

# Constipation

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## Practice Gaps

1. Pediatricians should be aware of the presenting signs and symptoms of constipation in children of different age groups.
2. Pediatricians should understand the importance of addressing alarm signals, or “red flags,” before entertaining any functional gastrointestinal diagnosis.
3. Pediatricians should understand that the management of constipation may require a behavioral approach.

## Objectives After completing this article, readers should be able to:

1. Understand the importance of distinguishing functional from organic causes of constipation.
2. Understand the relative roles of the Rome IV criteria for functional constipation–related disease and the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* criteria for encopresis.
3. Understand the role of the pediatric psychologist in managing problematic patients with constipation.
4. Appreciate the limitations of current research on pediatric constipation and how this affects treatment.

## Abstract

Constipation in otherwise healthy infants and children is a common problem despite confusion about how to precisely define constipation and constipation-related disorders. Constipation may, rarely, be a sign or symptom of a more serious disease or a diagnosis defined only by its symptoms and without any structural or biochemical findings. In the latter case it is classified as a functional gastrointestinal disorder (FGID). FGIDs are defined as disorders that cannot be explained by structural or biochemical findings. The Rome Foundation has standardized diagnostic criteria for all FGIDs. The Rome criteria are based on the available research as well as the clinical experience of the Foundation's assembled experts. The most recent report, Rome IV, described clinical criteria and diagnostic tools and encouraged more rigorous research in the area of FGIDs. The true incidence and prevalence of constipation is difficult to know because it may be treated at home using home remedies or diagnosed at a visit to a primary care

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### ABBREVIATIONS

APA	American Psychiatric Association
DSM-5	Diagnostic and Statistical Manual of Mental Disorders Fifth Edition
FC	functional constipation
FGID	functional gastrointestinal disorder
FI	fecal incontinence
NFI	nonretentive fecal incontinence
PEG	polyethylene glycol

provider or to a subspecialist pediatric gastroenterologist. The most recent attempts to define the prevalence of all pediatric FGIDs have been made using the Rome IV criteria. The defined FGID entities that may be associated with the complaint of constipation are infant dyschezia, functional constipation, and nonretentive fecal incontinence. The term *encopresis*, omitted from Rome IV, is defined by the American Psychiatric Association (APA) in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition*. The 3 Rome-defined (constipation-related) entities and the APA entity of *encopresis* are the focus of this review.

## INTRODUCTION

Constipation is commonly defined by the following symptoms: hard stools, painful stools, and stools that are difficult to pass, infrequent, or incomplete, dry, or hardened. For patients presenting with the symptoms of constipation, what matters is the alleviation of symptoms and not what we call this condition. However, for those focused on studying the problem, a consistent and rational categorization of these entities is necessary.

Practically speaking, the pediatric provider must distinguish between patients who require specialized evaluation (and potentially specialized medical/surgical intervention) and those with functional gastrointestinal disorders (FGIDs), who should be managed with a focus on fecal elimination using reassurance and no or minimal medical intervention. Toward that goal, patients who exhibit alarm signals, or “red flags” (Table 1), should be evaluated appropriately and should not be considered “functional” until physical and biochemical normality are evident.

The Rome Foundation has standardized diagnostic criteria for all FGIDs. The original Rome criteria were based on the available research as well as the clinical experience of the Foundation’s assembled experts. Those experts originally gathered in Rome to classify FGIDs in adults. Subsequently, pediatric experts were included in the Rome meetings, and specific criteria for FGIDs occurring in childhood have been identified. The evidence base underlying the development of the specific criteria has been expanding but is yet to have the rigor that most clinicians would generally demand for known biologically defined diseases. The most recent report, Rome IV, (2) described clinical criteria and diagnostic tools and encouraged more rigorous research in the area of FGIDs.

The Rome Foundation uses symptom-based definitions for FGIDs in an effort to minimize unnecessary testing (Table 2). Recognizing that not all clinical situations allow

for the same level of confidence in the interpretation of symptoms, Rome IV added more clinical flexibility to its FGID definitions by adding the following statement: “After appropriate medical evaluation the symptoms cannot be attributed to another medical condition.” The aim is to allow the physician to perform selective or no testing to establish the presence of an FGID. (4)

## SYMPTOM-BASED DESCRIPTIONS

### Infant Dyschezia (Ages 0–9 Months)

Infants with dyschezia appear completely well in the office. Parents may report isolated episodes of distressing straining with crying, perhaps with the baby’s face transiently turning deep red, in an apparent effort to defecate. The symptoms may last for 10 minutes but usually are resolved on their own by 20 minutes. The result is sometimes a soft stool, but other times it may be associated with failure to pass a stool during the episode described. Failure to pass a stool leads the parents to believe that the baby is experiencing constipation. Babies are completely better after these acute episodes. These episodes can be very distressing for parents. The onset of these symptoms is generally in the first few months of life, and they typically do not last for more than a month. The diagnosis of infant dyschezia is restricted to infants 9 months or younger (Table 3).

Babies with infant dyschezia are generally well nourished and have no red flags. The occurrence of vomiting, especially if accompanied by episodes of drawing up of the infant’s legs, or episodes followed by lethargy or seeming exhaustion may require ruling out intussusception. Diarrhea with or without blood is an alarm signal.

Parents often report resorting to rectal stimulation or the use of a glycerin suppository to provide relief for their infant. These interventions should be discouraged (see later herein). Pelvic floor movement, abdominal muscular contractions, and relaxation of the anal sphincters must all be

coordinated to achieve successful expulsion of the stool. The apparent cause of infant dyschezia is the newborn's inability to coordinate the voluntary and involuntary body movements necessary to expel stool. Implicit in this explanation is that this is a developmental skill that will be learned in time. Infants with infant dyschezia should be considered to have not yet learned this process, which, if unimpeded by ill-considered interventions, should be mastered by 9 months of age.

### Functional Constipation in the Infant, Toddler, and Older Child (Ages 0–18 Years)

Although it is difficult to know the true prevalence of functional constipation (FC) in childhood, across a range of cultures and ages, it seems to be approximately 12% to 18% (3)(4) (Table 2). FC may begin at any time in childhood, but the highest incidence seems to be associated with toilet training. Boys are reported to have a greater incidence of soiling. (4) There is consensus agreement that the following 3 factors may predispose to FC:

- Presumed dietary inadequacy suggesting that too much or too little or the wrong components or combination of components in the feed is responsible. For example, the inclusion of fiber-containing foods has strong advocacy among some, but definitive evidence of its role in FC is lacking; milk has been implicated as a cause of FC, but recent reviews express skepticism, at least about the frequency with which milk is a culprit; children with autism or other severe emotional disturbance may have extremely restricted and unusual diets.
- Cognitive decisions on the part of the infant, toddler, or child that may be self-limiting, requiring no or minimal intervention.
- Cognitive decisions on the part of the infant, toddler, or child that may require some form of intervention to treat the resulting FC. For example, providing a note requesting that a school-age child be allowed to use the nurse's bathroom may diminish the apprehension of using the students' toilet.

Although parents (and patients) tend to report hard painful bowel movements, they sometimes report loose stools, which may represent the overflow of watery stool past a bolus of hard stool (paradoxical diarrhea). Voluntary withholding has a significant role at the time of toilet training and may play a role throughout the school years. It is considered that unpleasant experiences associated with defecation (ie, pain or needing to take a break from enjoyable activities) reinforce stool retention and promote a vicious cycle. Social circumstance (ie, discomfort with using

the school toilet) may also promote stool withholding. When stool is withheld, water absorption is increased, making the stool harder and drier and more difficult to pass, with or without pain. This, in turn, creates a vicious cycle by promoting voluntary withholding. When there is an accumulation of stool in the rectum, there is a reflex decrease in gastric emptying, which may be associated with different symptoms, including upper gastrointestinal tract symptoms, such as abdominal distention, abdominal pain, loss of appetite, and nausea. The frequency, order of occurrence, and exact physiology of these symptoms is unclear. In the absence of warning signs, such as those in Table 1, the diagnostic criteria for FC should be considered (Table 4).

Primary care physicians' evaluations should include a comprehensive history and physical examination and must exclude alarm signals (Table 1). Of note, it is frequently suggested that urinary tract symptoms are more common in children with FC. van Summeren et al (5) noted in their review of urinary tract or "bladder" symptoms that there was substantial variability in reports of co-occurrence with FC. They concluded that "we cannot make any definitive statements on the prevalence of bladder symptoms in children with FC." They did conclude that symptoms referable to the urinary tract clearly occurred with "significant frequency" in children with FC and that children with FC are more likely to have [urinary tract] symptoms than are children without FC.

Clearly, symptoms related to the urinary tract are red flags that need to be assessed and resolved regardless of any real or hypothetical relationship to FC. (5) When the functional nature of the problem is considered, the Rome IV criteria for FC should be applied. Similarly, when appropriate, the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5)* (6)—defined diagnosis of encopresis may need to be considered (Table 5).

The presence of a large fecal mass in the rectum is one of the criteria for FC. Diagnosis of fecal impaction has historically been made based on appropriate history and digital rectal examination. The role of the digital rectal examination is now unsettled. Some physicians are comfortable with the use of digital rectal examination to determine the presence of fecal impaction in the rectum. Other physicians regard this as an unnecessary, uncomfortable (at best), and overly invasive examination and do not consider it part of their routine examination for constipation. The joint report of the North American and European societies of pediatric gastroenterology, hepatology, and nutrition (7) recommended a digital rectal examination if the diagnosis of FC is uncertain, ie, if only one of the (then) Rome III criteria was present, in

the presence of specific alarm signals/red flags, and in the presence of intractable constipation. More recently it has been suggested that performing a digital rectal examination likely provides little additional information for the examiner. (8)

The same joint report (7) also suggested that the routine use of abdominal radiography has no role in the diagnosis of FC but that it is of use in a child in whom fecal impaction is suspected but physical examination is unreliable or not possible. Some consider that the role of the abdominal radiograph is to confirm a successful cleanout in previously impacted children as well as when a digital examination is impractical for whatever reason and when there seems to be a discordance between symptoms and examination findings. There seems to be only a minimal role for using abdominal radiography in the emergency department for diagnosis.

The overriding goal of evaluation is for the health-care provider to assure herself or himself, so that the provider can with confidence assure the parents and patient that the constipation is functional and will respond to the measures offered if followed.

#### Nonretentive Fecal Incontinence (Ages 4–18 Years)

Nonretentive fecal incontinence (NFI) is distinguished from FC by having normal numbers of stools and, if tested, normal colonic transit times (which are generally prolonged in FC). Patients with NFI do not have to be disimpacted because they do not have large accumulations of stool as a mass in their rectum. They can, however, be expected to have either very significant psychosocial problems or a significant neurologic lesion. Diagnostic criteria are listed in Table 5.

#### Encopresis

The *DSM-5* continues to use the term *encopresis* with the diagnostic criteria listed in Table 5. Encopresis is considered an elimination disorder, along with enuresis. The 2 diagnoses—encopresis and enuresis—may coexist.

Although the actual symptoms associated with the American Psychiatric Association (APA) diagnosis of encopresis are distinct, so are those associated with NFI as defined by the Rome Foundation in Rome IV. For clarity, the criteria for each of these diagnoses are presented side-by-side in Table 5.

For the clinician, it may be helpful to appreciate that the Rome criteria focus on constipation as the main feature that distinguishes FC and NFI. The defining feature of encopresis is soiling. Distinctions between NFI and soiling are not always as clear as one might expect. It may be helpful to distinguish children who are soiling undergarments because

of poor perianal hygiene after stooling from those who experience leakage (ie, overflow incontinence) and those who have partial or complete bowel movements in their undergarments.

Briefly, the APA *DSM-5* diagnosis “encopresis—without constipation and overflow incontinence” seems to match the Rome IV diagnosis of NFI. However, the APA *DSM-5* diagnosis “encopresis—with constipation and overflow incontinence” does not match the Rome IV diagnosis of FC because the problem of incontinence is not included in FC, and it does not match the diagnosis of NFI because there is fecal retention (ie, constipation). It, therefore, has its own category, ie, “encopresis—with constipation and overflow incontinence.”

## FGID TREATMENTS

### Treatment of Infant Dyschezia

If the diagnostic criteria listed in Table 3 are met and the diagnosis of infant dyschezia is made, it is best to advise nothing more than comforting the baby during crying episodes. Gentle efforts at consoling the infant, including holding, cuddling, and massaging the abdomen, may relieve the stress on the baby and/or parents. Rectal stimulation has the risk of conditioning the infant to wait for stimulation to defecate. Depending on the vigor of the stimulation, there is the risk of physically hurting or of causing other harm. Changing infant formula (or moving away from breastfeeding) will not speed the process of resolving infant dyschezia. Laxatives do not have a role in the treatment of these infants. Reassurance is necessary because time will eventually resolve the problem.

### Treatment of FC

There is substantial agreement that the first step in treating the child with FC is adequate disimpaction. Without adequate cleaning out of retained stool, we believe that successful treatment is unlikely. In practice there is wide variability in the actual approach that practitioners use to accomplish this. Particularly challenging patients may need to be hospitalized to be cleaned out. This can be accomplished at a time that accommodates both staffing and parents' work schedules.

Treatment can be laborious, and we cannot urge strongly enough that patient/parent education is critical. We also suggest that practitioners provide a handout of their own preferred approach that reflects their experience and comfort level to reinforce their verbal teaching. Because systematic reviews (7)(9) suggest a satisfactory response at 12 months of only 50%, it is even more important that the

**TABLE 1. Alarm Signals (or “Red Flags”) and Examples of Potential Associated Disorders that May Have Constipation as a Symptom**

<b>SYMPTOM OR FINDING</b>	<b>EXAMPLES OF POSSIBLE CAUSES OR ASSOCIATIONS</b>
Passage of meconium >48 h Constipation in the first month after birth Family history of Hirschsprung disease	Hirschsprung disease
Family history of autoimmune disease such as celiac disease, type 1 diabetes	Celiac disease
Family history of cystic fibrosis	Pancreatic insufficiency Meconium ileus equivalent Chronic pancreatitis
Chromosomal abnormality (ie, Down syndrome)	Hirschsprung disease (~2.6% of patients with Down syndrome [1]) Intestinal malformation (atresia) Intestinal web
Physical asymmetry	Intestinal malformation
Ribbon stools	Rectal narrowing or atresia with fistula
Blood in the stool in the absence of anal fissures	Inflammation (NEC), milk allergy, polyp, intussusception
Weight loss or inadequate weight gain	Hirschsprung disease Numerous medical conditions
Lagging growth	Hirschsprung disease Chronic illness
Billious vomiting	Intestinal obstruction
Severe abdominal distention	Intestinal obstruction; ileus; severe obstipation Hirschsprung disease
Episodes of inconsolable crampy abdominal pain (especially if followed by sense of exhaustion)	Intussusception Volvulus or torsion
Urinary tract symptoms	Urinary tract disorder including obstruction or infection
Abnormal thyroid gland/function	Hypothyroidism
Abnormal position of the anus	Imperforate anus with fistula Anterior displacement with malpositioning of colon
Absent anal or cremasteric reflex Decreased lower extremity strength/tone/reflex Sacral dimple Tuft of hair on spine Gluteal cleft deviation	Spinal cord lesions (including sacroccygeal teratoma)
Dilated colon +/- ureters	Pseudo-obstruction disorders including neuropathies
Medication consumption	Iron intake, diuretics (dehydration), antispasmodics, calcium-containing medications, aluminum antacids, opioids, SSRIs and TCAs, unknown drugs, and herbals

*Continued*

TABLE 1. (Continued)

SYMPTOM OR FINDING	EXAMPLES OF POSSIBLE CAUSES OR ASSOCIATIONS
Restricted diet	Low fiber Unbalanced intake
Physical activity	Too sedentary, any chronic illness

NEC=necrotizing enterocolitis, SSRI=selective serotonin reuptake inhibitor, TCA=tricyclic antidepressant.

parents and (older) patient be educated to understand what is involved with their problem and the elements necessary for successful treatment. Potential medical therapies for treating fecal impaction are listed in Table 6.

Polyethylene glycol (PEG) 3350 is an agent that is soluble in water but minimally absorbed and seems to be inert (Table 7). It works by retaining water in the intestine and producing softer stools. It is commonly available over the counter and is sold under several different names. As with most of the commonly used agents for inducing bowel movements in children, it has not been approved for use in children. It is, however, widely used. A recent randomized, multicenter study (11) found that PEG 3350 was more effective than lactulose in achieving cleanout in FC. In addition, there were fewer adverse effects noted (principally, bloating and abdominal pain). The literature suggesting that the use of PEG 3350 is superior to lactulose is not settled because dosing and other conditions are not always comparable. It is reasonable to consider that the evidence remains inconclusive, and practitioner comfort and experience should guide the choice. Common variations in bowel disimpaction include several weeks of daily dosing as tolerated (ie, avoiding paradoxical diarrhea, especially with the use of PEG 3350). Some practitioners include the use of an oral laxative (10) (see Table 8 for often used laxatives), which may be continued for up to 2 to 4 weeks.

If the oral route is rejected or unsuccessful, the use of daily enemas may be substituted. In our experience, there is a disparity in knowledge and comfort regarding the use of enemas in both parents and medical providers. This should be taken into consideration before prescribing enemas. Some parents and providers will find biscodyl suppositories to be a more standardized and acceptable alternative to enemas. Their correct method of insertion can be demonstrated on the clothed child in the left lateral position on the examination table. The rectal suppositories melt in 10 to 15 minutes at body temperature and generally

induce a bowel movement within 30 minutes to 1 hour; their effect is complete after 2 hours (minimizing the effect on the child's schedule). They seem to be safe and effective and can be repeated daily, over 3 days, to accomplish the cleanout. Similar to all of the laxatives used, systematic safety studies in children are lacking, and caution is always warranted.

In general, it seems that most experts prefer nonstimulant laxatives, such as PEG 3350, lactulose, and Milk of Magnesia. These tend to be the gentlest, when used at an appropriate dose, with the goal of slowly softening any fecal mass and ultimately enabling passage. Biscodyl suppositories are expected to work within 1 to 2 hours.

Failure to achieve disimpaction on an ambulatory basis requires hospitalization. There is anecdotal data to suggest that hospitalizations for nasogastric tube placement and nasogastric lavage have increased greatly during the past decade; regardless, it is a too frequent necessity. The procedure involves placing the nasogastric tube in the hospital and instilling a PEG 3350 solution at the initial rate of 10 mL/kg per hour and gradually increasing to 20 and then up to 40 mL/kg per hour (if vomiting ensues, then the rate must be adjusted accordingly) (Table 7). For the impacted child it can take more than 24 hours before the effluent is clear. In instances where there is lack of clarity regarding successful cleanout, an abdominal radiograph to confirm the lack of stool left in the colon may help. Manual disimpaction is so rarely necessary that few become proficient. If necessary, it should be performed under general anesthesia (or deep sedation) to minimize patient trauma. Colonic perforation is a well-known complication of digital disimpaction, and those who perform the procedure should be prepared to deal with that serious sequelae.

Once a successful cleanout has been accomplished, it is necessary to maintain the "clean" rectum to allow the distended rectum to regain tone (Table 8).

Based on very limited evidence, it is reasonable to suggest that "normal" fluid intake and a fiber-rich diet help maintain

TABLE 2. **Prevalence of Specific Constipation-Related Disorders Using Rome IV Criteria**

DIAGNOSIS	INFANT <1 Y (N = 58)	TODDLER 1 TO <4 Y (N 238)	CHILD/ADOLESCENT (≥4 Y) (N = 959)
Infant dyschezia	<1%		
Functional constipation	12.1%	18.5%	14.1%
Nonretentive fecal incontinence			0.2%
Any functional gastrointestinal disorder <sup>a</sup>	37.9%	21.4%	25%

<sup>a</sup>Functional gastrointestinal disorders include, in addition to infant dyschezia, functional constipation, and nonretentive fecal incontinence, infant regurgitation, infant colic, cyclic vomiting syndrome, rumination, functional diarrhea, functional dyspepsia postprandial distress syndrome, functional dyspepsia epigastric pain syndrome, functional dyspepsia unspecified, irritable bowel syndrome, functional abdominal pain not otherwise specified, aerophagia, abdominal migraine, functional vomiting, functional nausea.

Adapted from Robin SG, Keller C, Zwiener R, et al. Prevalence of pediatric functional gastrointestinal disorders utilizing the Rome IV criteria. *J Pediatr*. 2018;195:134–139. (3)

normal bowel function. The efficacy of using fiber remains very controversial, and when we recommend fiber, we usually suggest that the entire family be included in a diet regimen that calls for adding 2 to 3 tablespoons of unprocessed bran flakes per day. This routine has both strong advocates and detractors. Between the cleanout and establishing a regular bowel routine it may be a good idea to offer maintenance dosing of PEG 3350, 0.4 g/kg per day that should be tapered (after 1–3 months) as symptoms resolve and a more acceptable bowel habit ensues. Although not approved for use in children, lactulose is used by many as an alternative to PEG 3350, especially in younger infants.

Relapses are so common that they must be anticipated. When they occur, the clinician must assess the acceptability of the original plan and decide whether a different or more rigorous maintenance regimen will be necessary after the next cleanout/disimpaction. Relapses may also be attributed to factors affecting the individual child (eg, refusal to take medications, purposeful stool withholding) and/or parent factors (eg, lack of understanding about regimen). In these cases, the assistance of an experienced and sympathetic nurse or, on occasion, referral to a behavioral psychologist may help improve adherence to the prescribed regimen.

The approach to treating the relapse is to repeat the successful cleanout. Generally, on completion of the cleanout, a more prolonged maintenance therapy period seems appropriate. In general food allergy testing, including milk allergy, is not routinely recommended, and further blood work, in the absence of alarm signal symptoms, is not warranted.

For concerns about Hirschsprung disease, rectal biopsy remains the gold standard, but 1 suction rectal biopsy can be expected to yield a definitive diagnosis in only 65% of patients, and a second biopsy will increase the yield to only 75%. (12) In patients with Down syndrome, where the risk of Hirschsprung disease is reported to be 2.62%, (11) it may be prudent to refer to a pediatric surgeon for full-thickness biopsy after 1 inadequate suction rectal biopsy. As with rectal biopsy, barium enema and anorectal manometry should not be routinely considered unless there are red flags concerning for Hirschsprung disease (Table 1).

#### Treatment of NFI and Encopresis—Without Constipation and Overflow Incontinence

In these conditions there is no evidence of constipation on physical examination or by history. Children with NFI (and those with encopresis without constipation and overflow incontinence) have normal colonic and anorectal motility. They have normal numbers of stools and are not constipated. NFI is associated with significant emotional distress and impulsive behavior, and there are often psychological comorbidities, including learning and behavioral

TABLE 3. **Rome IV Diagnostic Criteria for Infant Dyschezia**

#### MUST INCLUDE IN AN INFANT <9 MO OF AGE:

1. ≥10 min of straining and crying before successful or unsuccessful passage of soft stools
2. No other health problems

**TABLE 4. Rome IV Diagnostic Criteria for Functional Constipation**

**MUST INCLUDE ≥2 OF THE FOLLOWING OCCURRING AT LEAST ONCE PER WEEK FOR A MINIMUM OF 1 MO WITH INSUFFICIENT CRITERIA FOR A DIAGNOSIS OF IRRITABLE BOWEL SYNDROME:**

1. ≤2 defecations in the toilet per week in a child with developmental age of ≥4 y
2. ≥1 episode of fecal incontinence per week (after toilet training)
3. History of retentive posturing or excessive volitional stool retention
4. History of painful or hard bowel movements
5. Presence of a large fecal mass in the rectum
6. History of large-diameter stools that can obstruct the toilet
After appropriate medical evaluation, the symptoms cannot be explained by another medical condition

*Adapted from Hyams JS, Di Lorenzo C, Saps M, Shulman RJ, Staiano A, van Tilburg M. Functional disorders: children and adolescents. Gastroenterology. 2016;S0016-5085(16)00181-5. (2)*

disorders. (13) Although history of physical and sexual abuse may be associated with NFI, high-quality data on this subject are lacking, and associations may be conjectural. The approach to treating these children requires co-treatment by a physician or pediatric nurse practitioner to manage medically related issues and a pediatric psychologist to manage emotional and behavioral factors contributing to NFI.

#### Treatment of Encopresis—With Constipation and Overflow Incontinence

In this condition, there is evidence of constipation on physical examination or by history. Children with encopresis with constipation and overflow incontinence seem likely to have prolonged colonic transit. In that sense they share the physical characteristics of the child with FC. They may share the behavioral concerns of the patient with NFI. As with NFI and encopresis without constipation, the approach to these children can be optimized with co-treatment by a physician or pediatric nurse practitioner who manages the constipation and other medically related issues and a pediatric psychologist who manages the behavioral issues that are contributing to or maintaining constipation and fecal incontinence.

#### BEHAVIORAL APPROACH TO CHILDREN WITH FC, NFI, AND ENCOPRESIS

Psychosocial correlates and consequences of childhood constipation and fecal incontinence have been understudied. In general, the child with only FC is rarely a concern for the psychologist unless there are significant other

comorbid conditions. Children with fecal incontinence have been shown to have more mood concerns, disruptive behaviors, attentional problems, social problems, and school difficulties than children without fecal incontinence (14)(15)(16) Furthermore, these children experience poorer quality of life than children with other gastrointestinal disorders, such as inflammatory bowel disease and reflux. (17) It seems that the presence of fecal incontinence in children is related to significant decreases in their quality of life compared with children with FC alone. (18) Not surprisingly, both FC and fecal incontinence also affect family functioning. Parents report increased parent-child conflict about toileting, (19) as well as a high degree of parental stress, (13) which may be related to the burden of cleaning up after accidents and children's lack of candor about soiling. (20)

Although most children who experience soiling do not have psychosocial problems in the clinical range, (14) even sub-clinical anxiety, attentional problems, and oppositional behaviors can interfere with toileting and families' abilities to adhere to their treatment regimen (eg, anxiety about painful stools, refusal to stop playing to use the bathroom). Therefore, referral for multidisciplinary treatment may be helpful for families when high anxiety, poor executive functioning, oppositional behavior, or parent-child conflict have been identified, as well as for the approximately 40% of children with FC in pediatric practice who do not improve after 2 months of medical management. (21) Physicians should also consider referring children with FC and developmental disabilities and children with autism spectrum disorder because these children have an increased risk of toileting difficulties (22)(23) and may benefit from behavioral treatment in conjunction with medical



TABLE 5. **Rome IV NFI vs DSM-5 Encopresis**

ROME IV DIAGNOSTIC CRITERIA FOR NFI	DSM-5 DIAGNOSTIC CRITERIA FOR ENCOPRESIS
<ul style="list-style-type: none"> <li>• Children have a developmental age of <math>\geq 4</math> y</li> </ul>	<ul style="list-style-type: none"> <li>• Chronological age is <math>\geq 4</math> y (or equivalent developmental level)</li> </ul>
<ul style="list-style-type: none"> <li>• Defecation into places inappropriate to the social context</li> </ul>	Repeated passage of feces into inappropriate places (eg, clothing, floor) whether involuntary or intentional $\geq 1$ such event occurs each month for a $\geq 3$ mo
<ul style="list-style-type: none"> <li>• No evidence of fecal retention</li> </ul>	The diagnosis of encopresis should specify whether: <ul style="list-style-type: none"> <li>• Without constipation and overflow incontinence: There is no evidence of constipation on physical examination or by history                Subtype – Feces are likely to be of a normal form and consistency, and soiling is intermittent. Feces may be deposited in a prominent location. This is usually associated with the presence of oppositional-defiant disorder or conduct disorder or may be the consequence of anal masturbation. Soiling without constipation seems to be less common than soiling with constipation.</li> <li>• With constipation and overflow incontinence: There is evidence of constipation on physical examination or by history                Subtype – Feces in this type are characteristically (but not invariably) poorly formed and leakage can be infrequent to continuous, occurring mostly during the day and rarely during sleep. Only part of the feces is passed during toileting, and the incontinence resolves after treatment of the constipation</li> </ul>
<ul style="list-style-type: none"> <li>• After appropriate medical evaluation, the symptoms cannot be explained by another medical condition</li> </ul>	<ul style="list-style-type: none"> <li>• The behavior is not attributable to the physiologic effects of a substance (eg, laxatives) or another medical condition except through a mechanism involving constipation</li> </ul>

DSM-5=Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, NFI=nonretentive fecal incontinence.

treatment of constipation and fecal incontinence. Before making a referral for behavioral treatment, it is important for physicians to assess whether children are already receiving behavioral health services, and if so, whether toileting has ever been a focus of treatment. Families may continue to work with their mental health provider while also participating in short-term treatment for FC and fecal incontinence with a pediatric psychologist or other mental health provider with expertise in this field.

Behavioral treatment of FC and fecal incontinence includes a variety of components, including education, monitoring stool frequency and regimen adherence through use of a diary, initiation of a toileting routine that includes scheduled toilet sits, and rewards for appropriate toileting behavior. (24)(25) Pediatric psychologists will reinforce education about gastrointestinal system functioning, factors that contribute to and maintain constipation, and rationale for medications prescribed by the gastroenterologist. It is important to include children in these conversations to increase their understanding and motivation, as well as to reduce stigma and embarrassment about toileting issues. Families will then begin to track the frequency of bowel movements and soiling accidents, as

well as any times that children sit on the toilet. These data are helpful in creating a structured toileting schedule. Toilet sits are typically timed to occur after meals to take advantage of the gastrocolic reflex and/or around times that children typically experience fecal incontinence. Scheduled sits should be time limited (ie, no more than 5–10 minutes) to reduce the chance that children will become resistant to completing these. Children should be comfortable and relaxed while sitting on the toilet. Therefore, children are encouraged to sit with their feet supported, and psychologists may work with children to learn diaphragmatic breathing strategies to help relax pelvic floor and gluteal muscles.

Pediatric psychologists will work with caregivers to create a reinforcement plan to increase children’s motivation to complete all steps of their toileting plan (eg, cooperating with scheduled sits, defecating in the toilet, reducing fecal incontinence). Rewards may include stickers, a small toy, access to electronics, or one-on-one time with a caregiver. Of note, only rewarding children for “clean underwear” (ie, not soiling) may inadvertently reinforce children’s tendency to withhold their stool, subsequently leading to further constipation. In combination

**TABLE 6. Medical Therapies for Fecal Disimpaction at Home**

ROUTE	THERAPY	DOSING
Oral	Polyethylene glycol 3350 mixed as 17 g/8 oz of water, juice, or other liquid	>3 y of age 1–1.5 g/kg per day for 3 d, may be continued for up to a week. A large daily dose of up to 100 g/d for 1–2 d; lower doses for longer periods, up to 12 wk, have been used.
	Magnesium citrate	4 mL/kg per day – generally given on 2 consecutive evenings
	Lactulose	1 mL/kg, twice a day, for up to 12 wk then tapered over 4 wk
Rectal	Normal saline enema	10 mL/kg, generally given on 2–3 consecutive evenings
	Sodium phosphate enema	≥12 y: 4.5 oz enema on 2–3 consecutive evenings 5–11 y: 2.25 oz on 2–3 consecutive evenings 2–4 y: 1 oz on 2–3 consecutive evenings
	Mineral oil enema	≥12 y: 4.5 oz on 2–3 consecutive evenings 2–11 y: 2.25 oz on 2–3 consecutive evenings
	Biscodyl suppositories	1–2 suppositories per day for 2–3 consecutive evenings, may be repeated in 1–2 wk

Note that systematic dosage and safety studies on these medications have not been rigorously performed in the pediatric age range. Adapted from Colombo JM, Wassom MC, Rosen JM. Constipation and encopresis in childhood. *Pediatr Rev.* 2015;36(9):392–401. (10)

with tangible reinforcers, caregivers are taught to give children more attention for appropriate toileting behaviors and less attention for undesired behaviors (eg, withholding, soiling to help decrease battles around toileting).

Treatment may also include other components, depending on the children’s presenting problems. Other targets of treatment may consist of increasing adherence to prescribed medications with structured scheduling and/or reward systems, decreasing bathroom or toilet-related anxiety through graduated exposure, coordinating with schools to initiate toileting accommodations (eg, access to a private bathroom, prompted sit after lunch/snacks), and expanding the variety of foods with fiber that children will eat through exposure therapy and behavior modification.

The goal of treatment is to increase defecation in the toilet, decrease fecal incontinence, and eventually wean off of medications when medically appropriate. Older research suggested that behavior therapy did not improve children’s outcomes above and beyond medical treatment. (7)(26) However, there is a growing body of literature that has examined models of multidisciplinary treatment that suggests that combined treatment improves children’s prognosis. For instance, Freeman and colleagues (27) conducted a systematic review and found that children experienced approximately 2.81 fewer soiling episodes per week when behavioral therapy was included in treatment. Furthermore, combining medical and behavioral interventions demonstrated a reduction in fecal incontinence, abdominal pain, and use of diapers in an integrated care clinic. (25) Not only is combined treatment possibly more efficacious than

**TABLE 7. Polyethylene Glycol 3350 for Inpatient Bowel Disimpaction**

MIX 255 G IN 64 OZ OF BALANCED MULTI-ELECTROLYTE SOLUTION (OR 32 G IN 8 OZ)	
Bowel cleanout (oral)	Administer at approximately 8 oz per hour until stool is clear
Bowel cleanout (nasogastric tube)	Administer at ~10 mL/kg per hour to start and increase as tolerated by 10–20 mL every 1–2 h to a maximum of ~40 mL/kg per hour

TABLE 8. Maintenance Therapy for Chronic Constipation

THERAPY TYPE	THERAPY	DOSING
Osmotic laxatives	Polyethylene glycol 3350	0.5–1.5 g/kg per day (start low and titrate up with a maximal dose of 17 g/day)
	Lactulose	1–3 mL/kg per day in 2 divided doses
	Magnesium hydroxide	<2 y: 0.5 mL/kg per day
		2–5y: 5–15 mL/day (before bedtime or divided)
6–11 y: 15–30 mL/day (before bedtime or divided)		
	≥12 y: 30–60 mL/day (before bedtime or divided)	
Stool softeners/lubricants	Docusate	5 mg/kg per day (400 mg maximum)
	Mineral oil	1–3 mL/kg per day divided into 2 doses
Stimulant laxatives	Senna	1–2 y: 2.2–4.4 mg/day as 1 or 2 divided doses
		>2-6 y: 4.4–6.6 mg/day as 1 or 2 divided doses
		>6–12 y: 8.8–13.2 mg/day as 1 or 2 divided doses
		>12 y: 17.6–26.4 mg/day as 1 or 2 divided doses
	Biscodyl	3–12 y: 5–10 mg/day
	>12 y: 5–15 mg/day	
Chloride channel activators	Lubiprostone	New prescription medications approved only for adults with very limited pediatric (off-label) experience
	Linaclotide	

Adapted from Colombo JM, Wassom MC, Rosen JM. Constipation and encopresis in childhood. *Pediatr Rev.* 2015;36(9):392–401. (10)

medical treatment alone, but behavior therapy plus laxatives has been shown to actually reduce the need for medical appointments (28) and is less expensive than standalone medical treatment. (29) Therefore, we recommend that pediatricians and pediatric gastroenterologists continue to follow their patients with constipation closely to monitor and manage medications while families also work with a pediatric psychologist to increase the success of treatment.

### CONSTIPATION AND THE INTESTINAL MICROBIOME

Recent studies (30) of the microbiota inhabiting the intestines of patients with chronic constipation have suggested that changes may occur (dysbiosis) that may be related to constipation. It is tantalizing to suspect that changing the gut bacteria may one day become a therapy.

As of the writing of this review we have encountered many parents who can ill afford the cost of various unproven probiotics, prebiotics, and synbiotics. These potential therapies, even fecal microbiome transplant, are tantalizing but totally unproven. They are likely to become a major section of future versions of this review, but for now they cannot be considered efficacious.

### Summary

- Based on expert opinion, case reports, and reasoning from first principles (evidence quality “D”), (2) our view of functional gastrointestinal disorders (FGIDs) has been greatly enhanced. The work performed by the Rome Foundation has been modified, and their previous insistence that to diagnose an FGID there needed to be no evidence of organic disease has appropriately been updated to allow the diagnosis if “after appropriate medical evaluation the symptoms cannot be attributed to another medical condition.” This is important progress because it allows the clinician flexibility regarding the amount (if any) of testing deemed appropriate. It becomes easier for us to understand and to accept that FGIDs can coexist with other organic disorders, such as inflammatory bowel disease.
- Based on expert opinion, case reports, and reasoning from first principles (evidence quality “D”) and on some observational studies (evidence quality “C”), the American Psychiatric Association definition of encopresis has been partially aligned with the Rome criteria diagnosis of nonretentive fecal incontinence, (2)(6) and we can look forward to greater harmony in these definitions in the future.

- Based on expert opinion, case reports, and observational studies (evidence quality “D” and “C”), (6)(7)(13)(25)(27) the importance of the biobehavioral model continues to expand. Furthermore, the biobehavioral model will be further advanced as the field of neurogastroenterology matures and future basic science and clinical research begins to clarify how the brain-gut interactions affect the FGIDs. The role of the gut microbiome and its effect on gut signaling and its consequences will no doubt yield many new questions and, we hope, a few answers.
- Based on some randomized controlled trials (evidence quality “B”), (26)(28) observational studies, and expert opinion (evidence quality “C” and “D”), (6)(25)(27) clinicians almost universally accept that for many patients with FGIDs, co-management with a pediatric psychologist is a great asset, if not a necessity. We look forward to the greater acceptance by medical leadership and insurers of the key role that mental health providers play.

To view teaching slides that accompany this article, visit <http://pedsinreview.aappublications.org/content/41/8/379.supplemental>.

### Constipation

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## PIR Quiz

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1. A 5-year-old boy is brought to the clinic by his parents for evaluation of constipation. The patient is seen first by the medical student who is rotating with you in the clinic. The student presents the patient and you discuss the differential diagnosis. Based on the information presented and your assessment, your impression is that this patient most likely has functional constipation. In your discussion with the student, according to the Rome IV criteria, which of the following is required to establish a diagnosis of functional constipation in a patient?
  - A. Abdominal pain must be absent.
  - B. Laboratory testing and diagnostic imaging are required.
  - C. Symptoms cannot be fully explained by another medical diagnosis after an appropriate evaluation.
  - D. Symptoms must be present at least 3 times per week.
  - E. Symptoms must be present for at least 3 months.
2. A 3-month-old infant is brought to the clinic with a 2-week history of intermittent episodes of crying, straining, and turning red in the face. The infant is feeding well and growing steadily along the 25th percentile. Physical examination findings are normal. Which of the following findings, if present, supports a diagnosis of infantile dyschezia?
  - A. Blood in the stool.
  - B. Crying spells sometimes end with failure to pass a stool.
  - C. Delayed passage of meconium in the newborn nursery.
  - D. Hard stools.
  - E. Vomiting during episodes.
3. A 6-year-old boy presents to the clinic for a follow-up from an emergency department visit for constipation. He was seen the day before in the emergency department in significant discomfort. On physical examination a firm suprapubic mass was noted. A kidneys, ureters, and bladder radiograph confirmed the presence of significant amounts of stool. He received a normal saline enema and was discharged on polyethylene glycol 3350 with a follow-up today with his primary care physician for further evaluation. He has not been seen for routine care in more than a year since his 5th birthday. Which of the following is the most appropriate next step in the management of this patient?
  - A. Perform abdominal ultrasonography.
  - B. Obtain serum tissue transglutaminase levels.
  - C. Obtain a thorough history and perform a complete physical examination.
  - D. Order repeated abdominal radiography.
  - E. Order thyroid function tests.
4. A 7-year-old girl has had on and off constipation for the past several months. Her mother has tried to ensure adequate fluid intake and has added fiber to her diet, but she continues to pass hard stools every 2 to 3 days. There are no "red flag" symptoms in the history, and her physical examination findings are normal. In addition to continuing the increased fluids and fiber in her diet, which of the following is the most preferred pharmacotherapy to assist in achieving disimpaction in this patient?
  - A. Biscodyl suppository.
  - B. Lubiprostone.
  - C. Magnesium citrate.
  - D. Mineral oil enema.
  - E. Polyethylene glycol 3350.

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5. A 12-year-old girl is followed in your practice. She has had a poor response to 3 months of treatment for constipation and occasional fecal soiling. During those 3 months she was managed with dietary modifications, a structured toileting routine, and daily polyethylene glycol 3350. You now recommend to the family co-management with a behavioral health provider with expertise in gastrointestinal disorders. In your discussion of the plan with the family, which of the following best describes the way the behavioral health provider will assist the treatment program for this patient?
- A. Reassess the need for psychopharmacology.
  - B. Avoid discussion of toileting and gastrointestinal system functioning in front of the child to reduce stigma.
  - C. Evaluate the child for potential contributors, such as subclinical anxiety, attentional problems, and oppositional behavior.
  - D. Institute an appropriate punishment system for soiling.
  - E. Restrict rewards to the outcome of clean underwear only.

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