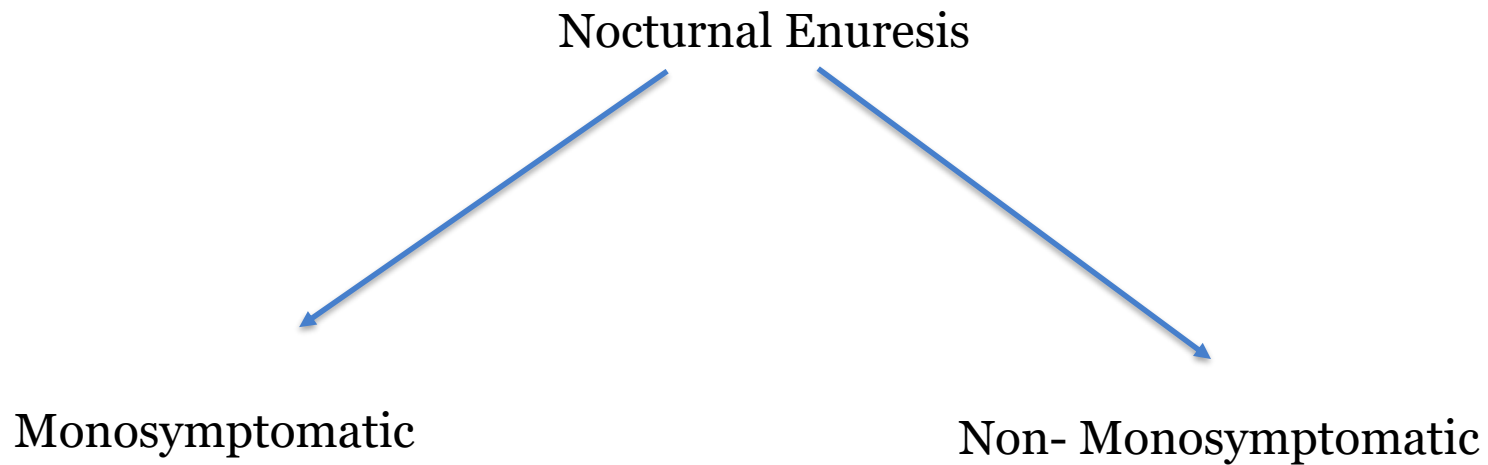
Nocturnal Enuresis

Kaitlyn Murphy, APRN

Children's Bladder and Continence Program



Nocturnal Enuresis





Journal of Pediatric Urology
Volume 9, Issue 2, April 2013, Pages 234-243



Educational article

Evaluation and treatment of nonmonosymptomatic nocturnal enuresis: A standardization document from the International Children's Continence Society

Israel Franco ^a  , Alexander von Gontard ^b , Mario De Gennaro ^c , the members of the International Children's Continence Society

 **Show more**

<https://doi.org/10.1016/j.jpurol.2012.10.026>

[Get rights and content](#)



The Journal of Urology

Volume 183, Issue 2, February 2010, Pages 441-447



Review Article

Evaluation of and Treatment for Monosymptomatic Enuresis: A Standardization Document From the International Children's Continenence Society

Tryggve Neveus ^a  , Paul Eggert ^b, Jonathan Evans ^c, Antonio Macedo ^d, Søren Rittig ^e, Serdar Tekgül ^f, Johan Vande Walle ^{g†}, C.K. Yeung ^h, Lane Robson ⁱ

 **Show more**

<https://doi.org/10.1016/j.juro.2009.10.043>

[Get rights and content](#)

Prevalence of Nocturnal enuresis

- Around 15–22% of boys
- 7–15% of girls wet the bed at 7 years of age,
- almost 3% wetting more than twice a week
 - (Butler, Golding, & Northstone, 2005).
- Combined (day and night) wetting has been reported in:
 - 3.3% of 7-year-olds (Butler et al., 2005)
 - And 4% of children aged 5–12 years (Bower, Moore, Shepherd, & Adams, 1996).

Prevalence Of Nocturnal Enuresis

- If a wetting frequency of more than one “wet night” per month is taken into account,
 - >10% among 6 year olds
 - Around 5% among 10 year olds
 - 0.5–1% among teenagers and young adults [\[17\]](#).
- The only epidemiological study analyzing children with NMNE is the British Alspac Study.
- Of 8242 7¹/₂-year-old children:
 - 15.5% wet the bed in total
 - 2.6% had a frequency of 2 or more wet nights per week
 - Of those children with frequent NE (2 or more wet nights per week), 68.5% were classified as monosymptomatic and 31.5% as ‘polysymptomatic’

Primary Evaluation

- History
 - Urgency
 - Holding maneuvers (standing on tiptoe, pressing the heel into the [perineum](#) etc.)
 - Interrupted micturition
 - A weak stream and the need to use [abdominal pressure](#) to pass urine.
 - Current or previous daytime incontinence
 - We also must know how often the child voids during normal days
 - The family should also be asked whether the child has had any [UTIs](#).

Primary Evaluation

- How often does it occur, every night or only sporadically?
- Has the child always been wetting?
- Does the child also have [nocturia](#)?
- [Somatic](#) and psychological comorbid
- Bowel Habits
- Fecal incontinence
- Developmental and psychiatric problems
- Sleep problems
- Apnea
- Snoring
- Parasomnias
- Restless leg syndrome

Primary Evaluation

- When do they drink most of their fluids
- When do they eat
- What are they eating
- What treatments have they used
 - Alarm
 - DDAVP
 - Imipramine
 - Timed voiding

Testing

- Urinalysis: YES!!
- Bloodwork: NO!!
- Routine ultrasound of the kidneys and upper urinary tract **is not warranted.**
- Post void residual is indicated if child has day time issues

Basic therapy recommendations

- Reduce fluid intake at night
- Make sure that meals are 3 hours before bedtime
- Regular sleep times
- No dairy i.e. milk or ice cream at dinner or forward
- Avoid highly sweet foods for desert or snacks at night
- Avoid highly salty foods and snacks at night
- If children play sports at night make sure they hydrate before and during sports activities and avoid over drinking after activity
- Hydrate during the day
- Regular type 4 BMs at least 4x/week
- Void before going to bed
- If in bed for an hour or more void before sleeping

Targeted Therapies For Nocturnal Enuresis

- Bladder Stretching
- Alarm Therapy
- DDAVP
- Anticholinergics
- Tricyclics
- New modalities and experimental avenues

Increasing Bladder Size: Hoeck et al J Urol 178:2132-2136

- 149 children broken into 5 groups
 - Placebo and Holding exercises
 - Holding exercises and oxybutynin
 - Placebo
 - Oxybutynin alone
 - Alarm treatment
- MNE response was significantly lower with all four groups (7%) when compared to the Alarm (73%)

Alarm Treatment For Nocturnal Enuresis

- Alarm treatment for nocturnal enuresis is form of type of CBT.
- It works in conjunction with positive reinforcement, as well as aversive, negative experiences, and has been shown to be highly effective after it was introduced by Mowrer and Mowrer in 1938.
- It is the most effective form of treatment of nocturnal enuresis with the best long-term results (grade I level of evidence according to several reviews and meta-analyses).
- Houts et al. compiled a systematic review and meta-analysis of 78 randomized studies on nocturnal enuresis; 62% were dry at the end of treatment and 47% at follow-up.
- The authors conclude that “urine alarm treatments should not only be considered the treatment of choice, but the evidence from this review suggests that cure rather than management is a realistic goal for the majority of children suffering from nocturnal enuresis”.

Desmopressin

- The [antidiuretic vasopressin analogue](#) desmopressin is also an evidence-based therapy (grade Ia evidence).
- As an estimate, 30% of children with enuresis are full responders and 40% have a partial response.
- Desmopressin is most efficient in children with nocturnal polyuria (nocturnal [urine production](#) greater than 130% of expected bladder capacity for age) and normal bladder reservoir function (maximum voided volume greater than 70% of expected bladder capacity for age).
- Other children who are likely candidates for desmopressin treatment are those in whom alarm therapy has failed or those considered unlikely to comply with alarm therapy.

Safety of Desmopressin

- Few side effects
- Low risks even when used for several years.
- There is a single safety concern. If combined with an excessive fluid intake, desmopressin can cause water [intoxication](#) with [hyponatremia](#) and [convulsions](#).
- Recent reports suggest that the risk of this complication is higher when the nasal spray is used.
- Consequently the enuresis indication has been removed for the nasal spray in many countries.
- [Polydipsia](#) is a contraindication to desmopressin treatment.
- A good rule of thumb is that an evening intake of 200 ml (6 ounces) or less and then no drinking until morning is well on the safe side.

Dosing of Desmopressin

- 0.2-0.6 mg nightly
- 1 hour before bedtime
- Not influenced by body weight
- Occasionally will go up to 0.8 mg but will obtain serum sodium levels at 1-2 weeks after start of therapy

0022-5347/04/1716-2586/0
THE JOURNAL OF UROLOGY®
Copyright © 2004 by AMERICAN UROLOGICAL ASSOCIATION

Vol. 171, 2586–2588, June 2004
Printed in U.S.A.
DOI: 10.1097/01.ju.0000108740.00453.b0

DESMOPRESSIN HAS AN INFLUENCE ON THE AROUSABILITY OF CHILDREN WITH PRIMARY NOCTURNAL ENURESIS

PAUL EGGERT,* ANJA FRITZ, BERIT STECKER AND DOMINIK MÜLLER

*From the Klinik für Allgemeine Pädiatrie der Christian-Albrechts Universität, Kiel and Charité Children's Hospital (DM), Berlin,
Germany*

- A prospective, randomized, placebo controlled, double-blind, crossover study was performed.
- Arousability was determined by a special bell apparatus with an adjustable sound pressure level.
- The wet nights per week and the results of the arousal tests were compared
- The number of wet nights per week decreased significantly with DDAVP treatment.
- Moreover 14 patients slept more soundly with DDAVP and only 4 were more difficult to awake after the medication. This difference was significant.
- Conclusions: This study revealed an effect of DDAVP on arousability of enuretic children as well as its previously known action for the treatment of primary nocturnal enuresis.
- This result is consistent with the known action of DDAVP on sleep of elderly adults..

PEDIATRICS
INTERNATIONAL

Official Journal of
the Japan
Pediatric Society



Original Article |  Full Access |

Gradual tapering of desmopressin leads to better outcome in nocturnal enuresis

Yoshiyuki Ohtomo , Daisuke Umino, Masaru Takada, Shuichiro Fujinaga, Shinichi Niijima, Toshiaki Shimizu

First published: 01 March 2015 | <https://doi.org/10.1111/ped.12614> | Cited by: 6

Anticholinergics and MNE

- Kass and Diokno J Urol 1979
 - 115 cases where urodynamic testing was performed on the patients
 - NE patients had nl bladders
 - Only 11% improved taking anticholinergics

Anticholinergics and Monosymptomatic Nocturnal Enuresis (MNE)

- Glazener, Evans and Peto Cochrane Database of Systematic Reviews Issue 1:2009
 - 7 studies found to include anticholinergics
 - 3 were with propantheline and 2 were in 1956
 - Rest included oxybutynin in comparison to other drugs or placebo
 - In no case did clean data indicate that an anticholinergic was better than imipramine or desmopressin for MNE

Anticholinergics: Combined therapy

- Monosymptomatic Nocturnal Enuresis (MNE)
 - Austin et al Pediatrics 122:1027-1032 2008
 - 34 pts divided into combined DDAVP 0.6 mg and Tolterodine 4 mg vs placebo
 - Using a generalized estimating equation approach they claimed a 66% reduction in wet nights

Anticholinergics and Non MNE

- In a Multicenter trial* utilizing DDAVP and Oxybutynin patients were stratified into MNE and Non MNE.
- Non MNE pts had a 54% improvement with oxybutynin alone and 71% success rate with DDAVP and oxybutynin

*Caione et al Eur Urol 1997:31:459-463

Imipramine: Mechanism of Actions

- Peripheral anticholinergic effects
- Central action affecting level of awareness
- Disrupts REM sleep
- Central action producing secretion of AVP*
- Has serotonergic and noradrenergic facilitation in the CNS
- The [active metabolite](#), desimipramine, is bound more to the [locus coeruleus](#) than to any other part of the central nervous system

*Tomasi et al BJU intl 2001:88:932-937

Imipramine and DDAVP

- Franco et al presented at AAP/ICCS meeting 2008
- Combination therapy in failed pts
- Maximum dose was 50 mg
- Success rate was 25/30 showed improvement in wetting
- 3 non responders
- Avg time to dryness was 1 month

Atomoxetine

- 87 pediatric subjects using an outpatient, multicenter, randomized, double-blind, parallel, placebo-controlled study
- 42 atomoxetine-treated and 41 placebo-treated subjects. Atomoxetine increased the average number of dry nights per week by 1.47 compared with .60 for placebo ($F = 7.06$; $df = (1, 75)$; $p = 0.01$).
- Fifteen atomoxetine-treated subjects (35.7%) had an increase of at least 2 dry nights per week compared with only 6 (14.6%) placebo-treated subjects (Fisher's exact test; $p = 0.042$).
- There were no significant differences in adverse events between the groups.

Placebo-controlled study of the effects of atomoxetine on bladder control in children with nocturnal enuresis.

[Sumner CR](#), [Schuh KJ](#), [Sutton VK](#), [Lipetz R](#), [Kelsey DK](#)

J Child Adolesc Psychopharmacol 2006; 16:699-711.



Original Article |  Full Access |

Atomoxetine ameliorates nocturnal enuresis with subclinical attention-deficit/hyperactivity disorder

Yoshiyuki Ohtomo 

First published: 08 August 2016 | <https://doi.org/10.1111/ped.13111> | Cited by: 2

- 24 were diagnosed with ADHD, and they were treated with atomoxetine (1.8 mg/kg/day) in addition to ongoing therapy for NE.
- Results:
 - After 8 weeks of atomoxetine, the average wet nights per months was significantly decreased: 18.5–4.6 in the MNE group ($P = 0.001$), and 22.1–12.4 in the NMNE group ($P = 0.0251$).
 - Overall, atomoxetine was beneficial in 19 of 24 patients.

Conclusions

- Nocturnal enuresis is a heterogenous problem that requires appropriate evaluation to define if it is monosymptomatic or non-monosymptomatic
- Alarm therapy is an appropriate treatment modality but it requires investment by the parents and child
- DDAVP is a safe & proven therapy for NE
- In refractory patients consider looking for neuropsychiatric problems that have been missed or are subclinical.

Questions



Email: kaitlyn.murphy@yale.edu