CONSTIPATION IN CHILDREN

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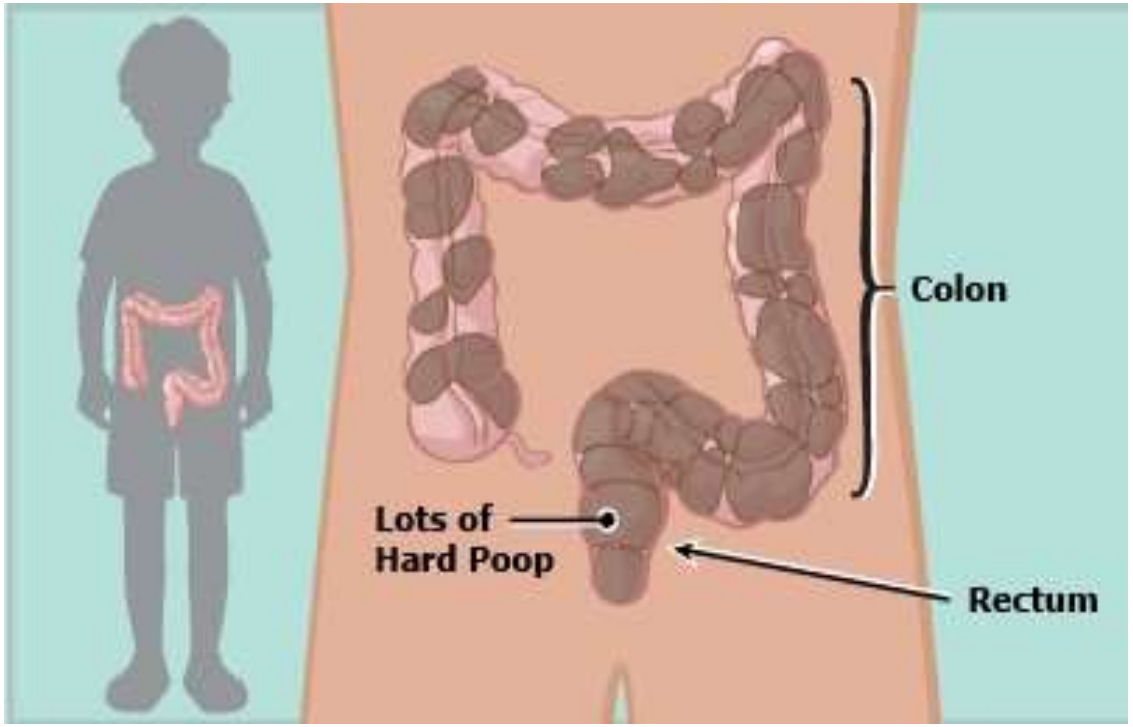
Definition of constipation



-Constipation, defined as a delay or difficulty in defecation present for 2 or more weeks, is a common pediatric problem

-Constipation is often associated with infrequent and/or painful defecation, fecal incontinence, and abdominal pain; ------- causes significant distress to the child and family; and has a significant impact on health care cost.

BRISTOL STOOL CHART FOR ASSESSING THE TYPE OF STOOL :

Type 1 	Separate hard lumps, like nuts (hard to pass)
Type 2 	Sausage-shaped but lumpy
Type 3 	Like a sausage with cracks on its surface
Type 4 	Like as sausage, smooth and soft
Type 5 	Soft blobs, clear cut edges (passed easily)
Type 6 	Fluffy pieces, ragged edges mushy stool
Type 7 	Waterly, no solid pieces, entirely liquid

Normal frequency of bowel movements in infants and children

Age	Mean number of bowel movements per week	Mean number of bowel movements per day
0–3 months (breastfed)	5–40	2.9
0–3 months (formula-fed)	5–28	2.0
6–12 months	5–28	1.8
1–3 years	4–21	1.4
Over 3 years	3–14	1.0

- Monika Kwiatkowska Adv Clin Exp Med. 2021;30(4)

Causes of constipation according to age in children

Cause of constipation	Infants	Children older than 1 year
Functional constipation	rare (prevalence 3–12.1%)	more than 95% of cases (prevalence 0.5–32.2%)
Hirschsprung's disease	yes	yes
Congenital anorectal malformations	yes	rarely
Neurological disorders	yes	rarely
Encephalopathy	yes	rarely
Spinal cord abnormalities: myelomeningocele, spina bifida, tethered cord	yes	rarely
Cystic fibrosis	yes	yes
Metabolic causes: hypothyroidism, hyper-calcemia, hypokalemia, diabetes insipidus	yes	yes
Heavy metal poisoning	yes	yes
Medication side effects	yes	yes
Gluten enteropathy	no	yes
Spinal cord trauma	no	yes
Neurofibromatosis	rarely	yes
Developmental delay	rarely	yes
Sexual abuse	rarely	yes

Monika Kwiatkowska Adv Clin Exp Med. 2021;30(4)

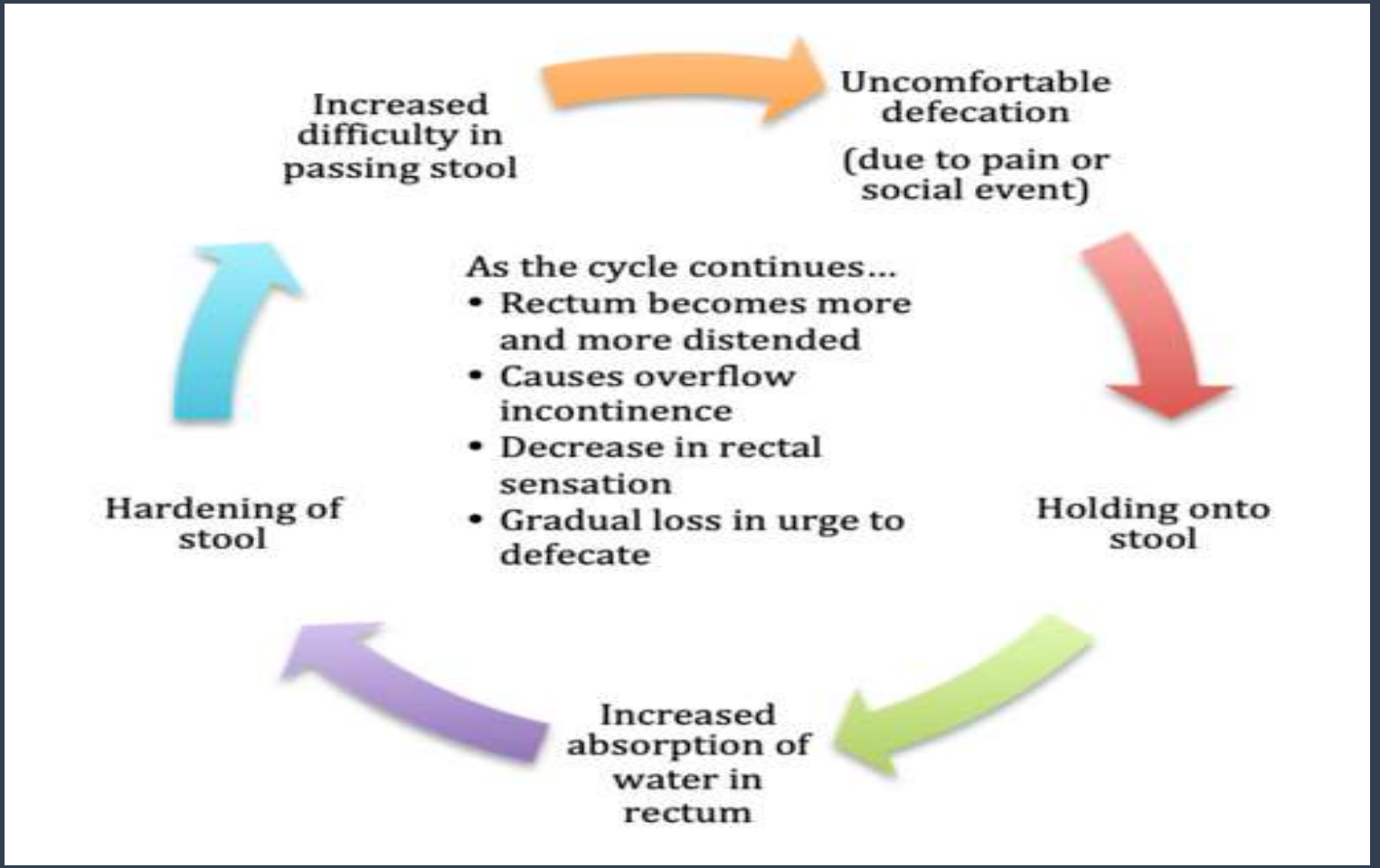
Functional constipation vs Hirschsprung disease

TABLE I DIFFERENCES BETWEEN FUNCTIONAL CONSTIPATION AND HIRSCHSPRUNG DISEASE

Features	*Functional constipation*	*Hirschsprung disease*
Delayed passage of meconium	None	Common
Onset	After 2 years	At birth
Fecal incontinence	Common	Very rare
History of fissure	Common	Rare
Failure to thrive	Uncommon	Possible
Enterocolitis	None	Possible
Abdominal distension	Rare	Common
Rectal examination	Stool	Empty
Malnutrition	None	Possible

UJJAL PODDAR, indian pediatrics 2016

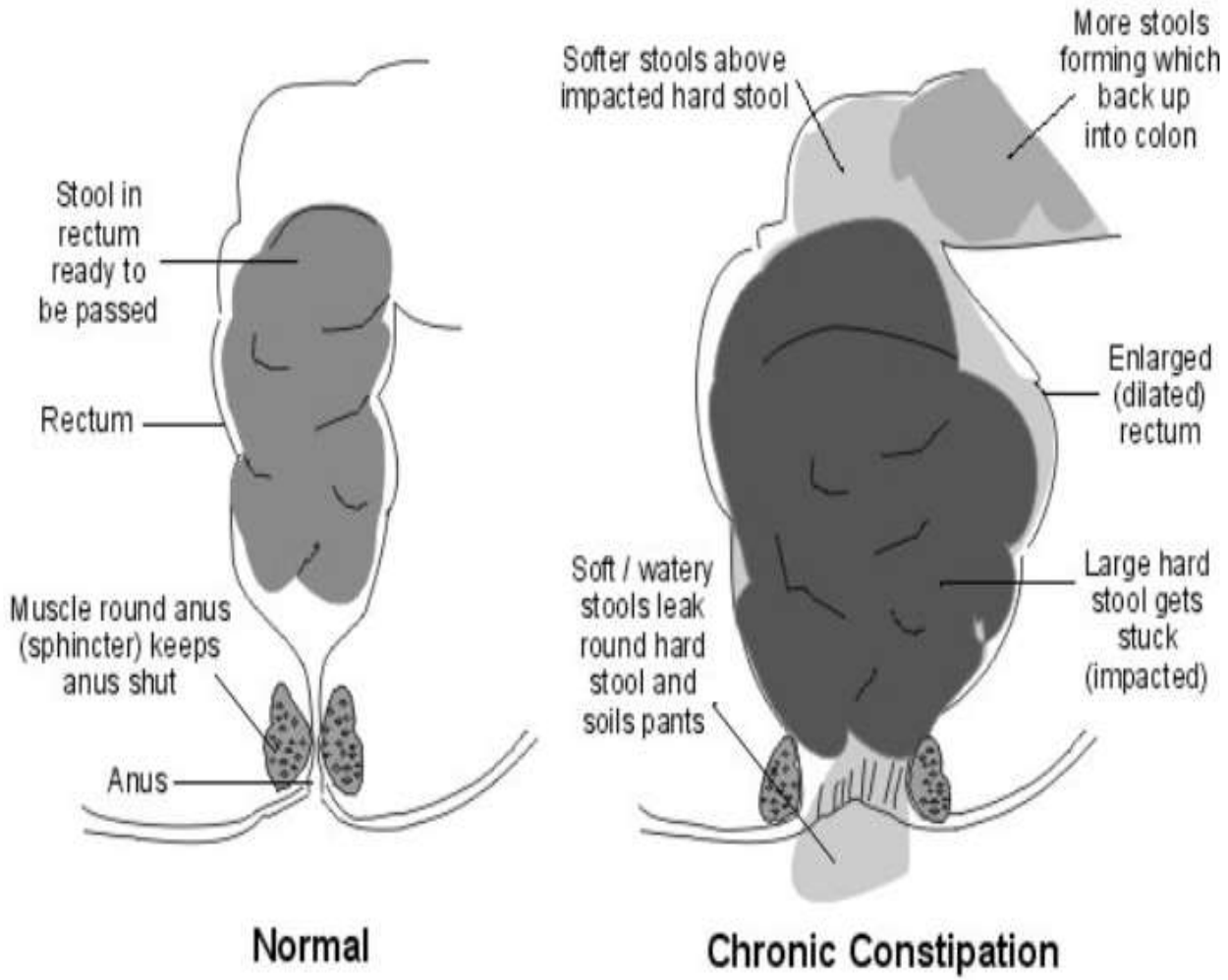
Pathophysiology of constipation



Deborah M. Consolini *MD, Thomas Jefferson University Hospital*

chronic constipation leading to fecal impaction

- Leung, AK, C onstipation in Children" American Family Physician 1996 Aug 54(2) 611-8, 627



Criteria	Children <4 years *	Children >4 years **
Rome IV criteria	• 2 or fewer defecations per week	• 2 or fewer defecations in the toilet per week
	• history of excessive stool retention	• at least 1 episode of fecal incontinence per week
	• history of painful or hard bowel movements	• history of retentive posturing or excessive volitional stool retention
	• history of large-diameter stools	• history of painful or hard bowel movements
	• presence of a large fecal mass in the rectum	• presence of a large fecal mass in the rectum
	In toilet-trained children, the following additional criteria may be used:	• history of large-diameter stools that can obstruct the toilet
	• at least 1 episode/week of incontinence after the acquisition of toileting skills	
	• history of large-diameter stools that may obstruct the toilet	

* Must fulfil ≥2 criteria at least once per week for a minimum of 1 month with insufficient criteria for a diagnosis of irritable bowel syndrome.
** Must fulfil ≥2 criteria at least once per week for a minimum of 1 month with insufficient criteria for a diagnosis of irritable bowel syndrome. After appropriate evaluation, the symptoms cannot be fully explained by another medical condition.

Rome IV criteria for functional constipation

- Monika Kwiatkowska Adv Clin Exp Med. 2021;30(4)

History and physical examination to diagnose Functional constipation

History

Stool passed within 48 hours of birth

Extremely hard stools, large-caliber stools

Fecal soiling (encopresis)

Pain or discomfort with stool passage; withholding of stool

Blood on stools; perianal fissures

Decreased appetite, waxing and waning of abdominal pain with stool passage

Diet low in fiber or fluids, high in dairy products

Hiding while defecating before toilet training is completed; avoiding the toilet

Physical examination

Mild abdominal distention; palpable stool in left lower quadrant

Normal placement of anus; normal anal sphincter tone

Rectum packed with stool; rectum distended

Presence of anal wink and cremasteric reflex

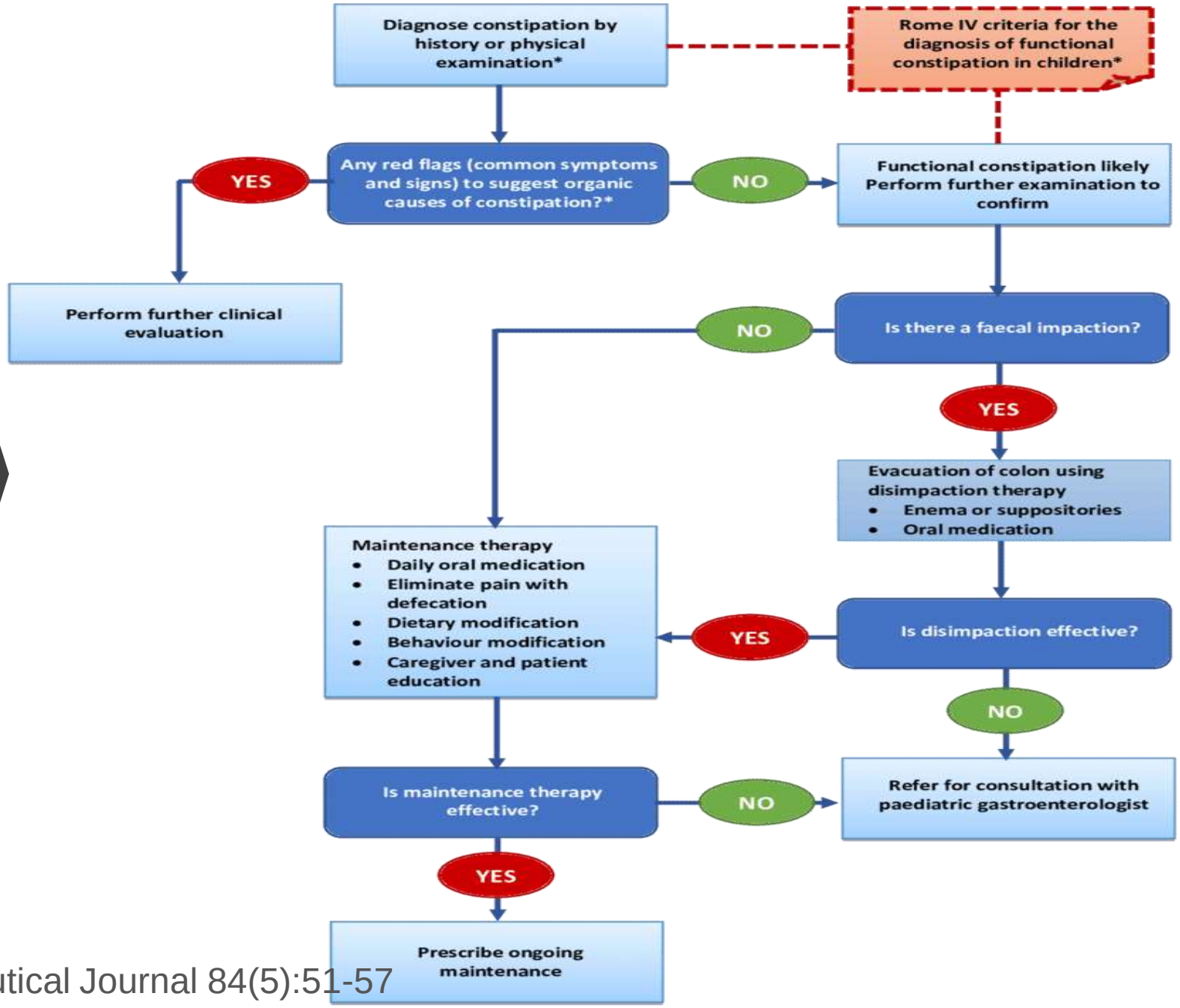
WENDY S. BIGGS Am Fam Physician 2006;73:469-77, 479- 80, 481-2

Warning signs for organic constipation

- Xinias I HIPPOKRATIA 2015, 19, 1: 11-19

Warning signs for organic constipation (red flags)
Symptom onset before 12 months of age
Delayed passage of meconium
Lack of fecal retention
Lack of fecal leakage (soiling)
Malnutrition
Empty rectal ampulla
Pigmentary abnormalities
Positive fecal occult blood test
Extraintestinal manifestations
Gallbladder diseases
Resistance to standard treatment

Algorithm for management of functional constipation



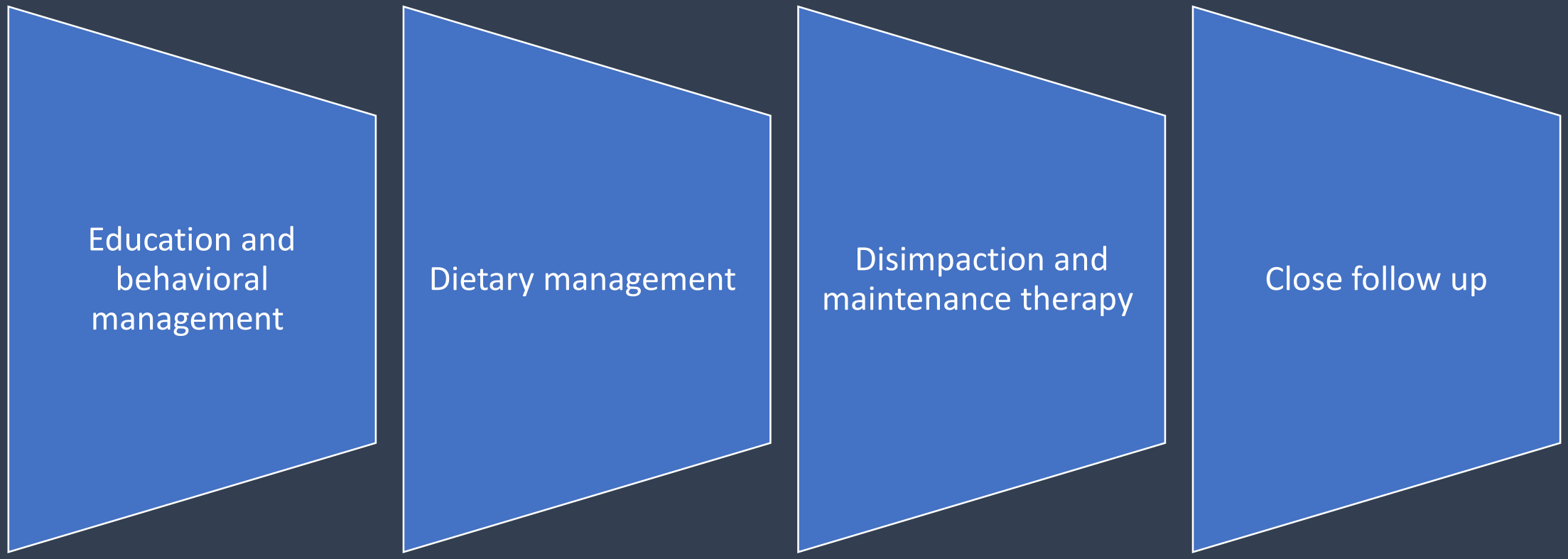
Johanna Catharina Meyer SA Pharmaceutical Journal 84(5):51-57

Treatment management

TARGET	DURATION
Phase I - bowel emptying	1-3 days
Phase II – Restore muscle tone to sphincters and rectum of the gut – bring gut diameter to normal size	≥ 2-6 months
Phase III – restore bowel movements and relapse avoidance	≥ 4- 6 months

Xinias I HIPPOKRATIA 2015, 19, 1: 11-19

Management of constipation



PARENTAL COUNSELLING AND EDUCATION

- Parents need to be educated
- The **withholding behaviour of a child** : when this continues for a period of time; it establishes a vicious cycle that leads to chronic habitual constipation.
- This can lead to fecal impaction/overflow incontinence when left untreated.
- Parents are advised to encourage their child to defecate within 30 minutes of the major meal in order to utilize gastrocolic reflex.

Diet : Fiber and Water Intake

- The daily diet should include a sufficient quantity of fiber (0.5 g/kg/day) and adequate water.

- It should be noted that milk has a minimal quantity of fiber.
- The daily diet should include cereals, pulses, vegetables, and fruits.

PHYSICAL ACTIVITY

- Sedentary lifestyle is discouraged and

- participation in physical activities are encouraged as this encourages bowel movement.

MEDICAL THERAPY

- Medical therapy includes **disimpaction** and **maintenance.**

- Identification of fecal impaction and **disimpaction with laxatives** is an important initial requisite for subsequent effective maintenance laxative therapy.

A. DIFFERENT REGIMENS USED FOR FECAL DISIMPACTION

ORAL AGENT	DOSAGE	SIDE EFFECT
POLYETHYLENE GLYCOL (AT HOME)	1.5 – 2 g/kg/d in two divided dose for 3-6 day.	Loose stool, bloating, vomiting
POLYETHYLENE GLYCOL (AT HOSPITAL)	25 ml/kg/h oral or NG tube. Endpoint is clear rectal effluent.	Nausea, vomiting, abdominal cramps

RECTAL AGENTs	DOSAGE	SIDE EFFECT
SALINE	Neonate <1kg= 5ml >1kg=10ml >1yr=6ml/kg OD/BD	
Phosphate soda (proctoclysis enema)	2-18yr : 25ml/kg Max- 133ml/dose	Hypophosphatemia Hypocalcemia

OSMOTIC LAXATIVES AND DOSES :

NAME	DOSE	MECHANISM OF ACTION	SIDE EFFECT
POLYETHYLENE GLYCOL	0.5-1 g/kg/d	Retain intraluminal water	Nausea and vomiting
LACTULOSE	<1yr = 2.5 ml BD 1-5yr = 10 ml BD 5-20yr = 5-20ml BD	Synthetic disaccharide which retain intraluminal water	Bloating
LACTITOL	200-400 mg/kg/d	Synthetic monohydrate which retain intraluminal water	Mild bloating

STIMULANT LAXATIVE AND DOSES

NAME	DOSE	MECHANISM OF ACTION	SIDE EFFECT
SODIUM PICOSULFATE	2.5-10mg/d up to 4 year 2.5 to 20 mg from 4-18 year	Converts into active metabolite by gut bacteria which increases peristalsis	Nausea, crampy abdominal pain and diarrhea

Medications for the treatment of pediatric constipation

Laxative	Dosage	Side effects
Lactulose	1 mL/kg/day – 3 mL/kg/day in divided doses	Flatulence, abdominal cramps
Milk of magnesia (Magnesium hydroxide)	1 mL/kg/day – 3 mL/kg/day of 400 mg/5 mL available as liquid	Magnesium poisoning (infants). In overdose, hypermagnesemia, hypophosphatemia and secondary hypocalcemia
Polyethylene glycol 3350	Disimpaction: 1 g/kg/day – 1.5 g/kg/day for 3 days Maintenance: Starting dose at 0.4 g/kg/day – 1 g/kg/day	Limited. Occasional abdominal pain, bloating, loose stools
Polyethylene glycol-electrolyte solution (lavage)	Disimpaction: 25 mL/kg/h (to 1000 mL/h) by nasogastric tube until clear effluent Maintenance: 5 mL/kg/day – 10 mL/kg/day (older children)	Nausea, bloating, abdominal cramps, vomiting and anal irritation
Mineral oil	Disimpaction: 15 mL/year – 30 mL/year of age (up to 240 mL daily) Maintenance: 1 mL/kg/day – 3 mL/kg/day <1 year of age: Not recommended	Lipid pneumonia if aspirated. Theoretical interference with absorption of fat-soluble substances, but no evidence
Senna	2–6 years: 2.5 mL/day – 7.5 mL/day 6–12 years: 5 mL/day – 15 mL/day	Idiosyncratic hepatitis, melanosis coli, hypertrophic osteoarthropathy, analgesic nephropathy
Bisacodyl	Oral: 3–12 years: 5 mg – 20 mg Rectal: <2 years: 5 mg/day 2–11 years: 5 mg/day – 10 mg/day	Abdominal cramping, nausea, diarrhea, proctitis (rare)
Docusate sodium	5 mg/kg/day divided three times a day or as a single dose	Abdominal pain, cramping, diarrhea
Glycerin suppositories	–	None
Phosphate enemas	<2 years old: Not recommended >2 years: 6 mL/kg (up to 135 mL)	Risk of mechanical trauma to rectal wall Abdominal distention or vomiting Hyperphosphatemia, hypocalcemia

What is the recommended duration of therapy for chronic constipation ?

- **European Society for Paediatric Gastroenterology, Hepatology, and Nutrition (ESPGHAN)** - maintenance treatment should continue for **at least 2 months**.
- All symptoms of constipation symptoms should be resolved for at least 1 month before discontinuation of treatment.
- **Indian Society of Paediatric Gastroenterology, Hepatology and Nutrition and Paediatric Gastroenterology Chapter of Indian Academy of Paediatrics (ISPGHAN)** - maintenance therapy should be given for at **least 6 months** before attempting to taper the laxatives.
- It is then advisable to taper gradually over a period of 3 months.
- **National institute of health care excellence (NICE)** - Continue medication at maintenance dose for **several weeks** after regular bowel habit is established – this may take several months.
- **AAFP (American Academy of Family Physicians)**- Maintenance doses of medications need to be continued for **several weeks to months** after a regular bowel habit is established

DOES COMBINING TWO DIFFERENT LAXATIVES LIKE, PEG + LACTULOSE OR PEG + SENNA OR PEG + BISACODYL IS EFFECTIVE?

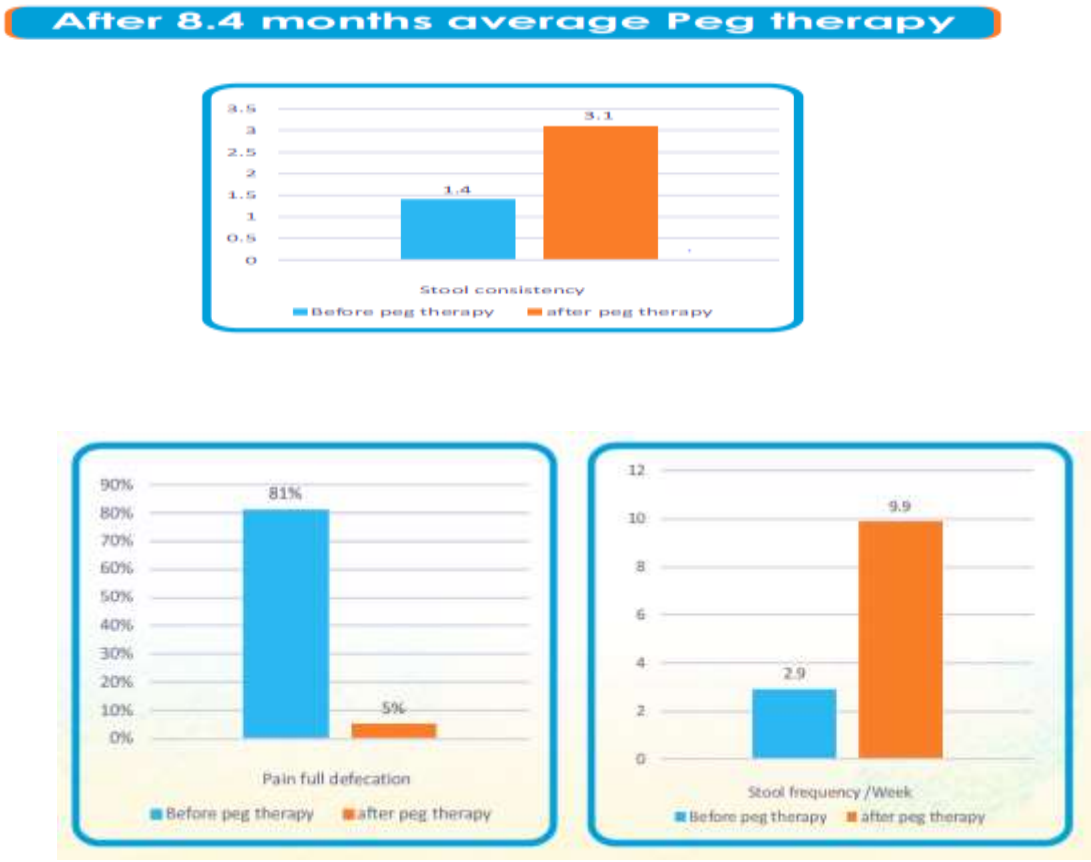
- Polyethylene glycol with right dose based on the body weight and for right duration would be effective itself in both disimpaction and maintenance.
- Adding a stimulant laxatives like senna and bisocodyl is not recommended for maintenance therapy as it cause abdominal pain.
- PEG 3350 + lactulose is not effective in treating constipation and also not effective in preventing reoccurrence.

IS PEG 3350 BETTER THAN PEG 4000 ?

- Polyethylene glycol is hydrophilic molecule meaning it attracts water molecules and tends to dissolve well in water, so more water is required to show its effectiveness.
- Without water Polyethylene glycol won't reach small intestine to show required action.
- Polyethylene glycol 3350 has more number of studies than Polyethylene glycol 4000.
- Polyethylene glycol needs to be dissolved in water to increase the palatability.
- Drinking water with Polyethylene glycol also helps to take adequate quantity of fluids required per day

HOW SAFE AND EFFECTIVE IS POLYETHYLENE GLYCOL 3350 FOR LONG TERM USE?

- PEG is inert molecule, so it is minimally absorbed in the GIT and is excreted unchanged in faeces, so there are no major side effects.
- Diarrhoea is a desirable effect, and only modification of dosage is important but not stoppage of polyethylene glycol.
- Long term safety data with average 8.4 months usage of PEG 3350 also shows- no clinical and biochemical abnormality.



WHAT ARE THE CHANCES OF RELAPSE IN CONSTIPATION ?

- Refractory rate or reoccurrence of constipation is as high as 30% even after successful treatment.
- Refractory constipation is due to early discontinuation of laxatives or inadequate laxative dose. So PEG 3350 should be given for a minimum of 6 months to prevent recurrence.
- After achieving 1-2 painless stools/day, Dose of PEG 3350 should be decreased gradually for 3 months and then discontinuing the treatment and observing for any reimpaction.
- With follow-up and successful weaning success rate of constipation is >90%.

Complications of constipation

- Abdominal distention
- Recurrent abdominal cramps
- Decreased fluid intake
- Vomiting
- Urinary incontinence
- Urinary tract infections
- Anal prolapse, fissures or hemorrhoids
- Low self-esteem, depression

VERA LOENING-BAUCKE, GASTROENTEROLOGY Vol. 105, No. 5

Summary

- Functional Constipation is an underestimated but common health problem worldwide, decreasing the quality of life
- In the last decade, significant progress had been made in understanding the pathophysiology and treatment of childhood constipation
- Management protocol should be adapted as per the algorithm suggested by the National and International Society guidelines
- Emphasis should be laid on toilet-training and importantly in counseling particularly related to long-term usage of medical therapy
- PEG is the first line of therapy for Functional Constipation in children as suggested by the ISPGHAN , IAP, ROME IV criteria , ESPGHAN and NASPGHAN guidelines
- Management of functional constipation starts with Disimpaction for 1 to 3 days followed by maintenance and follow up to prevent relapse.
- PEG is the safest medication that can be used for recommended duration as Per ESPGHAN ,ISPGHAN, NICE and AAFP
- PEG works in occult constipation, chronic constipation and constipation with encopresis.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