The 6th Family Medicine Review Course- Pediatrics in General Practice

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Outline

- Developmental Milestones
- Constipation
- Nocturnal enuresis
- Acute Limping in children
- Cow’s milk protein allergy

Developmental history

- Gross motor
- Fine motor
- Speech-language
- Cognitive
- Social-emotional

Gross motor key milestones

3 month: head control

6 month: (arms): leans on hands to support themselves while sitting, pushes up with straight arms when on tummy

9 months: (trunk): sits without support

12 month: (legs): pull to stand, 1st steps

18 month: run

3 years: tricycle, walks down stairs & upstairs with alternating feet

4 years: hopping

Red flag: not rolling or sitting by 9 month, not walking by 18 months

Fine motor key milestones

- 4 months: Hands to midline; reaches for objects
- 6-8 months: Palmar grasp
- 9-12 months: Pincer grasp
- 2 years: Uses spoon; copies vertical line
- 4-5 years: Draws 10+ part person; dresses with no buttons

Red flag: not transferring objects by 9 month, not scribbling by 18 month

Speech & Language key milestones

- 2-4 months: Visual Attention
- 6-9 months: Babbling
- 12 months: Language Emergence
- 2 years: 2-word combination, 50% intelligible
- 3 years: 3-word combination, 75% intelligible
- 4 years: phrased speech, 100% intelligible

Red flag: absent babbling by 9 months, no words or name recognition by 12 months

Social-emotional key milestones

- Stranger anxiety: 5-6 months
- Separation anxiety: 9-15 months
- Points to get desired objects: 12 months
- Hugs & kisses: 15-16 months
- Pretend play: 18 months
- Parallel play: 2 years
- Imaginary play: 3 years

When to Refer

- **When the parent is concerned**
- **Regression**
- By 9 months:
  - Not sitting well; decrease in vocalizations
- By 12 months:
  - No words or name recognition
  - Not pulling to stand
- By 18 months:
  - Less than 15 words
  - Social communication concerns

- AAP recommendations
  - Developmental screening at 9, 18 & 30 months
  - ASD screening at 18 & 24 months

Useful resources for development

Your baby at 9 months*

Baby's Name _____ Baby's Age _____ Today's Date _____

Milestones matter! How your baby plays, learns, speaks, acts, and moves offers important clues about his or her development. Check the milestones your baby has reached by 9 months. Take this with you and talk with your baby's doctor at every well-child visit about the milestones your baby has reached and what to expect next.

What most babies do by this age:

Social/Emotional Milestones
- ☐ Is shy, clingy, or fearful around strangers
- ☐ Shows several facial expressions, like happy, sad, angry, and surprised
- ☐ Looks when you call her name
- ☐ Reacts when you leave (looks, reaches for you, or cries)
- ☐ Smiles or laughs when you play peek-a-boo

Language/Communication Milestones
- ☐ Makes different sounds like "mamamama" and "bababa"
- ☐ Lifts arms up to be picked up

Cognitive Milestones (learning, thinking, problem-solving)
- ☐ Looks for objects when dropped out of sight (like his spoon or toy)
- ☐ Bangs two things together

Movement/Physical Development Milestones
- ☐ Gets to a sitting position by herself
- ☐ Moves things from one hand to her other hand
- ☐ Uses fingers to "rake" food towards himself
- ☐ Sits without support

* **It's time for developmental screening!** At 9 months, your baby is due for general developmental screening, as recommended for all children by the American Academy of Pediatrics. Ask the doctor about your baby's developmental screening.

Other important things to share with the doctor...
- What are some things you and your baby do together?
- What are some things your baby likes to do?
- Is there anything your baby does or does not do that concerns you?
- Has your baby lost any skills he/she once had?
- Does your baby have any special healthcare needs or was he/she born prematurely?

You know your baby best. Don't wait. If your baby is not meeting one or more milestones, has lost skills he or she once had, or you have other concerns, act early. Talk with your baby's doctor, share your concerns, and ask about developmental screening. If you or the doctor are still concerned:

1. Ask for a referral to a specialist who can evaluate your baby more; and
2. Call your state or territory's early intervention program to find out if your baby can get services to help. Learn more and find the number at **cdc.gov/FindEI**.

For more on how to help your baby, visit **cdc.gov/Concerned**.

Don't wait. Acting early can make a real difference!

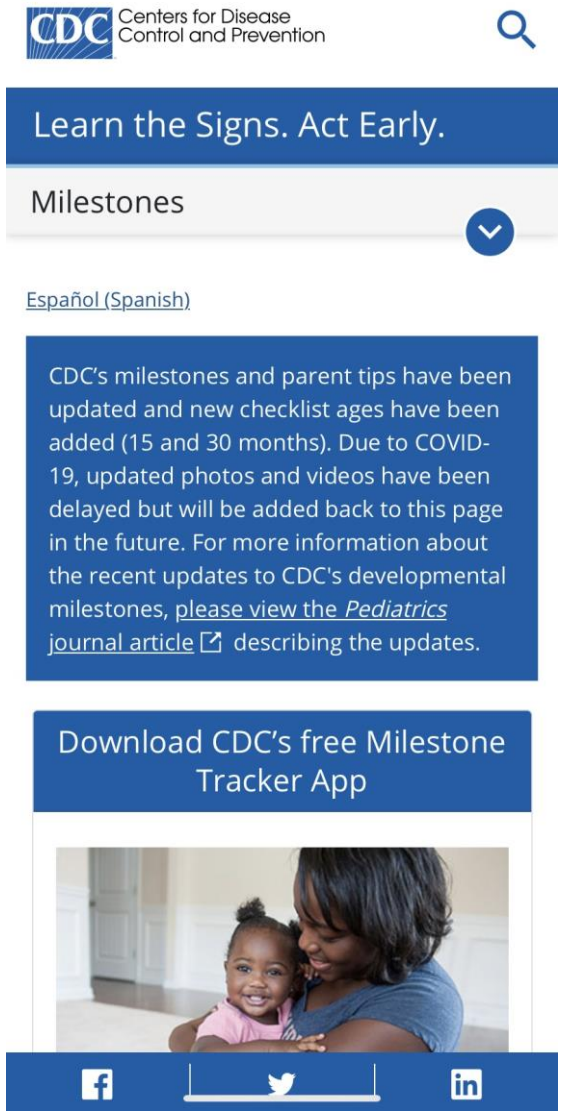
Download CDC's free Milestone Tracker app

American Academy of Pediatrics

Help your baby learn and grow

As your baby's first teacher, you can help his or her learning and brain development. Try these simple tips and activities in a safe way. Talk with your baby's doctor and teachers if you have questions or for more ideas on how to help your baby's development.

- Repeat your baby's sounds and say simple words using those sounds. For example, if your baby says "bababa," repeat "bababa," then say "book."
- Place toys on the ground or on a play mat a little out of reach and encourage your baby to crawl, scoot, or roll to get them. Celebrate when she reaches them.
- Teach your baby to wave "bye-bye" or shake his head "no." For example, wave and say "bye-bye" when you are leaving. You can also teach simple baby sign language to help your baby tell you what he wants before he can use words.
- Play games, such as peek-a-boo. You can cover your head with a cloth and see if your baby pulls it off.
- Play with your baby by dumping blocks from a container and putting them back in together.
- Play games with your baby, such as my turn, your turn. Try this by passing a toy back and forth.
- "Read" to your baby. Reading can be talking about pictures. For example, while looking at books or



CDC Centers for Disease Control and Prevention

Learn the Signs. Act Early.

Milestones

Español (Spanish)

CDC's milestones and parent tips have been updated and new checklist ages have been added (15 and 30 months). Due to COVID-19, updated photos and videos have been delayed but will be added back to this page in the future. For more information about the recent updates to CDC's developmental milestones, please view the *Pediatrics* journal article describing the updates.

Download CDC's free Milestone Tracker App

Constipation

- You are working in a primary care clinic. Your next patient is Nasser, a 5-year-old boy with no significant medical history. Nasser's mother explains to you that since starting KG earlier in the year, he has been having progressively worse periodic abdominal pain. When he has this pain he is cranky, refuses to eat, and has even vomited on a few occasions. She also explains that since starting school he has been having regular soiling accidents despite successfully potty training over a year ago. What could be causing these symptoms in a child like Nasser? Could these symptoms be caused by constipation?

Rome IV criteria for functional constipation(developmental age≥4 years)
At least 2 of the following present at least once per week for at least 1 month

- 2 or fewer defecations in the toilet per week.
- At least 1 episode of fecal incontinence per week.
- History of retentive posturing or excessive volitional stool retention.
- History of painful or hard bowel movements.
- Presence of a large fecal mass in the rectum.
- History of large diameter stools that may obstruct the toilet

The symptoms cannot be fully explained by another medical condition

The symptoms are insufficient to fulfill the diagnostic criteria of irritable bowel syndrome

Rome IV criteria for functional constipation(infants & toddlers up to 4 years old)
At least 2 of the following present for at least 1 month

- 2 or fewer defecations per week
- History of excessive stool retention
- History of painful or hard bowel movements
- History of large-diameter stools
- Presence of a large fecal mass in the rectum

In toilet-trained children, the following additional criteria maybe used:

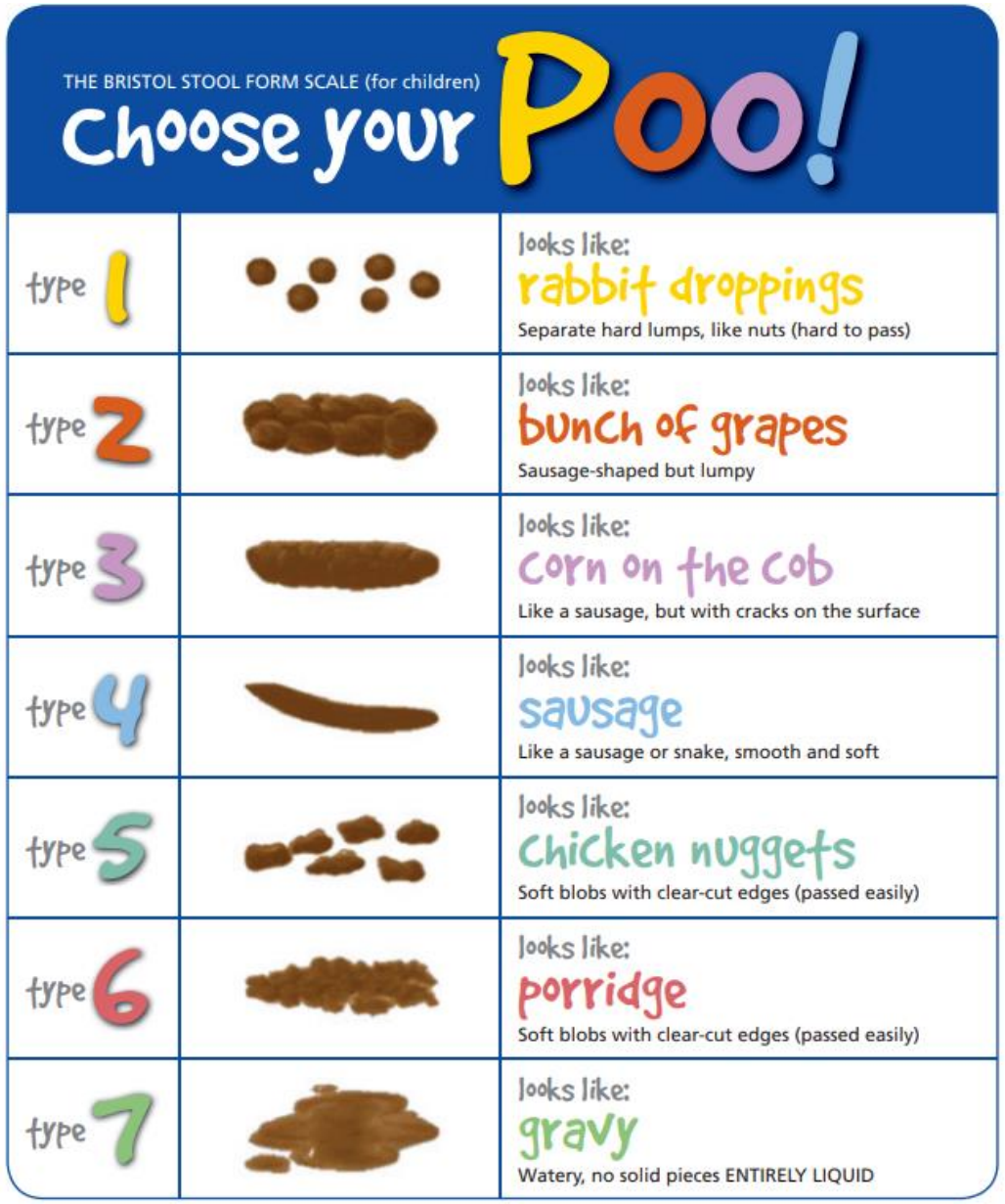
- At least 1 episode /week of incontinence after the acquisition of toileting skills
- History of large-diameter stools that may obstruct the toilet

History & Physical Examination

- Frequency, consistency, size of stool
- Age of onset
- Pain or bleeding per rectum
- Abdominal pain
- Fecal/urinary incontinence
- Withholding behaviors
- Systemic symptoms
- Social stressors
- Age of passing meconium
- Interventions: past & current

- Review of growth parameters
- Abdominal examination
- External examination of the perineum and perianal area
- Evaluation of the thyroid
- Evaluation of spine
- Neurologic evaluation for appropriate reflexes (cremasteric, anal wink, patellar)
- A digital examination of the anorectum is recommended

Bristol stool chart



Red flags (suggesting organic cause)

Symptom/sign	Possible implication
Delayed passage of meconium >48 hrs of life	Hirschsprung disease, CF
Fever, vomiting, diarrhea, severe abdominal distension	HD-associated enterocolitis
Rectal bleeding	Anal fissure, IBD, food protein-induced proctitis
Ribbon stools	Anal stenosis
Urinary incontinence	Congenital/acquired neurologic deficit
FTT	Celiac dx, CF
Lower spine abnormalities (dimple, hair tuft, deviation of gluteal cleft)	Spinal dysraphism
Decreased LL tone or power	Spinal cord anomalies
Abnormal thyroid gland	Hypothyroidism
Extreme fear during anal inspection	Sexual abuse

Organic causes of Constipation

Systemic disorders: CF, Celiac Dx, CMPA, psychiatric dx

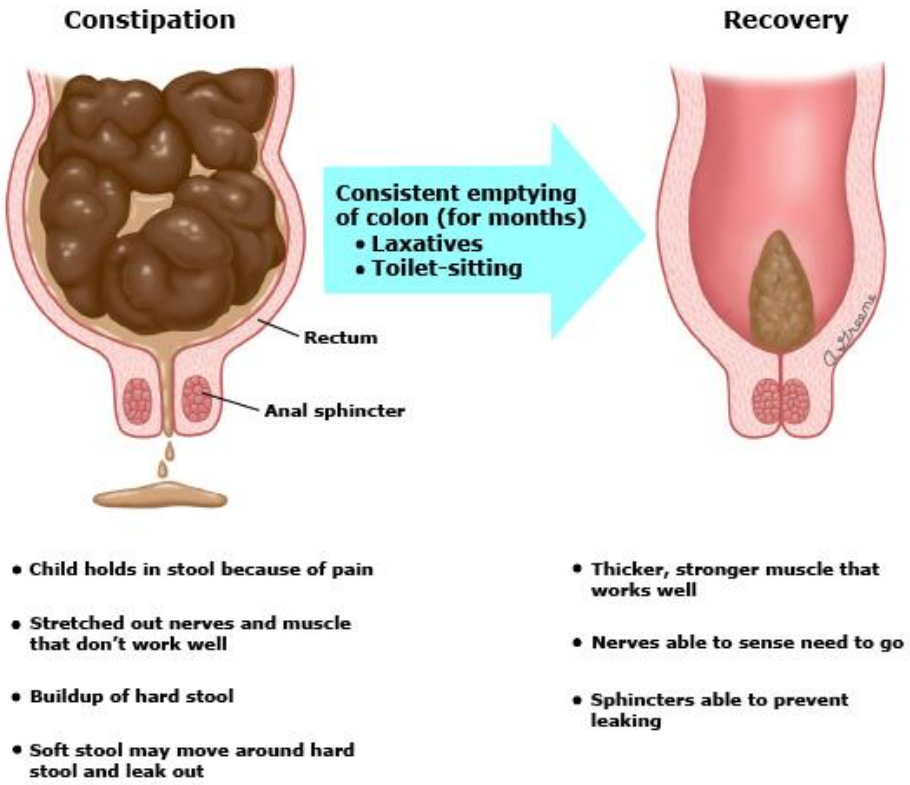
Toxins/drugs: lead toxicity, antidepressant Tx, antacids, opiates, phenobarbital

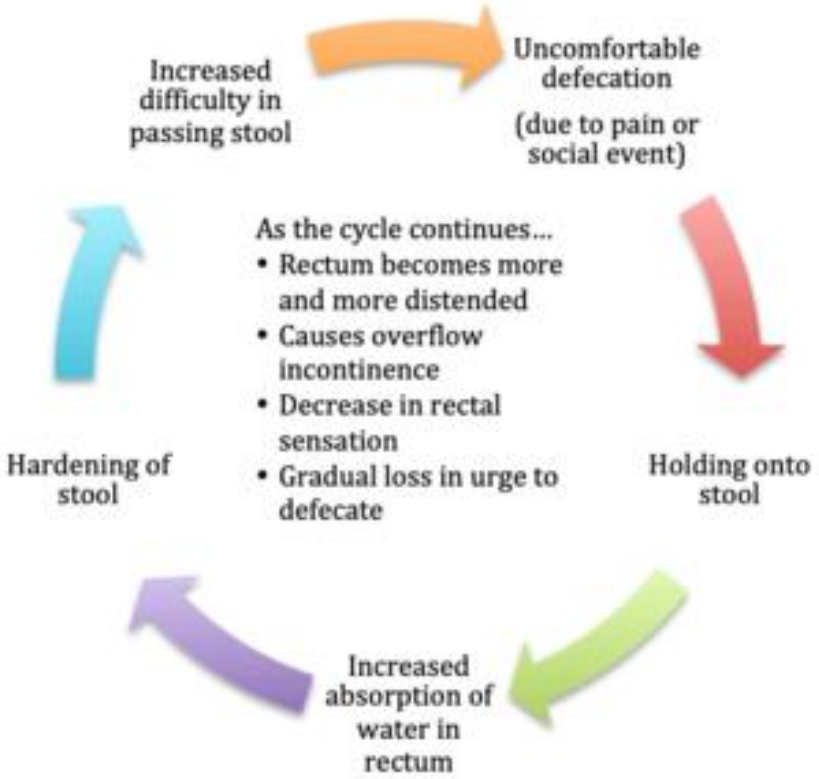
Metabolic conditions: hypothyroidism, hypercalcemia, hyperkalemia

Spinal cord abnormalities: tethered spinal cord, tumors, trauma, meningomyelocele, spina bifida

Anatomic malformations: anteriorly displaced anus, anal/colonic stenosis, imperforate anus

It’s a cycle!


Constipation
Recovery
Consistent emptying of colon (for months)
• Laxatives
• Toilet-sitting
Rectum
Anal sphincter
• Child holds in stool because of pain
• Stretched out nerves and muscle that don’t work well
• Buildup of hard stool
• Soft stool may move around hard stool and leak out
• Thicker, stronger muscle that works well
• Nerves able to sense need to go
• Sphincters able to prevent leaking


Uncomfortable defecation
(due to pain or social event)
Holding onto stool
Increased absorption of water in rectum
Hardening of stool
Increased difficulty in passing stool
As the cycle continues...
• Rectum becomes more and more distended
• Causes overflow incontinence
• Decrease in rectal sensation
• Gradual loss in urge to defecate

Management of constipation

Medication

- Disimpaction: PEG 3350 (1 – 1.5 g/kg per day), Enemas, Admission for NG clean out with PEG solution
- Digital disimpaction is not recommended
- Maintenance: PEG 3350 (0.4 – 1 g/kg/day)
- Goal: 1-2 soft painless stool/day

Drug	SE
PEG 3350	Occasional bloating, abdominal pain
Lactulose	Flatulence, abdominal cramps
Mg hydroxide	Hyper Mg, Hypo Ca, Hypo Phos
Senna	Nephropathy, hepatitis, melanosis coli
Bisacodyl	Abdominal cramp, nausea
Glycerin supp	None
Mineral oil	Lipid pneumonia
Phosphate enema	Risk of rectal trauma, hypocalcemia

Medications in Constipation

Management of constipation

Diet

- Healthy well-balanced diet is the most important
- Ensure lots of fluids
- Carbohydrates (mainly sorbitol) in juice (prune, apple, pear) may help increase water content in stool
- Increase fiber to daily recommended amount (0.5 g/kg/ day)
- No evidence to removing milk from diet will improve constipation
- No evidence for probiotics

Management of constipation

Behavior modification

- Toilet regime including sitting on the toilet for 3-10 minutes
- Following meals 2-3 x per day (gastrocolic reflex)
- Foot stool if they cannot reach the floor
- Praise for sitting even if no stool is produced
- Keep a diary

When to stop

- Minimum 2 months until you have reach goal for 1 month
- Wean & never stop abruptly
- If the child in the toilet-train age, remain on maintenance until successful toilet training

Nocturnal Enuresis

Definition: involuntary discharge of urine during sleep in children 5 years of age

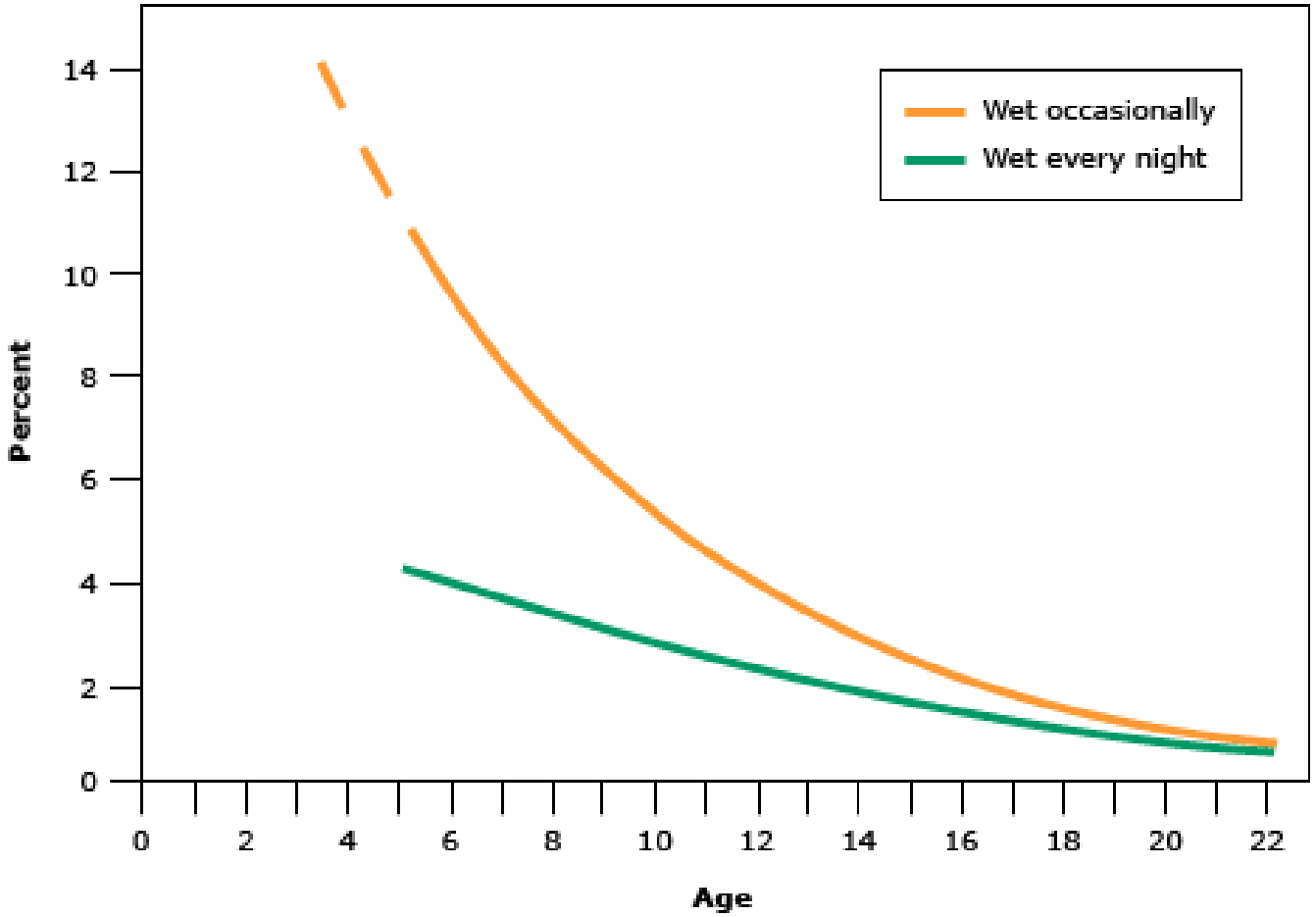
Primary: bladder control never attained; ***Secondary***: incontinence after 6 month of continence

Monosymtomatic: without lower urinary tract symptoms & without history of bladder dysfunction

More in boys, family history (gene identified on chromosome 13q)

Causes: maturational delay, genetic, polyuria, disturbed sleep, small bladder capacity, detrusor overactivity

Epidemiology and prognosis of monosymptomatic enuresis



History & Physical examination

- Daytime symptoms
- Symptoms of UTI
- Period of dryness(>6 months)
- Frequency
- Fluid intake
- Stooling history
- Review of symptoms: snoring, wt loss, fatigue, polydipsia, gait abnormalities, staring spells
- Family history
- Recent stressors

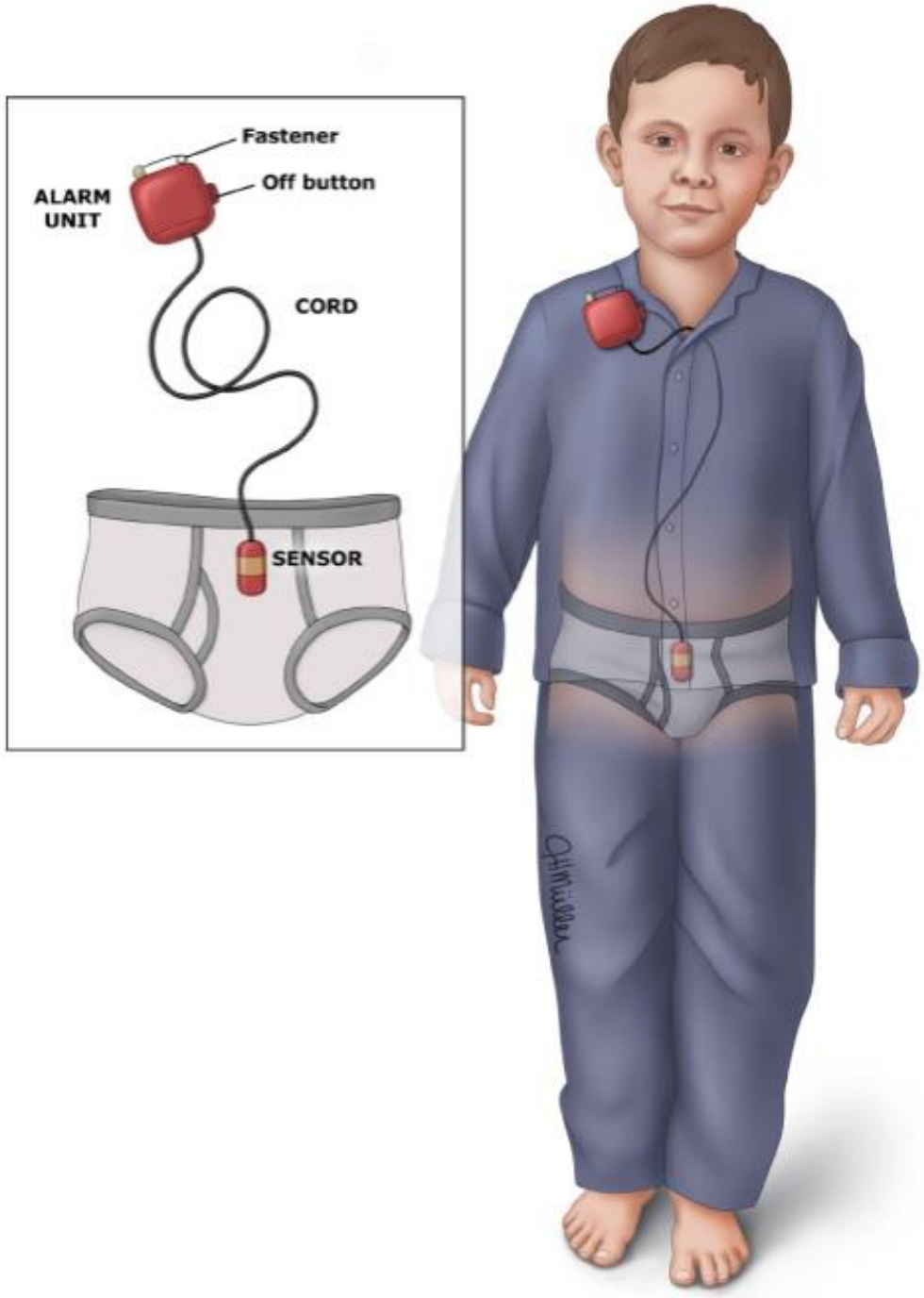
- Growth parameters
- BP
- Abdomen: palpable bladder, fecal mass
- Abnormalities of lumbosacral area
- Neurologic exam of the LL

Management

- Treatment of primary nocturnal enuresis should be aimed at minimizing the emotional impact on the child.
- Its not the fault of the child NOR the parents!
- Behavioral therapies: Reward systems and lifting should not be recommended without careful consideration

Management of primary nocturnal enuresis

- If the child wakes up at night, take him to toilet
- Assure the child's access to the toilet
- Avoid high sugar, caffeine-containing foods and excessive fluids before bedtime
- Have the child empty the bladder at bedtime. 4-7x/ day
- Take the child out of diapers (training pants may be acceptable)
- Include the child in morning clean-up in a nonpunitive manner
- Use bed protection, room deodorizers
- Preserve the child's self-esteem



Alarm system devices

- Use of alarm devices for older (above 7yr), motivated children from motivated families for whom more simple measures are unsuccessful
- Success rate: 50%
- Program: Trial should be continued for 3-4months. 1-2months to see an improvement. The initial improvement is a decrease in urine output rather than a totally dry night. Use of the alarm system is continued until there have been 14 consecutive dry nights.

Pharmacologic therapy

- Desmopressin: synthetic analogue of antidiuretic hormone (ADH)
- Available in tablets & nasal preparation
- Extreme caution in patient with osmoregulation (fluid balance) and cystic fibrosis
- Special care should be made to avoid consuming fluids for 1 hr before and 8 hrs after taking desmopressin.
- For short term treatment (sleep over, camp) or ineffective alarm system
- Side effects: water intoxication, headache, abdominal pain, stuffiness & epistaxis in nasal preparation

Pharmacologic therapy

- Imipramine hydrochloride: Tricyclic antidepressant
- Mode of action: unclear
- Maximal effect: 1st week, trial of 2 weeks before adjusting the dose
- Side effects: potential for overdose (cardiac arrythmias, convulsion)

ENURESIS: COUNSELLING & MANAGEMENT

INITIAL MANAGEMENT

1. **Determine if…**
   - ☐ Both child and parent see enuresis as problematic, and are motivated to participate in treatment
   - ☐ The child is mature enough to engage in and assume responsibility for treatment
2. **Treat co-existing conditions:**
   - ☐ Constipation, sleep disordered breathing, ADHD, underlying stressors, poor self-concept, psychologic
3. **Educate, emphasizing…**
   - ☐ High prevalence and generally self-resolving natural history
   - ☐ Child should NOT be punished for bedwetting
   - ☐ Usefulness of bed protection, absorbent undergarments, room deodorizers
   - ☐ Avoiding sugary and caffeinated beverages
4. **Establish goals and expectations:**
   - ☐ Determine family priorities (Reassurance? Staying dry for sleepovers? Decreasing # wet nights?)
   - ☐ May involve several methods, be prolonged, fail in short term, often relapses
   - ☐ Slow, steady improvement is more realistic

Personalized Calendar

Record:
- Daytime incontinence
- Enuresis events
- Encopresis
- Frequency & timing of bowel movements

- Helps to follow progress
- Parents should be cautious of implementing a reward system
- **AVOID** punishment and humiliation

Voiding Diary

Should record:
- **Time** of void
- **Volume** voided
- **Relationship** to events (meals, school recess, play activities, stress)
- Episodes of **urgency** or **incontinence**

BEHAVIOURAL THERAPY

Goal: **achieve good bladder and bowel habits**

- ✓ Encourage frequent voids
  - Introduce timed voiding every 2 hours, regardless of if child feels the need to void
  - Avoid holding urine, urgency, and incontinence
  - Ensure easy access to toilets at school & home
  - Always have child void immediately before sleep
- ✓ Encourage daily bowel movements
  - Establish a schedule at specific time of day such as after breakfast before leaving for school
  - PEG 3350 for constipation
- ✓ Consume majority of fluids in morning and afternoon, minimize after dinner
- ✓ Encourage physical activity and discourage prolonged sitting
- ✓ Requires supportive environment, child motivation, patience, and time (average 6 months)

ACTIVE THERAPY

Similar outcomes, choose based on patient preference and fit with family

Pharmacologic Therapy

- **Desmopressin:**

Goal: optimize oral medication to reduce production of urine overnight (ADH analogue).
- Take medication **60 minutes** before bedtime
- **No fluid intake** 1 hour prior to and 8 hours after taking medication
- WATCH FOR: signs of symptomatic hyponatremia with water intoxication: discontinue if developing headache, nausea, vomiting.

Can be used **intermittently**, thus a good option for **special occasions** such as sleepovers and camps.

- **Anticholinergics and tricyclic agents** (second and third line): may be considered if other therapeutic options have failed.

Bed Alarms

Goal: teach child to awaken from sensation of a full bladder. Sensors attached to child's undergarments are connected to an alarm that awakens the child at the moment of bed wetting.
- Should be using **every night**
- Initially, child may not awaken from alarm, requiring parent to awaken child instead
- Child should then void in the **washroom**
- Return to sleep

- Most effective in children **>7 years old**
- Generally see **initial response in 1 – 2 months**
- **3 – 4 month** trial of continuous therapy is recommended
- Discontinue when dry for 14 consecutive nights, or if no improvement at one month
- Effective long term in **< 50%** of children
- Recommend for older, motivated children from cooperative families

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Sarah Park (Medical Student C2022, University of Alberta), Dr. Peter Metcalfe (Pediatric Urologist, University of Alberta) for www.pedscases.com

Acute Limping

- Amar, a 3-year-old boy, presents to ER with pain preventing walking. He was first noticed to be limping 2 days ago whilst playing at nursery, He is an active child and often falls but no specific injury was reported that day. Since then, his pain has worsened despite regular paracetamol and ibuprofen. He has had no diarrhea or vomiting, no fever, and has been drinking well although this morning he refused breakfast. His parents report he is usually a very cheerful boy, even during a recent cold 10 days ago, and are worried by his reduced activity.
- What else would you like to know about Amar? What are the important differentials in this case?

Limping child

- Limping: abnormality in gait that is caused by pain, weakness, or deformity (refusal to walk or stand)
- Gait abnormalities: antalgic, steppage, Trendelenburg, circumduction, equinus
- Duration: Acute→2 days, subacute→2days-6 wks, chronic→6 weeks

History

- Duration of symptoms >7 days
- Focal pain/ intermittent/ constant/ at rest/migratory/radiating
- History of trauma, falls or injury
- Pattern and severity of pain and limp: severe localised joint pain should raise suspicion for septic arthritis
- Change to urinary or bowel habit
- Functional limitations: complete inability to walk or weight-bear may indicate significant pathology
- Nocturnal pain and symptoms
- Systemic symptoms: fever, night sweats, chills, rigors, rash
- Constitutional symptoms eg unplanned weight loss, lethargy/easy fatigue, anorexia (consider malignancy/haematological causes)
- Recent viral infection (acute myositis, transient synovitis)

More history

- Abdominal pain/back pain
- Insect bite
- Morning stiffness, associated with activity
- Bleeding disorder
- Travel to endemic area: Lyme disease
- Sexual activity

Physical examination

- Generalised wasting, pallor, interaction with carer, obesity
- Fever
- Assess gait if possible – walking +/- running
- Joint examination using "Look, Feel, and Move" including joints above and below area of pain: joint swelling/ redness/warmth/tenderness
- Neurovascular assessment of affected limb
- Abdomen, scrotum, back/spine
- Skin rashes: Petechiae/purpura/ecchymosis (consider HSP, malignancy/haematological cause)

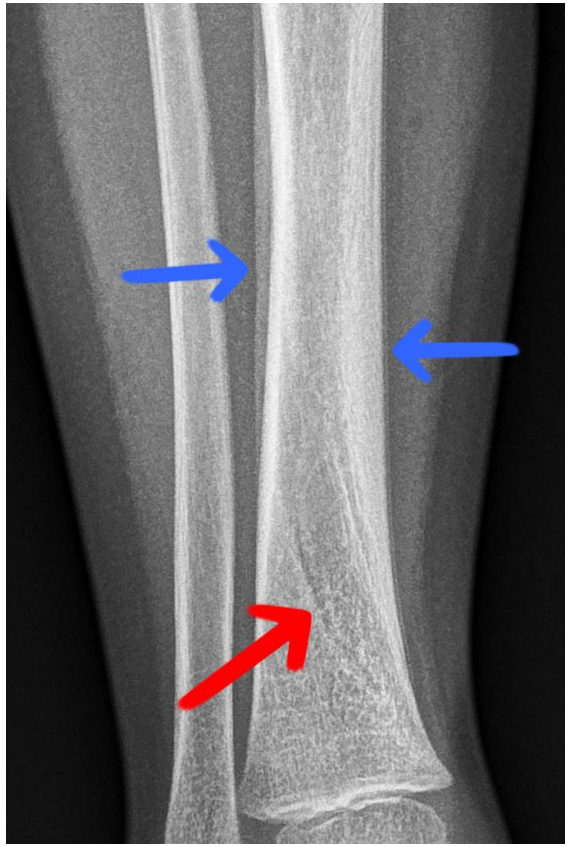
Differential diagnoses of Acute Limping

- MSK: cellulitis, myositis, sprain/tendinopathy, FB in the foot, fractures (toddlers #, Osgood Schlatter)
- Infection: reactive arthritis(transient synovitis), septic arthritis, osteomyelitis
- Child abuse
- HFMD, immunization
- Hematology: Hemophilia, VOC in SCD
- Rheumatology/Immunology: SLE, JIA, HSP, Serum sickness, RF
- Orthopedic: Perthes, SCFE, hypermobility syndrome
- Intraabdominal/Genitourinary: appendicitis, ovarian or testicular torsion, psoas abscess, IBD
- Malignancy: leukemia, neuroblastoma, metastasis, primary bone tumors

Physical examination

Investigations

- No investigations are indicated if **all of the following** apply:
  - no red flags in the history and physical examination
  - ambulating with mild or no discomfort with simple analgesia
- Imaging
  - X-ray (area of suspicion)
    - pelvis AP or frog leg view is useful for identifying SCFE, DDH (>6 mo), Perthes disease and common pelvic avulsions
    - normal x-ray does not exclude septic arthritis or early osteomyelitis
  - Ultrasound (hip)
    - assess for presence of drainable effusion when septic arthritis is suspected
    - presence of an effusion often does not differentiate between septic arthritis and transient hip synovitis
  - MRI/Bone scan
- Laboratory
  - Inflammatory markers (platelets, WBC, CRP +/- ESR): infective or inflammatory picture.
  - Blood cultures (pre-antibiotics if possible)
  - Blood film if any concern for haematological malignancy
  - Coagulation profile
  - ASOT
  - Synovial fluid analysis: WBC>50, 75% neutrophils



Perthes SCFE Toddler'#

Is it septic arthritis?

Kocher Criteria

In a child with **hip** pain, presence of the following 4 criteria increases the likelihood of septic arthritis:

- fever >38.5°C
- non weight-bearing
- leucocytosis >12.0 x 10^9/L
- ESR >40 mm/h (or CRP >20 mg/L)

1 RF(3%), 2 RF (40%), 3 RF (93%), 4 RF (99%)

Case

- Baby M. is a full-term, 4-kg infant girl delivered vaginally of a 22-year-old primiparous mother after an uneventful pregnancy. At the 2-week follow-up visit, Baby M. has regained her birth weight. Her mother reports frequent episodes of regurgitation after breastfeeding which do not distress her. Family history is significant for environmental allergies in both parents and a paternal uncle with eczema and severe asthma. At the 4-week follow-up visit, the mother reports ongoing regurgitation followed occasionally by crying. Stools have become more frequent and appear watery. The baby's weight is 4150 g, a gain of 10 g/d since the last visit.

Cow’s milk protein allergy (CMPA)

- Cow's milk is 3rd most common food, after peanut and tree nuts, responsible for food-induced anaphylaxis in pediatrics
- **Major milk allergens** – Casein and whey proteins, IgE-mediated
- Cooking & fermentation (Yogurt) diminishes the amount of intact whey protein→ tolerance
- Presentation: Ig-E mediated, non-Ig-E mediated, Mixed
- Mixed: atopic dermatitis (moderated-severe), Allergic eosinophilic GI disorders (GER, feeding difficulties, FTT, food impaction)

Presentation of CMPA

- IgE-mediated
- Anaphylaxis
  - Urticaria & angioedema
  - Dyspnea, cough, wheeze, stridor, hoarseness, tightness in throat, dysphonia
  - Nausea, abdominal pain, vomiting, diarrhea, dysphagia
  - Syncope, dizziness, cardiac arrest
  - Apprehension, headache, seizure, behavioral changes

- Non-IgE mediated
  - Enterocolitis: severe vomiting & diarrhea, GER, FTT
  - Proctitis: bloody-streaked mucousy loose stool
  - Enteropathy: malabsorption, FTT
  - Heiner syndrome (food-induced pulmonary hemosiderosis): cough, wheeze, hemoptysis, FTT, colic, V&D

Diagnosis

- Oral food challenge (clinician-supervised, double-blind, placebo-controlled): Gold standard
- Cow’s milk-specific IgE, skin prick test, patch test
- Elimination diet trial

Management of CMPA

Avoidance of cow's milk (CM) protein

- Cross contact & hidden ingredients, food labels, cross reactivity with sheep & goat, non-food sources eg cosmetics, medications

Replacement of CM with alternative protein and calcium sources

- Extensively hydrolysed & amino-acid based formulas
- Maternal supplement with Ca, protein alternatives

Education in the proper management of accidental exposures

- Epipen

Natural history

- Non-IgE mediated CPA resolve earlier than IgE mediated (75-90% by 3-4 yrs)
- IgE mediated is more persistent (64% outgrow by 12 yr)
- Prognostic factors that favour tolerance
  1. Lower initial milk specific IgE
  2. Faster rate of decline of milk specific IgE-level
  3. Absence of concomitant allergic rhinitis or asthma

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“Believe you can and you are halfway there”-*Theodore Roosevelt*


ANY
QUESTIONS
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