Voiding Dysfunction in Children - An Overview for the General Pediatrician

LA AAP Potpourri
August 23, 2015

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• “I do intend to discuss an unapproved/investigative use of a commercial product/device in my presentation.”
Educational Objectives

1. To understand the common terminology used to describe urinary incontinence
2. To outline the basic evaluation and treatment of daytime incontinence and enuresis
3. To appreciate reasons for referral and initiation of extended management of daytime incontinence and enuresis
4. To appreciate the difference between monosymptomatic nocturnal enuresis and nonmonosymptomatic nocturnal enuresis
A Little Pee, What’s The Big Deal?

- 20% of school-aged children will experience incontinence
- Incontinence accounts for 30-40% of visits to pediatric urologists
Evaluation of Management of Urinary Incontinence

• Outline of today’s talk:
  – Common terminology used to describe urinary incontinence
    • International Children’s Continence Society (ICCS) consensus statement
  – Evaluation and Management of
    • Daytime incontinence and Nonmonosymptomatic Nocturnal Enuresis (NMNE)
    • Monosymptomatic Nocturnal Enuresis (MNE)
  – Case discussion
Terminology

- Collective effort of International Children’s Continence Society (ICCS)
- Intended to avoid confusion in both research and clinical settings
- Allows better categorization of patients with implications for management strategies
Terminology

Subdivision of urinary incontinence in children

- Incontinence
  - Continuous incontinence
  - Intermittent incontinence
    - Day-time incontinence
    - Nocturnal incontinence, enuresis
Terminology

• Monosymptomatic enuresis
  – Condition
  – Enuresis without any other lower urinary tract symptoms

• Nonmonosymptomatic enuresis
  – Condition
  – Enuresis with lower urinary tract symptoms such as daytime incontinence, urgency, holding maneuvers, etc. (constipation)
Terminology

• Daytime Incontinence
  – Marked by considerable overlap in symptoms

• Overactive Bladder
  • Symptom
  • Based on urgency: sudden feeling of impending void
  • May or may not result in incontinence

• Urge Incontinence
  • Symptom
  • Urgency with resulting incontinence
Terminology

- **Daytime Incontinence**
  - Voiding Postponement
    - Symptom
    - Habitual postponement of micturation, often in specific situations, often using holding maneuvers
Standardisation Documents

On this page completed standardisation documents - as well as appendices and/or slides, if available - are posted as soon as they are finalised and published. These documents represent general recommendations and guidelines that have been agreed upon after discussions within the ICCS and consultation with other relevant expert organisations. Standardisation documents that are in production can be reviewed in draft form via the members’ section (password needed) and are open for comments by all paying ICCS members.

1. ICCS terminology document
2. Slides to ICCS document on MNE
3. Diagnostic Evaluation of Children With Daytime Incontinence
4. Evaluation of and Treatment for Monosymptomatic Enuresis
5. Monosympt Enuresis Appendices
6. The Management of Dysfunctional Voiding in Children

All suggestions or comments about this site should be addressed to the General Secretary
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http://i-c-c-s.org/standardisation-documents/
Daytime Incontinence
Clinical Evaluation
Clinical Evaluation

Diagnostic Evaluation of Children With Daytime Incontinence

P. Hoebeke, W. Bower, A. Combs, T. De Jong and S. Yang

From the Department of Pediatric Urology, Ghent University Hospital, Ghent, Belgium (PH); Department of Surgery, Chinese University Hong Kong, Hong Kong, China (WB); Department of Pediatric Urology, Columbia University, New York, New York (AC); Pediatric Renal Centre WKZ, University Children’s Hospital, Utrecht, The Netherlands (TDJ); and Division of Urology, Buddhist Tzu Chi University, Taipei, Taiwan (SY)

• Goals of Clinical Evaluation
  – Detailed history for risk factors for incontinence
  – Detailed exam to rule out anatomic cause
  – Use of imaging studies when appropriate

• Is incontinence physiologic versus pathologic?
Clinical Evaluation

• History
  – Prenatal findings to suggest structural GU anomaly
  – Developmental history and milestones
  – Medical history
    • Chronic illness?
    • ADHD?
    • GU history (UTIs, Surgery)?
  – Social/Psychiatric history
  – Toilet training
    • First Interest?
    • Duration?
    • Was complete dryness achieved?
Clinical Evaluation

• History
  – Current Voiding History
    • Continuous or intermittent incontinence?
    • Day, Night, Day and Night?
      – Situational vs. random?
      – How often?
    • Volume (soaked pants vs. damp underwear?)
    • Signs of postponement?
    • Rushing to the restroom?
    • Quality of stream, posture, muscle tone during void?
    • Distressing for the child?
Clinical Evaluation

• History
  – Current Stooling History
    • How often?
    • Consistency and size?
    • Abdominal pain or difficulty stooling?
    • Treatment for constipation?
    • Encopresis?

<table>
<thead>
<tr>
<th>Bristol Stool Chart</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
</tr>
<tr>
<td>Separate hard lumps, like nuts (hard to pass)</td>
</tr>
<tr>
<td>Type 2</td>
</tr>
<tr>
<td>Sausage-shaped but lumpy</td>
</tr>
<tr>
<td>Type 3</td>
</tr>
<tr>
<td>Like a sausage but with cracks on the surface</td>
</tr>
<tr>
<td>Type 4</td>
</tr>
<tr>
<td>Like a sausage or snake, smooth and soft</td>
</tr>
<tr>
<td>Type 5</td>
</tr>
<tr>
<td>Soft blobs with clear-cut edges</td>
</tr>
<tr>
<td>Type 6</td>
</tr>
<tr>
<td>Fluffy pieces with ragged edges, a mushy stool</td>
</tr>
<tr>
<td>Type 7</td>
</tr>
<tr>
<td>Watery, no solid pieces. Entirely Liquid</td>
</tr>
</tbody>
</table>
Clinical Evaluation

1. I pee in my underwear during the day:
   - Never
   - Day a week
   - 1-2 times
   - 2-3 times
   - 3-4 times
   - 4-5 times
   - Everyday

2. When I pee in my underwear, they are:
   - I don’t pee in my underwear
   - Almost dry
   - Damp
   - Wet
   - Soaked

3. In a normal day I go to the washroom to pee:
   - 1-2 times
   - 3-4 times
   - 5-6 times
   - 7-8 times
   - more than 8 times

4. I feel that I have to rush to the washroom to pee:
   - Never
   - less than half of the time
   - half of the time
   - more than half of the time
   - Everyday

5. I hold my pee by crossing my legs or sitting down:
   - Never
   - less than half of the time
   - half of the time
   - more than half of the time
   - Everyday

6. It hurts when I pee:
   - Never
   - less than half of the time
   - half of the time
   - more than half of the time
   - Everyday

7. I wet my bed at night:
   - Never
   - 3-4 nights per month
   - 1-2 nights per week
   - 4-5 nights per week
   - Every night
Clinical Evaluation

8. I wake up to pee at night:

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>3-4 nights per month</th>
<th>1-2 nights per week</th>
<th>4-5 nights per week</th>
<th>Every night</th>
</tr>
</thead>
</table>

9. When I pee, it stops and starts:

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>less than half of the time</th>
<th>half of the time</th>
<th>more than half of the time</th>
<th>Everyday</th>
</tr>
</thead>
</table>

10. I have to push or wait for my pee to start:

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>less than half of the time</th>
<th>half of the time</th>
<th>more than half of the time</th>
<th>Everyday</th>
</tr>
</thead>
</table>

11. I have bowel movements (poop):

<table>
<thead>
<tr>
<th></th>
<th>more than once per day</th>
<th>every day</th>
<th>every other day</th>
<th>every 3 days</th>
<th>more than every 3 days</th>
</tr>
</thead>
</table>

12. My stool (poop) is hard:

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>less than half of the time</th>
<th>half of the time</th>
<th>more than half of the time</th>
<th>Everyday</th>
</tr>
</thead>
</table>

13. I have bowel (poop) accidents in my underwear:

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>1-2 times per week</th>
<th>3 times per week</th>
<th>4-5 times per week</th>
<th>Everyday</th>
</tr>
</thead>
</table>

14. How easy was to answer these questions?

<table>
<thead>
<tr>
<th></th>
<th>Very easy</th>
<th>easy</th>
<th>neither easy or difficult</th>
<th>difficult</th>
<th>very difficult</th>
</tr>
</thead>
</table>

Afsar K, J Urol 2009
Clinical Evaluation

- Physical Exam
  - Abdomen
    - Palpable kidneys, bladder, stool?
  - Gross neurologic exam
  - Back
    - Spine including sacrum, gluteal cleft
  - Anus
    - Visual assessment of sphincter tone
    - Stool soiling
Clinical Examination

• Physical Exam
  – Genitalia-Boys
    • Pathologic phimosis with urine trapping
    • Meatus: location, patency
  – Genitalia-Girls
    • Labial adhesions
    • Presence of urine in vagina
    • Dermatitis
    • Active dribbling of urine
Clinical Evaluation

• Urinalysis
  – Rule out UTI
    • Leukocyte Esterase, Nitrite
  – Evaluate potential renal pathology
    • Proteinuria, Hematuria
  – Evaluate reasons for polyuria
    • Specific Gravity, Glucose
Clinical Evaluation

• Radiographic Evaluation
  – Renal Bladder Ultrasound
    • ICCS recommends screening ultrasound
    • Upper tract anomalies: hydronephrosis, hydroureter, renal duplication
    • Bladder wall thickness (difficult to correlate clinically)
    • Pre and post-void bladder imaging
    • Post-void residual urine measurement
      – Should be less than 10% of expected bladder capacity
      – Can use bladder scanners in clinic setting
        » Less accurate?
        » Less expensive
        » Not user dependent
Clinical Evaluation

TRANS BLADDER PRE-VOID

TRANS BLADDER POST-VOID--THRU CATHETER
Clinical Evaluation

• Radiographic Evaluation
  – Voiding Cystourethrogram
    • Should not be a standard component of evaluation for incontinence
    • Indicated for:
      – Known history of symptomatic UTI (fever)
      – Abnormal renal/bladder ultrasound
Clinical Evaluation

• Radiographic Evaluation
  – KUB
    • Assess stool burden
    • Especially in cases of equivocal clinical symptoms (or parental denial)
## Clinical Evaluation

### Voiding Diary: (Date)

<table>
<thead>
<tr>
<th>Time</th>
<th>Voided Volume</th>
<th>PO Intake</th>
<th>Accident</th>
<th>Bowel Movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>06:00</td>
<td>220cc</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>07:00</td>
<td></td>
<td>240cc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:00</td>
<td></td>
<td></td>
<td>Soaked</td>
<td></td>
</tr>
<tr>
<td>11:00</td>
<td>100cc</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12:00</td>
<td></td>
<td>360cc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14:00</td>
<td></td>
<td></td>
<td>Damp</td>
<td></td>
</tr>
<tr>
<td>15:00</td>
<td>240cc</td>
<td>240cc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17:00</td>
<td>150cc</td>
<td></td>
<td></td>
<td>Bristol 2</td>
</tr>
<tr>
<td>18:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19:00</td>
<td></td>
<td>300cc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21:00</td>
<td>230cc</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23:00</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>24:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>01:00</td>
<td></td>
<td></td>
<td>Soaked</td>
<td></td>
</tr>
<tr>
<td>02:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>940cc</td>
<td>1260cc</td>
<td>three</td>
<td>one</td>
</tr>
</tbody>
</table>
Clinical Evaluation

• Evaluation to this point can be reasonably done by the pediatrician

• Reasons for referral:
  – History of prenatal or postnatal GU pathology
  – Significant voiding symptoms
    • Continuous incontinence
    • Frequency (severe)
    • Straining to void
    • Abnormal urinary stream
Clinical Evaluation

• Reasons for referral (cont):
  – History of recurrent UTI or symptomatic UTI
  – Abnormal findings on physical exam
  – Abnormal findings on imaging studies

• First-line therapies can begin in others
Therapy - General Concepts

- Education is paramount to successful treatment
  - Explain **basic** voiding physiology
    - The bladder is a muscle that has to relax to store urine and contract to empty urine
    - The sphincter has to be closed to store urine and relaxed to empty urine
    - Babies empty by reflex once the bladder is full
    - To become potty trained, a child has to learn how to control the reflex
    - Incontinence can result from failure of any of the above
Therapy- General Concepts

• Reassurance is helpful
  – The natural history of pediatric incontinence is that the child will become dry
  – It is unlikely that something is ‘wrong’ with your child though it is ok to be concerned
  – Careful observation and treatment over time will help indentify children who may need more aggressive treatment
Therapy - General Concepts

• Expectations must be set
  – There is no magic pill
  – How long it will take a child to respond to therapy and eventually become dry is hard to predict
  – This will be hard work for everyone involved!
Therapy- General Concepts

- Daytime incontinence must be addressed before enuresis.
- Basic urotherapy is beneficial for both day and night symptoms.
- Focusing only on enuresis despite daytime symptoms will result in a high rate of therapy-resistant enuresis.
Therapy- Daytime Incontinence

• Most daytime voiding symptoms have a behavioral component
• Urotherapy is designed so caregivers can redirect voiding habits
• Any plan for urinary incontinence should includes these basic concepts
# Therapy - Daytime Incontinence

## Urotherapy

![Table 3. Recommendations for the Use of Behavioral Therapy.*](image)

<table>
<thead>
<tr>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove underpants and have child void in toilet at start of every day</td>
</tr>
<tr>
<td>Encourage child to avoid holding urine</td>
</tr>
<tr>
<td>Encourage voiding at least once every 2 hr, at least several times during school day, and often enough to avoid urgency and incontinence†</td>
</tr>
<tr>
<td>Facilitate easy access to school toilets with a note to the teacher</td>
</tr>
<tr>
<td>Have child drink a liberal amount of water during morning and early afternoon hours, a total of at least 30 ml per kilogram of body weight†</td>
</tr>
<tr>
<td>Minimize intake of fluids and solutes after dinner unless child is participating in evening sports or social activities†</td>
</tr>
<tr>
<td>Encourage a daily bowel movement, preferably after breakfast and before child leaves for school</td>
</tr>
<tr>
<td>Have child use optimal posture to relax pelvic-floor muscles, facilitating good emptying of bowel† ‡</td>
</tr>
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<td>Encourage the child to eat foods that soften stool and to avoid foods that harden stool</td>
</tr>
<tr>
<td>Encourage the child to engage in physical activity and discourage prolonged sitting in front of television or computer†</td>
</tr>
</tbody>
</table>

* These recommendations are based on clinical experience rather than the results of randomized trials.
† This recommendation is from Nevéus et al.⁴
‡ The optimal posture involves sitting in the middle of the toilet with heels flat on the ground or on a footstool.
Therapy - Daytime Incontinence

• Voiding Posture
Therapy- Daytime Incontinence

• Constipation Management
  – Constipation:
    • Stool in rectum results in reflexive increase in pelvic floor tone → poor bladder emptying
    • Stool in rectum compresses bladder → decreased bladder capacity
    • Distended rectum possibly increases parasympathetic signaling to bladder → increased bladder tone/contractions

Therapy - Daytime Incontinence

• Constipation Management
  – Diagnosis
    • Clinical history
      – North American Society of Pediatric Gastroenterology and Nutrition: “a delay in defecation, present for two or more weeks and sufficient to cause distress to the patient”
    • Rome III criteria
    • Bristol stool scale
    • Leech score →
Therapy- Daytime Incontinence

• Constipation Treatment
  – Clear impaction if present
  – Regular mealtimes with avoidance of grazing
    • Establish ‘GI rhythm’
  – Limit constipating foods
  – Increase fiber in the diet: Age + 5 grams/day
    • Insoluble > Soluble
  – Osmotic laxatives
    • Polyethylene Glycol: Miralax
      – Goal of Bristol 4 stools, 1-2/day
Therapy - Daytime Incontinence

- Limit potentially irritating foods and fluids
  - A lot of trial and error
  - General offenders
    - Caffeine
    - Sugar
    - Dyes (Red #40)
    - http://www.sugarydrinkfacts.org/
Therapy- Daytime Incontinence

• Medical Therapy
  – Anticholinergics
    • Emphasize that it is not a cure or a fix
    • Can be used temporarily while underlying causes of OAB are sought and behavioral therapy is instituted
Therapy- Daytime Incontinence

- Medical Therapy
  - Anticholinergic medications
    - Parasympathetic efferent fibers within the sacral plexus exert a stimulatory effect on the bladder via muscarinic receptors in the bladder wall
    - Anticholinergic medications block the muscarinic receptors.
## Therapy - Daytime Incontinence

- **Medical Therapy**

<table>
<thead>
<tr>
<th>Generic</th>
<th>Trade</th>
<th>Indication</th>
<th>Safety</th>
<th>Effectiveness</th>
<th>Etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxybutynin</td>
<td>Ditropan</td>
<td>Kids &gt; 5</td>
<td>Yes</td>
<td>Yes</td>
<td>Neurogenic population</td>
</tr>
<tr>
<td>Tolterodine</td>
<td>Detrol</td>
<td>None</td>
<td>Yes</td>
<td>Not Studied</td>
<td></td>
</tr>
<tr>
<td>All others</td>
<td>None</td>
<td>Not Studied</td>
<td>Not Studied</td>
<td>Not Studied</td>
<td></td>
</tr>
</tbody>
</table>
Therapy - Daytime Incontinence

• Medical Therapy
  – Oxybutynin Dosing:
    • Label: children > 5:
      – 5mg tab: one tab bid-tid
      – 5mg/5cc elixir: 5cc bid-tid
    • Off label: children < 5:
      – 5mg/5cc elixir: 0.2mg/kg tid*

*UpToDate, 8/9/12
Daytime Incontinence - Extended Evaluation

• For patients that have significant risk factors or fail first-line measures

• Benefits of referral
  – Placebo effect
  – Reassurance
  – Expertise to perform extended evaluation
    • Uroflowmetry/EMG
    • Urodynamics
  – Expertise to perform additional therapy
    • Biofeedback
Daytime Incontinence - Extended Evaluation

• Uroflowmetry/EMG
  – Simultaneous measurement of urine flow and pelvic floor tone
  – Velocity of flow is not as important as pattern
  – An interrupted flow accompanied by increased pelvic floor tone = dysfunctional voiding
    • Candidates for Biofeedback
Daytime Incontinence - Extended Evaluation

- Uroflowmetry/EMG
Daytime Incontinence - Extended Evaluation

- Uroflowmetry/EMG

![Graph showing uroflowmetry and EMG results]
Daytime Incontinence- Extended Evaluation
Daytime Incontinence - Extended Therapy

• Biofeedback
  – Therapy designed to allow cognitive awareness of body function
  – Use of EMG electrodes to demonstrates one’s ability to affect pelvic floor tone
  – EMG signal can be turned into age appropriate graphic and turned into a game
Daytime Incontinence- Extended Therapy

• Biofeedback
Daytime Incontinence

• Unless a pathologic condition exists, children will eventually respond to therapy or will ‘outgrow’ the incontinence.

• Time for developmental maturation is just as important as any one means of therapy.
Nocturnal Enuresis
Nonmonosymptomatic NE

• Treatment should focus first on the ‘non’
  – Daytime incontinence
  – Voiding dysfunction
  – UTIs
  – Constipation
  – Etc.

• Evaluation and treatment of NE can then commence
## Prevalence of Enuresis

<table>
<thead>
<tr>
<th></th>
<th>Age 7</th>
<th>Age 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>9%</td>
<td>7%</td>
</tr>
<tr>
<td>Girls</td>
<td>6%</td>
<td>3%</td>
</tr>
</tbody>
</table>
Standardized Treatment of MNE

Less than ½ of kids with enuresis are estimated to have MNE

Once MNE is diagnosed, directed therapies can be undertaken
Standardized Treatment of MNE

- Etiology of enuresis

- Increased arousal threshold

- Nocturnal polyuria

- Detrusor overactivity
Standardized Treatment of MNE

- General evaluation will parallel that done for daytime incontinence
- Special attention should be paid to nighttime routine
  - Daytime drinking habits?
  - Dinner time?
  - Drinks between dinner and bed?
  - Voids before bed?
Standardized Treatment of MNE

• Enuretic history
  – Primary vs. Secondary Enuresis
    • If secondary, what has changed?
    • Psychological stress?
  – Wets nightly?
  – Waking to void
    • By parents?
    • Spontaneously?
  – Past therapies?
  – Consider voiding diary
## Standardized Treatment of MNE

### Urotherapy

<table>
<thead>
<tr>
<th>Table 3. Recommendations for the Use of Behavioral Therapy.*</th>
</tr>
</thead>
<tbody>
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</table>

* These recommendations are based on clinical experience rather than the results of randomized trials.
† This recommendation is from Nevéus et al.4
‡ The optimal posture involves sitting in the middle of the toilet with heels flat on the ground or on a footstool.

Robson L, NEJM, 2009
Standardized Treatment of MNE

• Complex algorithms to determine if relative nocturia versus problems with sleep arousal are primarily responsible for enuresis
  – Difficult for providers and families

• A practical approach relies on one of two first line therapies
  – Bedwetting alarm
  – DDAVP
Standardized Treatment of MNE

• Bedwetting Alarms
  – Only curative treatment
  – Form of conditioning
  – Increased arousal with the act of voiding
  – Will be effective in >60% of children
  – May take up to 2-3 months for maximal benefit
  – Requires familial motivation and participation
  – Relapses often respond to an additional course of treatment
Standardized Treatment of MNE

- Bedwetting Alarms
  - bedwettingstore.com
  - Basic model:
# Standardized Treatment of MNE

- **Medical Therapy**

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<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Desmopressin</th>
<th>Anticholinergic Agent</th>
<th>Imipramine and Other Tricyclic Agents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence based</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Mechanism</td>
<td>Reduces nocturnal polyuria</td>
<td>Increases bladder capacity, reduces detrusor overactivity</td>
<td>Not clear(^4)</td>
</tr>
<tr>
<td>Considerations</td>
<td>Use as first-line pharmacologic therapy(^4); consider using for special occasions (sleepovers, camp)</td>
<td>Use as second-line pharmacologic therapy for children who do not have a response to other therapies(^4); consider using in combination with desmopressin</td>
<td>Use only as third-line therapy, when all other therapeutic options have failed(^4)</td>
</tr>
<tr>
<td>Efficacy</td>
<td>Cessation of bed-wetting in 3 to 48% of study subjects(^{27-29}); works as a control, not a cure — relapse expected after medication is stopped</td>
<td>Works as a control, not a cure — relapse expected after medication is stopped</td>
<td>Cessation of bed-wetting in about 20% of study subjects(^{30}); works as a control, not a cure — relapse expected after medication is stopped</td>
</tr>
</tbody>
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Robson L, NEJM, 2009
# Standardized Treatment of MNE

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<tbody>
<tr>
<td>Dose*</td>
<td>Tablets: 200–600 µg 1 hr before bedtime; fast-melting formulation: 120–360 µg 30–60 min before bedtime (consider this formulation for younger children who prefer not to swallow tablets)³¹</td>
<td>Oxybutynin tablets or syrup: 5 mg before bedtime; tolterodine tablets: 2 mg before bedtime</td>
<td>Tablets: 25–50 mg before bedtime⁴; do not exceed 75 mg before bedtime⁴</td>
</tr>
<tr>
<td>Adverse events</td>
<td>Water intoxication with headache, nausea, vomiting, decreased level of consciousness, seizure³²,³³; nasal-spray formulation labeled with black-box warning regarding increased risk of water intoxication — not recommended</td>
<td>Constipation, dry mouth, blurred vision, facial flushing, heat intolerance, mood change, increased residual urine</td>
<td>Mood changes, nausea, sleep disturbance; cardiotoxicity, with potential for death with overdose — medication should be securely stored, out of reach from children</td>
</tr>
<tr>
<td>Drug interactions</td>
<td>Nonsteroidal antiinflammatory medications and antidepressant medications may cause additional fluid retention⁴</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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* The doses for both formulations of desmopressin have been approved by the Food and Drug Administration (FDA) for children 6 years of age or older, and the doses for both formulations of oxybutynin have been approved by the FDA for children 5 years of age or older. Tolterodine has not been approved by the FDA for use in children.
Standardized Treatment of MNE

- Drug holiday is indicated with all meds
  - 6 months after effective therapy
  - DDAVP can be used on a situational basis
- Prevalence of enuresis drops to around 1% by age 15-16
  - Time will often be curative
  - Other therapies help bridge the gap
Incontinence

• Common problem
• Needs to be addressed systematically
  – Day before night
• Confounding factors need to be recognized
• Treatment will be hard work for providers and families
• Behavioral therapy is more important than medical therapy
• Most incontinence improves with time, treatment hopefully lessens time to resolution
Case

• 5 year old male with cardiofaciocutaneous syndrome and enuresis
  – Wets nightly
  – Wets during nap time
  – PCP orders
    • Ur Cx: negative
    • Renal U/S: normal
  – Referred to urology
Case

• Voiding history
  – Achieved daytime continence around age 3
  – Wets nightly since then
  – Also wets during nap time, even short naps
    • Otherwise no daytime incontinence
  – Complains of urgency without urge incontinence
  – Will make trips to bathroom that are at times unproductive
  – Daily BM without any noticed difficulty
  – No history of UTI
Case

• Other History
  – PMH:
    • Cardiofaciocutaneous syndrome
      – Mild ASD
      – Chronic dermatitis
      – Epilepsy
        » Keppra bid
    • No known neurologic deficits
  – Social Hx.
    • Kindergarten, lives with mom and dad
  – PCP suspects mild developmental delay
Case

• Exam
  – Gen: small for age, no eyebrows
  – Neuro: coordinated gate, grossly intact
  – Abd: soft, no palpable stool
  – GU:
    • Descended testes
    • NL phallus, circumcised

• UA: NL

• PVR: 15 cc
Case

• Assessment
  – NMNE
  – Suspected overactive bladder
    • Wetting during naps
    • Urgency
  – Unclear etiology
    • Neurologic?
    • Behavioral?

• Plan
  – Timed voiding
  – Awareness and avoidance of bladder irritants
  – Monitor stooling history
  – RTC 3 months
Case

• Follow-up visit
  – No significant change, persistent diurnal enuresis
  – Stools can be hard, BM qd-qod
  – KUB ordered
Case

• Started on Miralax
  – ½ to full capful qd
  – Titrate to Bristol 4 stool, 1-2x per day

• Continue behavioral voiding therapy

• RTC in 3 months
Case

- Returns in 3 months
  - Stooling every day on Miralax
  - Wetting during naps and urgency have resolved
  - Dry 1-2 nights per week
  - Continued bowel management and timed voiding
  - Discussed primary enuresis therapies, will continue to observe with above tx.
Incontinence

Thanks for your attention!

Questions?


