Paediatric Constipation: A serious problem

Nisha Naka

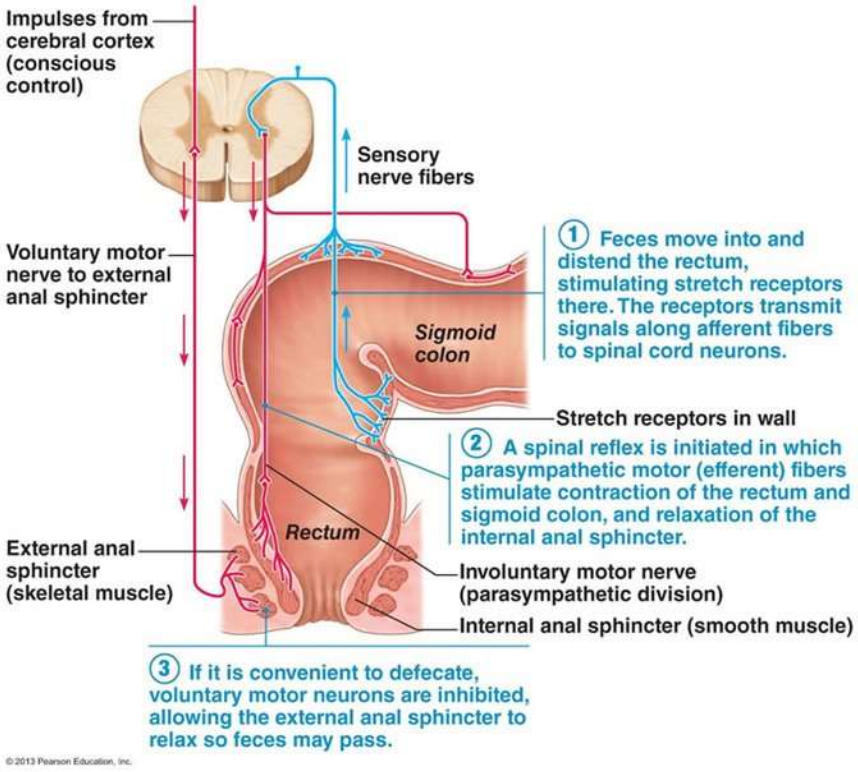
26 July 2024

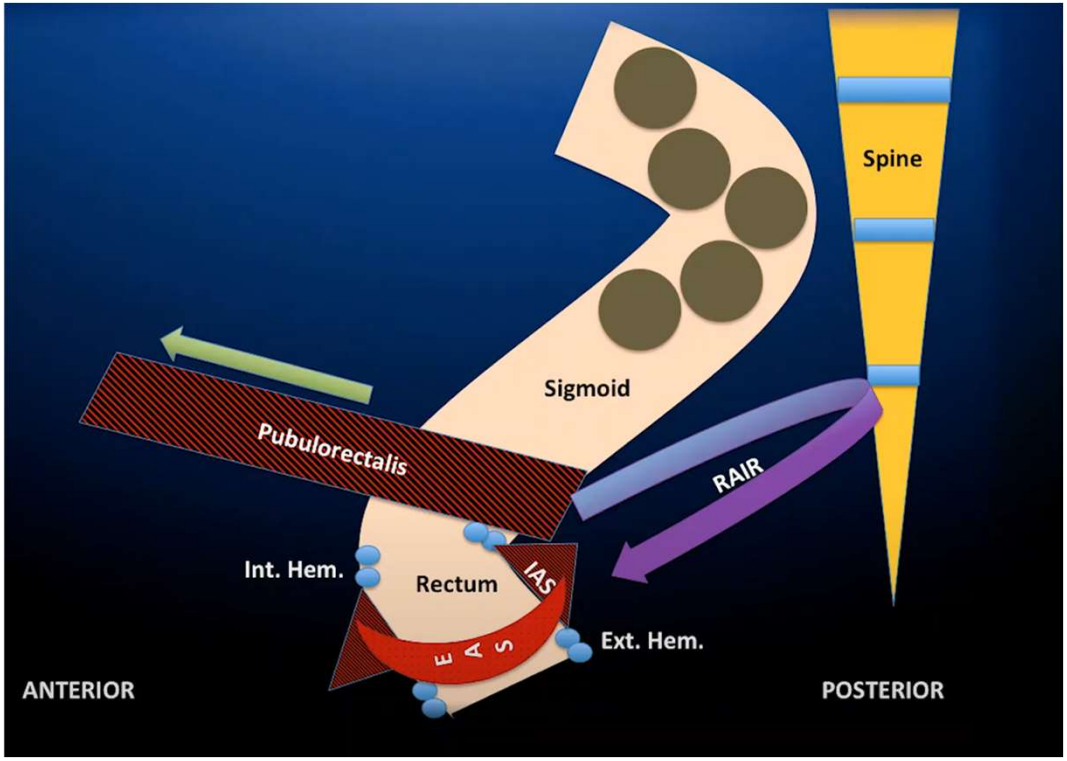
Outline

- Physiology of normal defaecation
- Pathophysiology
- Epidemiology
- Definition (ROME IV)
- Clinical presentation
- Diagnosis
- Management
- Conclusion


HAPPENS

Journey from the caecum to the bowl





Vicious Cycle

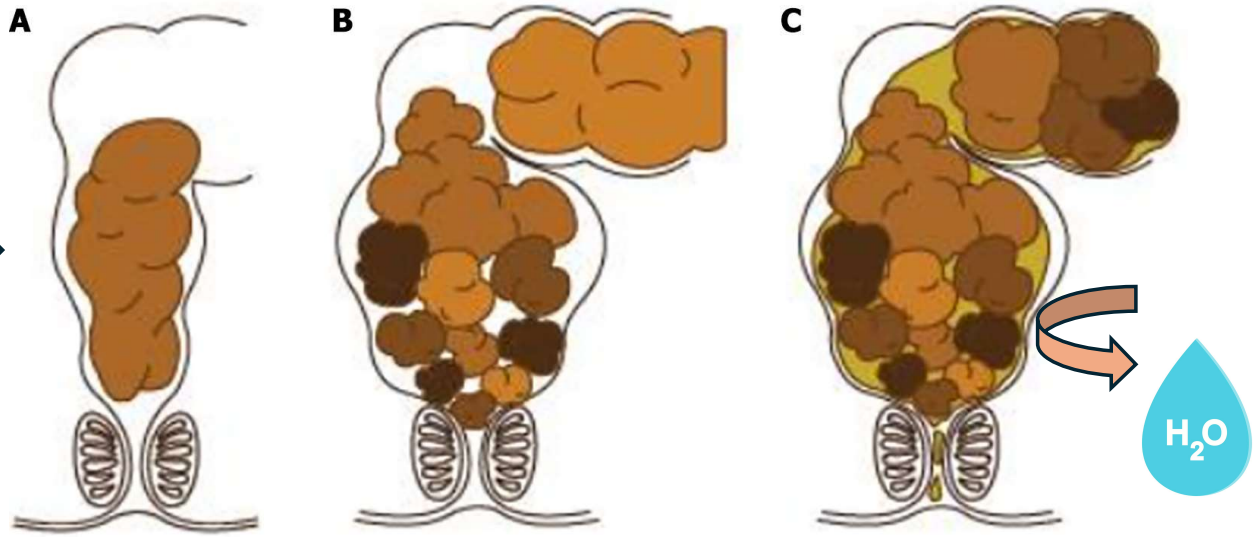
Triggers:

Pain → Withholding → Pain

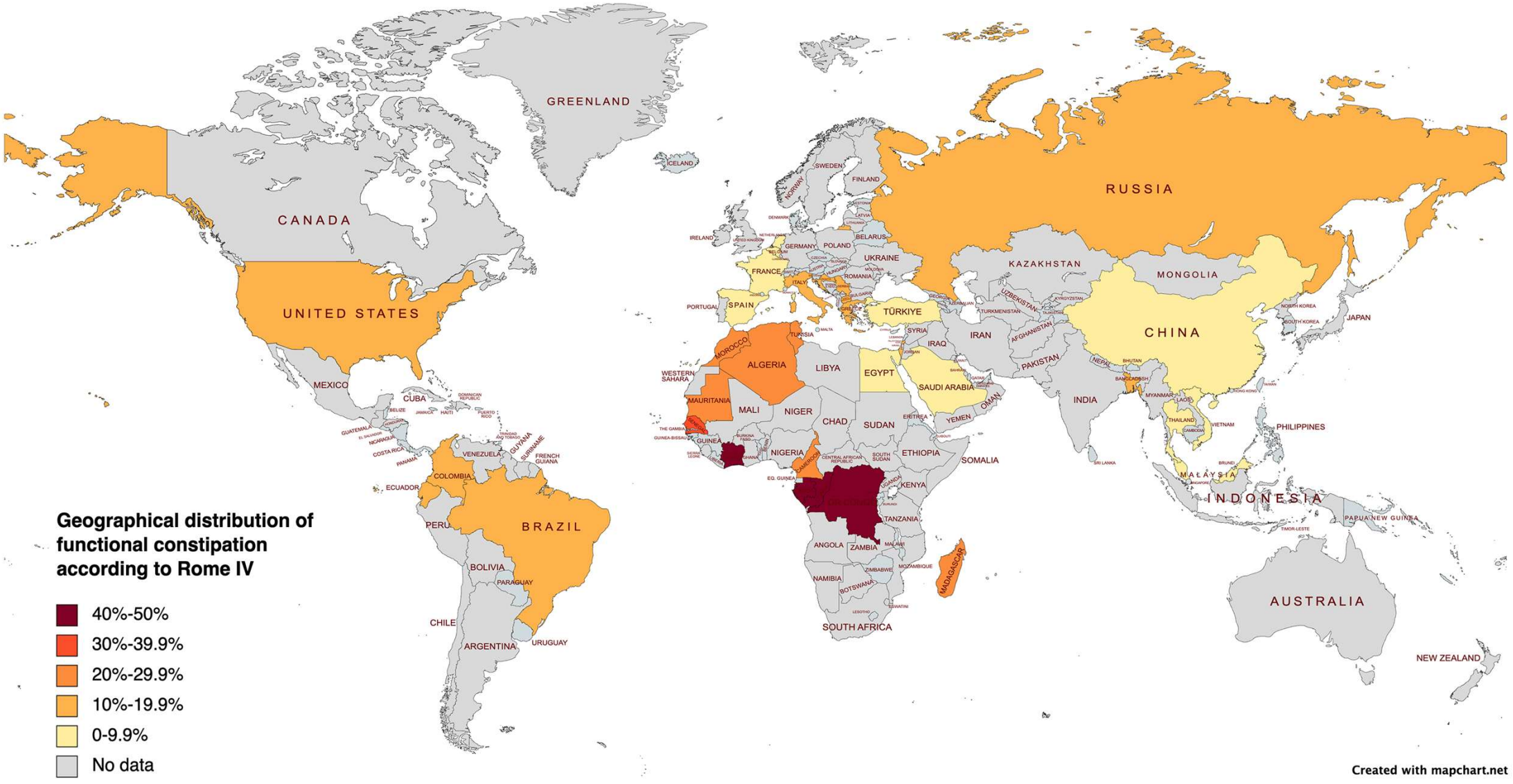
Diet

Toilet training

Psychosocial etc.



Tran DL, Sintusek P. Functional constipation in children: What physicians should know. World J Gastroenterol 2023; 29(8): 1261-1288



World J Gastroenterol. Feb 28, 2023; 29(8): 1261-1288

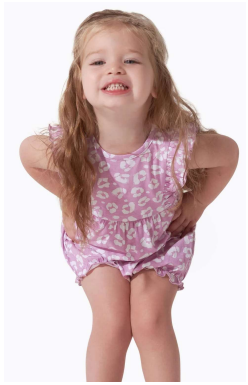
Definition – Rome IV criteria

Infants and Toddlers up to 4 years
At least 2 of the following for at least 1 month
•<=2 stools per week
•History of excessive stool retention
•History of painful/hard stool
•History of large diameter stool
•Presence of faecal mass in rectum
In toilet trained children, additional criteria may be used:
•>=1 episode/week of incontinence
•History of large diameter stool obstructing toilet

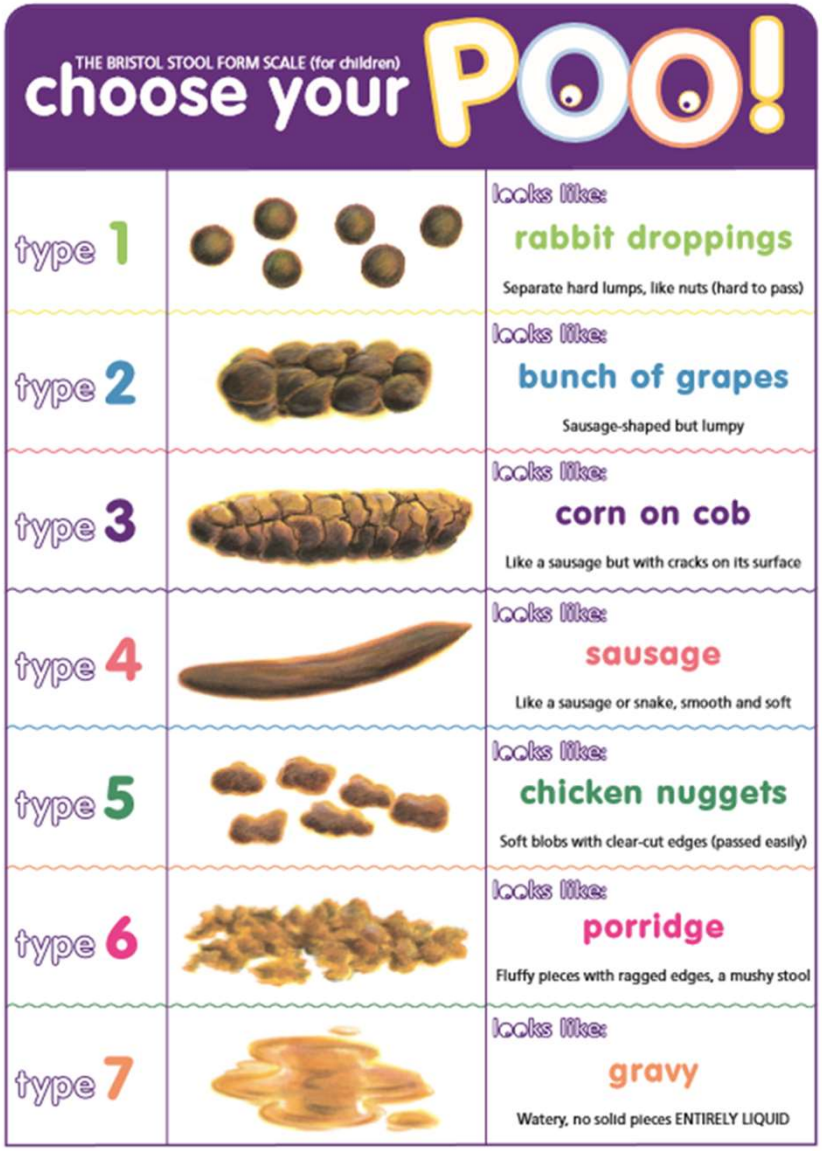
Children & adolescents over 4 years
At least 2 of the following at least once a week for at least 1 month:
•<=2 stools per week
•History of retentive posturing or excessive stool retention
•History of painful/hard stool
•History of large diameter stool that may obstruct toilet
•Presence of faecal mass in rectum
•>=1 episode/week of incontinence
Symptoms cannot be explained by another medical condition and are insufficient to meet criteria of IBS-constipation

95% of paediatric constipation is functional

Bristol Stool Chart



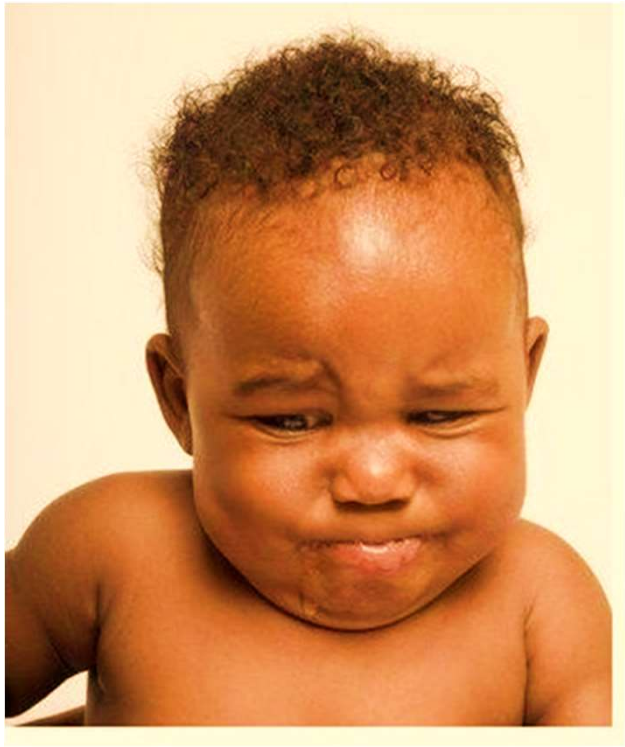
Source: Bishop WP: *Pediatric Practice Gastroenterology*: www.accesspediatrics.com



Organic Causes

Organic causes	
Abnormalities of colon and rectum	Anal or colonic stenosis. Imperforate anus. Anteriorly displaced or ectopic anus. Cloacal malformations. Chronic intestinal pseudo-obstruction
Systemic disorders	Hypothyroidism. Hypercalcemia. Hypocalcemia. Diabetes mellitus. Panhypopituitarism. Cerebral palsy. Myotonia congenita. Scleroderma. Amyloidosis. Mixed connective tissue disease. Myotonic dystrophy. Progressive systemic sclerosis
Others	Cystic fibrosis. Celiac disease. Heavy metal ingestion (lead, mercury)
Spinal cord abnormalities	Meningomyelocele. Spinal cord tumor. Sacral agenesis. Tethered cord
Neuropathic intestinal disorders	Hirschsprung's disease. Intestinal neuronal dysplasia. Chagas disease. Abnormal muscle of abdomen. Prune belly syndrome. Gastroschisis
Drugs	Opiates. Anticholinergics. Antacids. Antihypertensives. Antimotility agents. Cholestyramine. Psychotropics. Diuretics

Causes of straining in infants
Infant dyschezia
Anal fissure
Cows Milk Protein Intolerance
Hirschprung disease
Internal anal sphincter achalasia
Anal stenosis



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How few is too few?

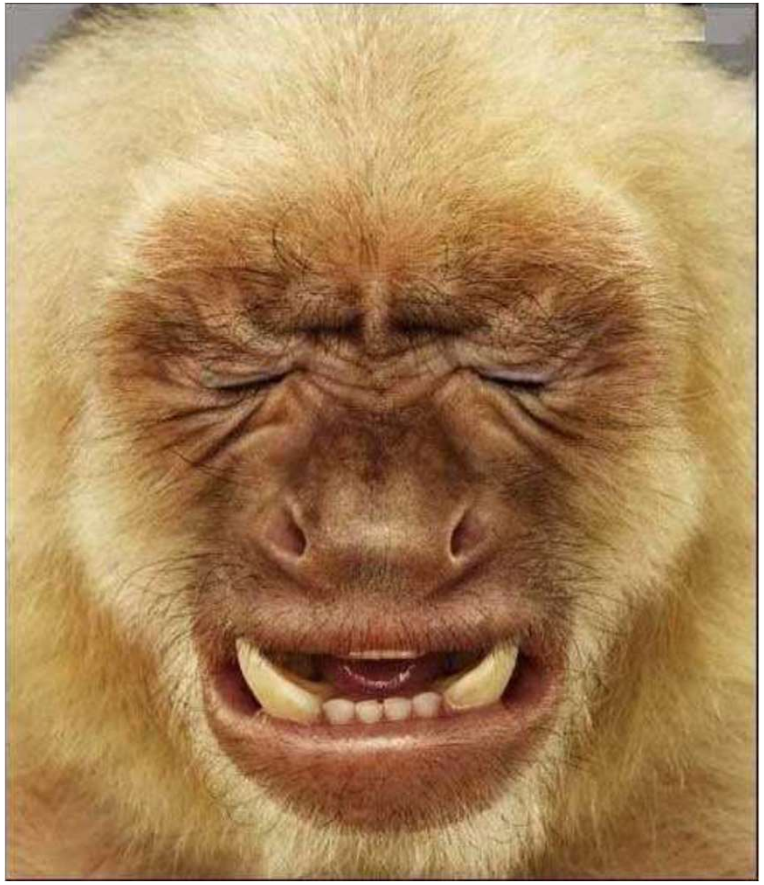
Table III. Weighted mean defecation frequency and percentages of children with hard and soft stool consistencies

	Defecation frequency				Stool consistency			
Subgroups	Number of children	Number of measurements	Weekly defecation frequency (range)	Daily defecation frequency (range)	Number of children	Number of measurements	Children with hard stools (%)	Children with soft stools (%)
All infants 0-14 weeks old	9875	21 668	21.8 (3.9-35.2)*	3.1 (0.6-5.0)*	4142	7296	1.5%	27.0%
Human milk-fed children	4109	7327	23.2 (8.8-38.1)	3.3 (1.3-5.4)	1094	2979	0.3%	47.7%
Formula-fed children	3477	6801	13.7 (5.4-23.9)†	2.0 (0.8-3.4)†	1172	3739	1.8%	10.4%
Mixed-fed children	690	972	20.7 (7.0-30.2)‡	3.0 (1.0- 4.3)‡	78	189	1.2%	53.4%
Young children 14 weeks to 4 years old	5747	8257	10.9 (6.7- 16.7)†	1.6 (0.8- 2.4)‡	2919	7773	10.5%	6.2%

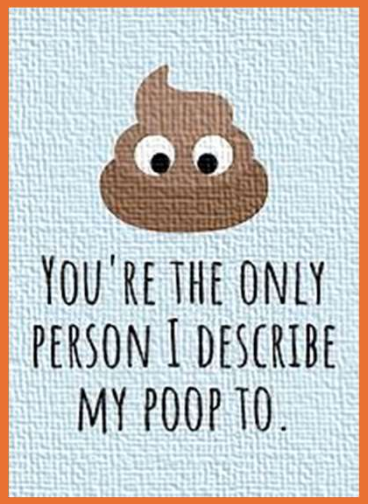
*this group also includes all children of which no information was given regarding feeding type; $P < .001$ compared to young children.
†$P < .001$ compared to human milk-fed infants.
‡data not normally distributed, non-parametric method used to determine range.

Baaleman et al 2023

Constipation
is a
symptom



History



- **Onset of constipation**
  - Passage of meconium (?prematurity, VLBW)
  - Key associations (toilet training, school, illness, fissure, change in diet..)
- • **Nature and severity of constipation**
  - Frequency
  - Straining, retentive posturing
  - Behaviour around stooling
  - Characteristics of stool (consistency, size, blood, faecal incontinence....)
  - *Faecal soiling may be mistaken for diarrhoea by some parents*
- • **Other medical history**
  - remember things that affect gut motility (fluid intake, medication)
  - associated systems (urinary tract)
- **Developmental History**
- **Family History**
- **Psychosocial History**

Red Flags

TABLE 5. Alarm signs and symptoms in constipation

Constipation starting extremely early in life (<1 mo)
Passage of meconium >48 h
Family history of HD
Ribbon stools
Blood in the stools in the absence of anal fissures
Failure to thrive
Fever
Bilious vomiting
Abnormal thyroid gland
Severe abdominal distension
Perianal fistula
Abnormal position of anus
Absent anal or cremasteric reflex
Decreased lower extremity strength/tone/reflex
Tuft of hair on spine
Sacral dimple
Gluteal cleft deviation
Extreme fear during anal inspection
Anal scars

HD = Hirschsprung disease.

- < 1500 g → 35% after 48 hrs
- < 2500 g → 80% within 48 hrs
- Term infants → 99% within 48 hrs
- Hirschsprung (>90%) and CF (~1/4) delayed passage of meconium

Tabbers MM et al. Evaluation and treatment of functional constipation in infants and children: evidence-based recommendations. JPGN 2014;58(2):258-74
Bekkali N et al. Duration of meconium passage in preterm and term infants. Arch Dis Child Fetal Neonatal Ed. 2008;93(5):376-9.

Examination

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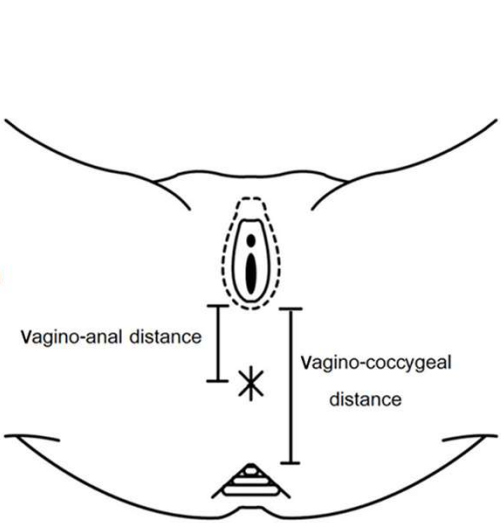

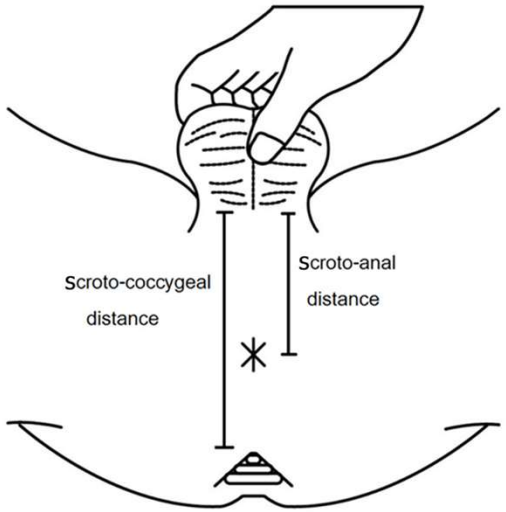

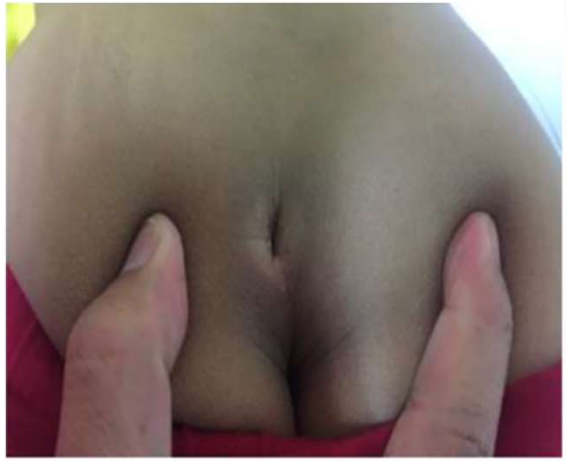

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To PR or not to PR?

- Present with red flags
- History of delayed meconium passage after birth
- Intractable constipation
- Uncertain diagnosis according to the Rome IV criteria
- Suspicion of an anatomic problem
- Assessment of faecal impaction after disimpaction

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Investigations

- Comprehensive history and examination
- Tailored to red flags
  - Lab investigations: TFT, Celiac, CF, Calcium
  - OFC
  - Ultrasound
    - Assess stool retention and size of rectum and colon
    - Non-invasive
    - May replace DRE

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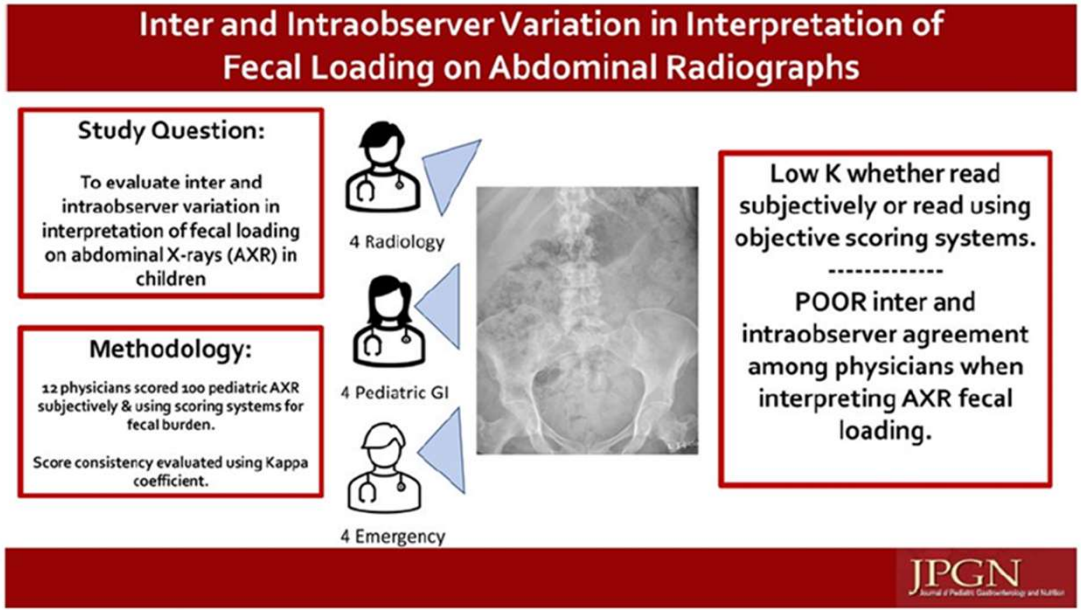
Abdominal Xray



- Not standardized, subjective and represents a single observation in time
- Daily variability – time of intake and defaecation
- Stool seen on AXR does not exclude other causes of abdominal pain

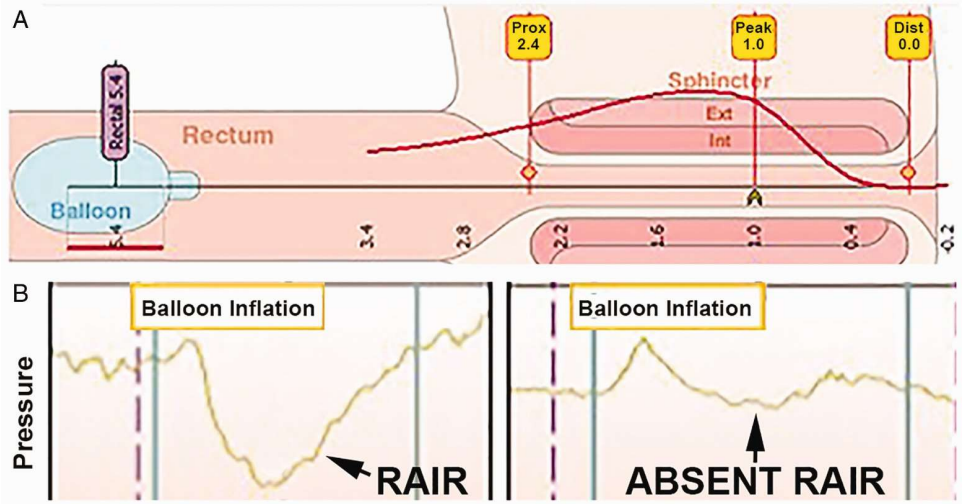
Kappa coefficient (*k):* 0 (no agreement) to 1.0 (perfect agreement).
Subjective interpretation: k – 0.18
Intra-observer reproducibility: k – 0.08-0.61
Objective Scoring: k – 0.14

Yallanki N et al. Inter and Intraobserver Variation in Interpretation of Fecal Loading on Abdominal radiographs JPGN • Volume 76, Number 3, March 2023
Brett Hoskins, DO, Steven Marek, MD, Things We Do for No Reason™: Obtaining an Abdominal X-ray to Assess for Constipation in Children, Journal of Hospital Medicine® Vol 15 | No 9 | September 2020*

Diagnosis of Hirschsprung's Disease

	Sensitivity (95% CI)	Specificity (95% CI)
Contrast enema	76% (57%-89%)	97% (91%-99%)
Anorectal manometry	83% (63%-93%)	93% (85%-97%)
Rectal suction biopsy	93% (77%-98%)	100% (96%-100%)

No significant differences between methods (p>0.05)



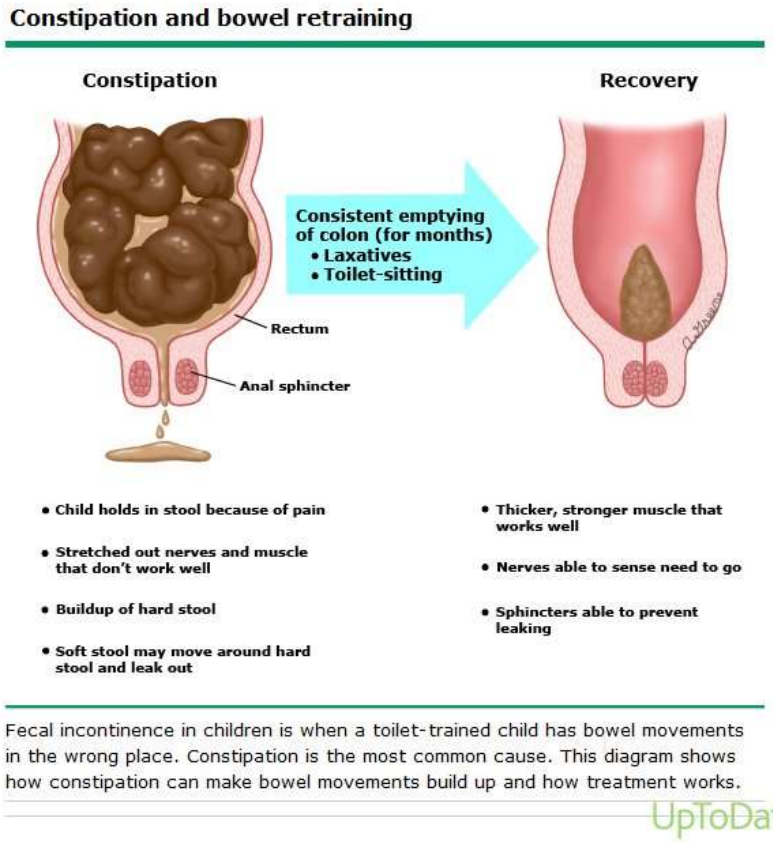
De Lorijn F et al. Diagnosis of Hirschsprung's disease: a prospective, comparative accuracy study of common tests. J Pediatr. 2005;146(6):787-92.

Management

- Organic Cause
  - Directed Therapy
- Functional
  - Education
  - Disimpaction
  - Maintenance
  - Prevention of recurrence
  - Patient and parenteral support

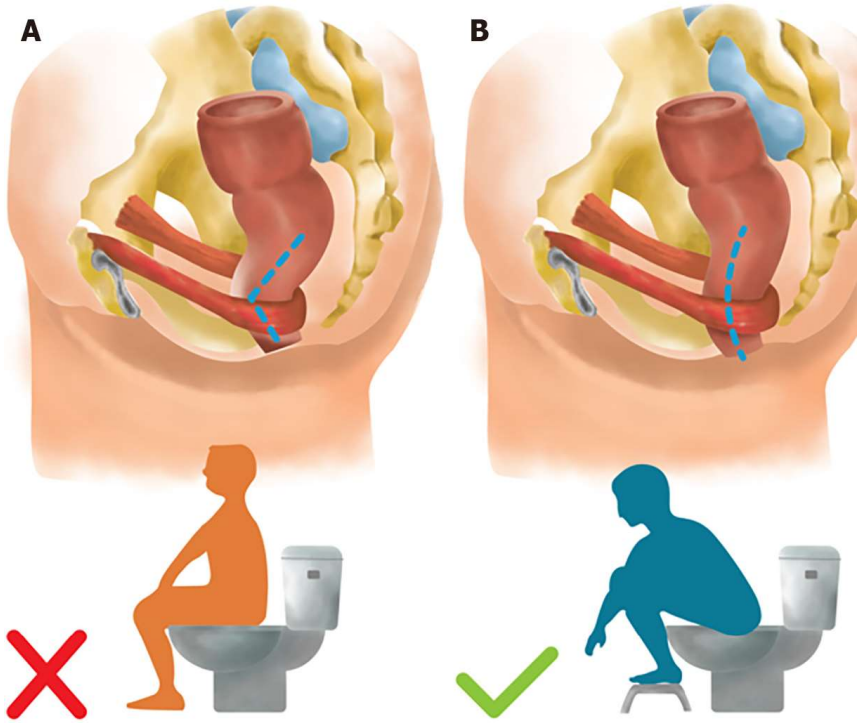
Education

- Pathophysiology
- Chronic nature of treatment
- Remove negative attributions
- No risk of “dependence” with osmotic laxatives
- Supportive written information



Toilet training

- Child Led
- Positioning
- Bowel retraining
  - Gastrocolic reflex
  - unhurried toilet time after meals
- School letters
- Positive reinforcement



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Diet and Hydration

- Normal fibre intake
  - Fibre intake in children >2-years: Age in years + 5-10g
  - Accompanied by adequate fluid intake
  - Important in the withdrawal phase
- Adequate fluid intake

Age	Total water intake/day (including water in food)	Water from drinks/day
Infants 0–6 months	700 ml assumed to be from breast milk	
7–12 months	800 ml from milk and complementary foods and beverages	600 ml
1–3 years	1300 ml	900 ml
4–8 years	1700 ml	1200 ml
Boys 9–13 years	2400 ml	1800 ml
Girls 9–13 years	2100 ml	1600 ml
Boys 14–18 years	3300 ml	2600 ml
Girls 14–18 years	2300 ml	1800 ml

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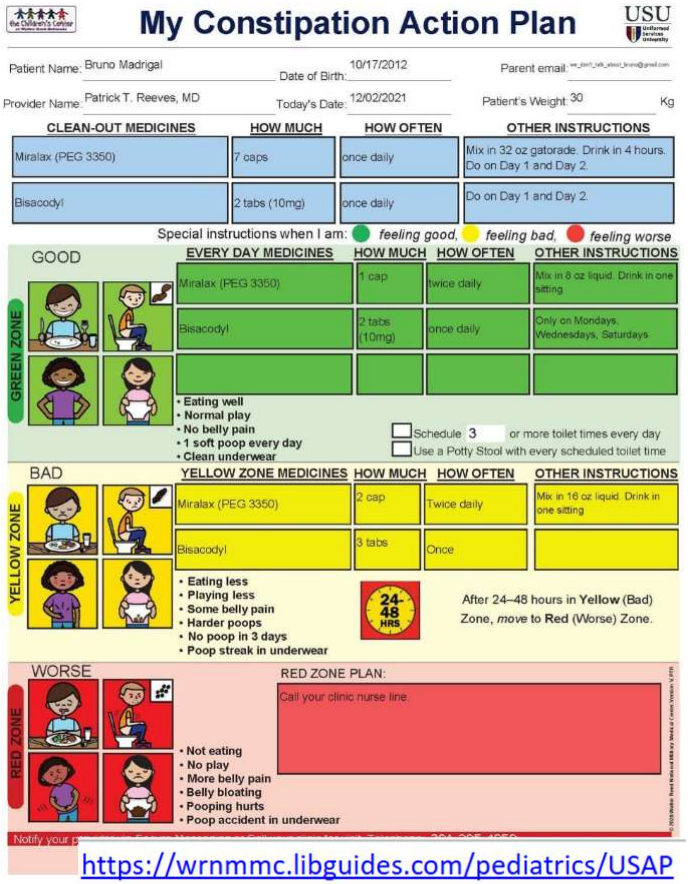
Diaries and Action plan

Name: John Smith
Weeks of: Jan 1-14

Day/date	Toilet sitting AM	Toilet sitting Midday	Toilet sitting PM	Stools outside of sitting time	Medication	Medication	Comments
SUN 1	o	o	x		✓	✓	
MON 2	o	o	o	x	✓	✓	
TUE 3	o	o	x		✓	✓	hard stool
WED 4	o	o	o	x	✓	✓	
THU 5	o	x	o		✓	✓	
FRI 6	o	o	x		✓	✓	abdominal pain
SAT 7	o	o	o	x	✓	✓	
SUN 8	x	o	o		✓	✓	
MON 9	o	o	x		✓	✓	
TUE 10	o	o	x		✓	✓	
WED 11	o	x	o		✓	✓	
THU 12	o	o	x		✓	✓	
FRI 13	x	o	o		✓	✓	
SAT 14	o	o	o	x	✓	✓	

Instructions:
Write your child's name and the time period in the upper right corner.
Write the day of the week and date in the first column.
When your child has a bowel movement in the toilet place an "X" in the appropriate column (ie, during toilet, sitting or outside of sitting time).
When your child sits on the toilet but doesn't have a bowel movement, place an "O" in the appropriate column.
When your child takes his or her maintenance laxative, place a checkmark in the "Medication" column.
Write any additional information in the "Comments" column (eg, need for rescue medication or episodes of wetting, soiling, or abdominal pain).
Keep this diary and bring it with you to the next appointment.



https://wrnmmc.libguides.com/pediatrics/USAP

Medical Options - BOSS

- **Bulk-Forming**
  - Fybogel
- **Osmotic**
  - Lactulose
  - Macrogol (Polyethylene glycol)
    - Trade Names
      - Movicol
      - Pegicol
      - Golytely
- **Stimulants**
  - Senna
  - Bisacodyl
- **Stool Softeners**
  - Mineral Oil/Liquid Paraffin

Agent	Child's age	Dosage	Side effects
Osmotic laxatives			
PEG	Any age	0.4-0.8g/kg per day for maintenance; 1-1.5g/kg per day for fecal disimpaction	Diarrhea, bloating, flatulence, nausea, vomiting, abdominal cramps
Lactulose (70% solution)	Any age	1 mL/kg once or twice daily (max 120 mL per day)	Bloating, flatulence, abdominal cramps, fecal, incontinence
Sorbitol (70% solution)	1-11 yr	1 mL/kg once or twice daily (max 30 mL per day)	Bloating, abdominal cramps
	> 12 yr	15-30 mL once or twice daily	
Milk of magnesium	> 2 yr	1-3 mL/kg per day once or twice daily	Abdominal pain, fecal incontinence, hypermagnesaemia, hypocalcaemia, hypophosphataemia (with excess use in children with renal disease)
Stimulant laxatives			
Senna (antraquinone)	> 2 yr	7.5-15 mg/kg per day once daily	Abdominal cramps, idiosyncratic hepatitis, melanosis coli in prolong used, nephropathy, neuropathy, hypertrophic osteoarthropathy
Bisacodyl	> 2 yr	5-10 mg per day once daily	Diarrhoea, abdominal cramps
Sodium picosulphate	4-5 yr	3 mg per day	Nausea, vomiting, bloating, abdominal cramps, diarrhea, headache, taste impairment
	> 6 yr	4-6 mg per day	
Glycerine suppository	< 1 yr	Half for pediatric suppository once daily	Rectal irritation, bloating, abdominal cramps, diarrhea
Rectal laxatives/enemas			
Sodium phosphate	> 1 yr	2.5 mg/kg	Rectal discomfort, diarrhea, abdominal cramps, electrolyte imbalance
Bisacodyl	2-12 yr	5 mg/dose once daily	Rectal discomfort, diarrhea, abdominal cramps, hypokalemia
	> 12 yr	5-10 mg/dose once daily	
Saline enema	Neonate	< 1 kg: 5 mL, > 1 kg: 10 mL	Rectal discomfort, bloating
	> 1 yr	6 mL/kg once or twice daily	
Lubricant			
Mineral oil	> 1 yr	1-2 mL/kg daily (max 90 mL per day)	Rectal discomfort, lipoid pneumonitis

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Disimpaction

PEG/Enema

- PEG: 1-1.5g/kg
- Enema: 2.5ml/kg (not <1year)
- Warm saline Washouts – 20ml/kg

Stimulant

- If no response after 2 weeks
- Bisacodyl cannot be crushed
- Chewable Dulcolax

Alternative

- Add lactulose 1-3ml/kg in divided doses
- (Liquid Paraffin/Mineral oil)

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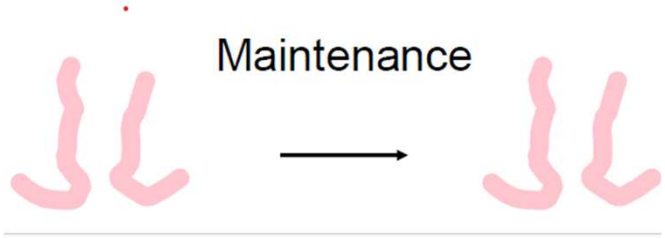
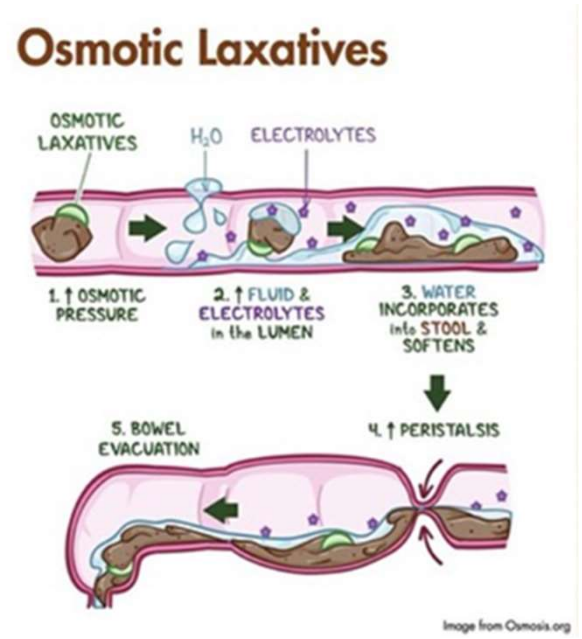
Maintenance

- Do not use dietary interventions alone as first line treatment
- Goals:
  - Produce soft and painless stools
  - Avoid stool re-impaction
  - stop the re-emergence of stool withholding behaviour.

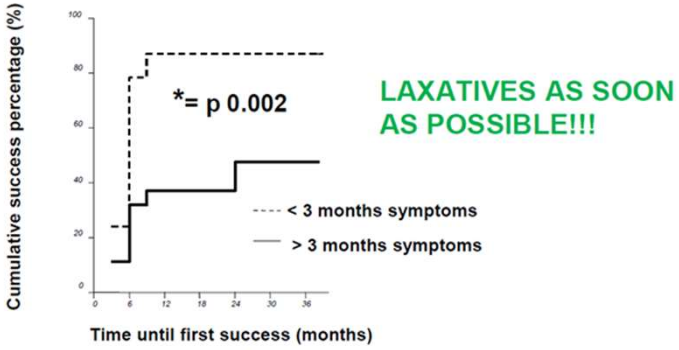


Maintenance

- Combine with non-pharmacological interventions
- Do not delay treatment!
- Osmotic laxatives most effective



„Wait and see“ approach???



Van den Berg MM et al. Epidemiology of childhood constipation: a systematic review. Am J Gastroenterol. 2006;101(10):2401-9.

Maintenance

PEG

- 1st line: more effective than lactulose
- Dose: 0.4-0.8g/kg/day

Lactulose

- 1-3ml/kg (maximum 120ml/day)

Stimulants

- Senna, Bisacodyl, Sodium Picosulphate
- Limited high quality RCT
- Additional or second line therapy

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Duration of treatment

No adequate evidence-based consensus

Expert opinion suggests:

- Maintenance treatment should be continued for a minimum duration of 2 months
- Wean gradually over a period of months in response to stool consistency and frequency
- Children who are toilet training should remain on laxatives until toilet training is well established

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Newer Therapies

Lubiprostone – locally acting chloride channel activator

- DBRCT – no efficacy vs placebo but comparable safety profile to adults

Linactolide – guanylate cyclase c receptor agonist

- FDA approved for children 6 -17 years.
- DBRCT - Increased frequency and consistency.
- Adverse event: Diarrhoea

Prucalopride: 5HT4 receptor agonist: prokinetic

- No efficacy vs placebo

Transcutaneous nerve stimulation

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Other Therapies

- **Probiotics**
  - Weak evidence
- **Physiotherapy**
  - Influenced by dysynergic defaecation
  - No added benefit that standard medical treatment
- **Biofeedback**
  - Low quality evidence to support its use
- **Botox**
  - Reduce anal sphincter muscle contraction,
  - diagnostic test - whether the obstructive symptoms are being caused by internal anal sphincter hypertonia
  - treatment for intractable constipation
  - Limitations – duration of treatment effect, GA

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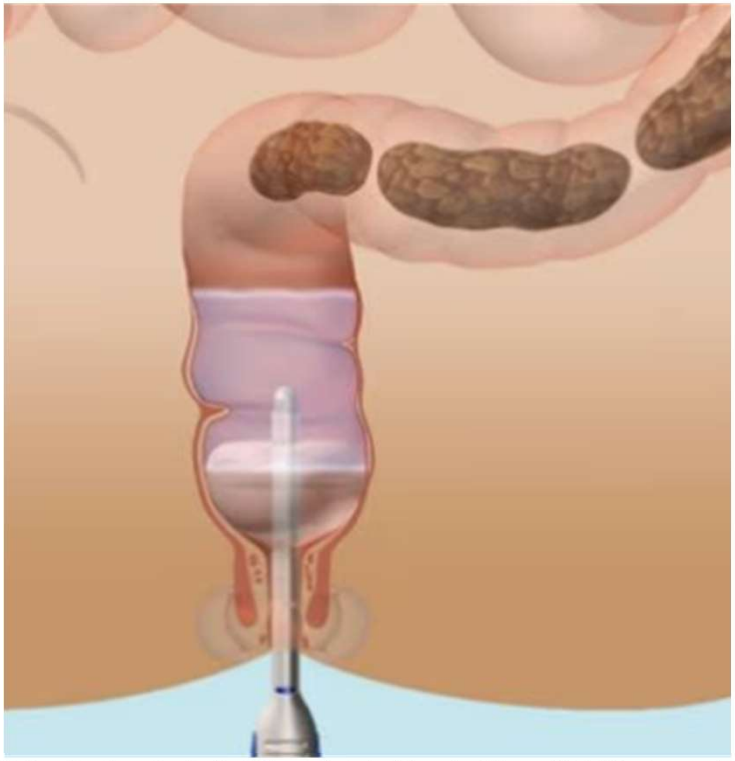
When all else fails…

- Transanal Irrigation



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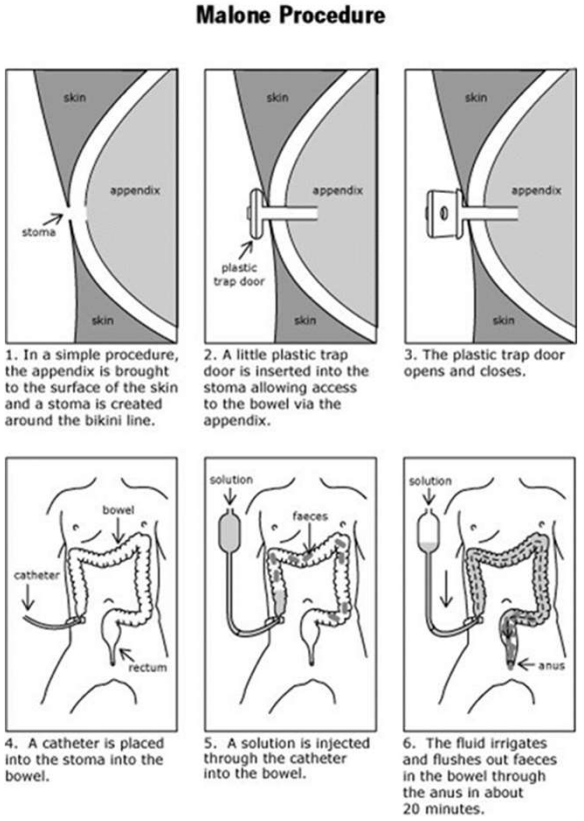
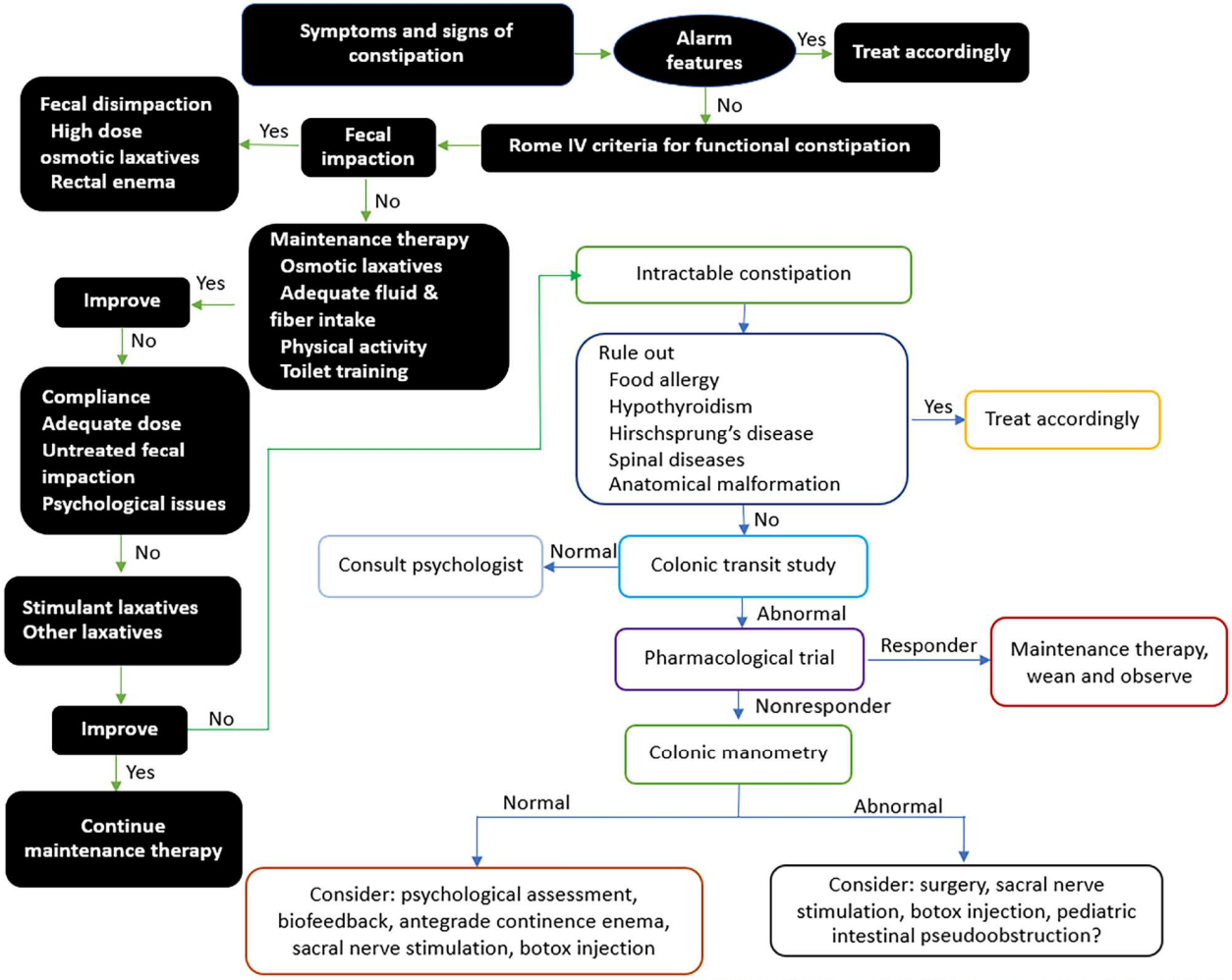
- Antegrade Continence Enema



Summary



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Prognosis

- Of children referred to paediatric gastroenterologists, after 6/12:
  - 50% will be asymptomatic and off treatment
  - 10% will be asymptomatic and on treatment
  - 40% will remain symptomatic on treatment
- Early treatment confers a better prognosis:
  - 80% vs 32% were asymptomatic if adequate treatment was started within 3/12 of symptom onset
- 50% and 80% recovery rates after 5 and 10 years
- Relapses are frequent

Tabbers MM et al. Evaluation and treatment of functional constipation in infants and children: evidence-based recommendations. JPGN 2014;58(2):258-74.

Take Home Message

- Functional constipation in children is a serious problem
- Impact on daily activities and social life
- Stool withholding is the main aetiology agent
- Diagnostic investigations - limited and focused on potential underlying pathology as indicated by history/examination (red flags)
- Treatment should be adequate and early!
- Stepwise approach is recommended
- Only rarely are basic therapeutic measures not sufficient

Thank you for your attention