Appendix 1. Sample of teaching material on constipation for small group teaching sessions (Residents are given a form without answers)

Constipation lecture outline

Objectives:

At the end of this discussion the resident should be able to:

-Name the differences between functional versus organic causes of constipation.
-Discuss key elements of the history and physical findings for a patient with constipation
-Discuss the evaluation and diagnosis of patients with potential Hirschsprung's disease
-Diagnose and treat children with encopresis
-Recognize potential causes of constipation for hospitalized patients
-Discuss potential outpatient treatments for children with constipation

Methods: Case-based learning approach with interactive discussion.

Residents are asked to review the topic prior to the lecture in order to help with preparation using the references provided (below). At the beginning of the session, residents are presented with a handout containing a series of cases involving constipation along with questions relating to each case. The cases are discussed in detail with the resident team using the question set to review key points.

Resident Cases and Questions

Case 1

The mother of a 6 month old infant presents to your office with the complaint that her baby is "constipated"

1) What is the definition of constipation?

Infrequent, hard, painful bowel movements. Acute constipation is < 2 week period of time. General frequency of BM's vary by age. Infants generally 3/day; 2 yo= 2/d; >3 is 1/d

2) At what ages does constipation generally occur?

Can occur at any age but generally around time starting solids, toilet training, and starting school

3) What additional history do you need to obtain?

Length of time with symptoms, frequency of stools, character of stools, color/blood, appetite and diet history (particularly milk intake), associated symptoms such as distension,vomiting, or weight loss. PMH including developmental hx and medications. Family history

What things should be included in the physical exam?

Vital, appearance, etc. Special focus on skin, sacral dimple or tufting, reflexes, anal exam, rectal exam, careful abdominal exam

What are "red flag signs" for possible organic etiologies? What is the differential for organic causes of constipation (all ages)?

Failure to pass meconium during the first 36h, constipation occurring outside the normal age ranges, Failure to thrive, anteriorly displaced anus, absent anal wink, spinal cord abnormalities, toe-walking, tight empty rectum with explosive stool after digital exam, severe abdominal distension

Differential: Anorectal malformations, hypothyroidism, electrolyte abnormalities, cystic fibrosis, Hirschsprung's, spinal cord abnormalities, botulism (<1 year), Down syndrome, pseudo-obstruction,

cow's milk protein intolerance. Celiac disease. All told these causes are estimated to make up <5% of cases of constipation

Supposing this child has no red flag signs and no abnormalities on physical exam, how would you treat this child? **Can add juice to diet, glycerin suppository, rectal stimulation. If older than 6 months can try lactulose (1-3ml/kg/d), miralax (0.8gm/kg/d), sorbitol (1-3ml/kg/d). Avoid enemas and mineral oil in infants.**

How would you further evaluate this child if you were concerned about Hisrchsprung's disease? **Could get a barium enema looking for transition zone, suction rectal biopsy looking for aganglionosis, anorectal manometry**

Case 2

The stressed-out parents of a 4 year old boy come to you with stating that their child is unable to be potty-trained. He is still in diapers. Parents state that they find him in the corners of rooms "straining to have a bowel movement." There is always a small amount of soft stool in the diaper. The boy is otherwise developing normally.

What does this child most likely have? How does it develop?
Expected physical exam findings?
This child has encopresis. He likely had an episode of passing a hard stool which caused him to develop fecal retention. Soft stool leaks around an impaction. Rome II criteria are fecal retention x3 months with large stools <2x/wk and retentive posturing. On physical exam there may be a palpable abdominal mass, dilated rectum w/ large amount of stool, decreased anal sphincter tone.

How do you treat this disorder?

1) **Remove stool load by cleanout; can use Miralax 1 capful TID, use enemas (including mineral oil, fleets phosphosoda) Dulcolax, mag citrate, milk of magnesia. MUST REMOVE IMPACTION TO WORK WELL**
2) **Education to parents and families- behavior is NOT under patient's control and should not be punished**
3) **Bowel retraining/behavior modification- sitting program 5-10 minutes after meals with sticker chart. Needs to be a daily routine. Make sure patient has a stand for their feet if toilet is too high**
4) **Diet modification. Increase fiber. Daily requirement is age +5 years up to 20+ grams/d. Cow's milk intake in a child should be <16 oz/d**

How long do you treat?
Express that this is a chronic problem. Need to treat for as long as it took to develop the problem. Emphasize to parents that relapses occur when stop too soon.

Case 3

You are on call in the hospital when the orthopedics resident calls about a 13 year old girl status post hip-reconstruction. The patient had been in the hospital for about a week recuperating from the surgery and was getting ready to go home. She is now complaining of new abdominal pain. Abdominal X-ray shows a moderate/large amount of stool.

What may have happened here? How can it be prevented?
This is likely delayed motility from narcotics and inactivity. Best way to prevent is to limit opiate use and get patient up and out of bed as soon as possible. Consider starting a maintenance medicine (ie Miralax) as soon as patient able to take po

Case 4

An 8 year old boy with a chronic history of constipation successfully treated with Miralax in the past comes to the office. The patient had stopped taking his medication over a year ago. Over the last few months he has re-developed symptoms. You have worked with the family and he is currently taking Miralax 1 capful TID as well as receiving enemas. He continues to have fecal soiling in his underwear and is clearly embarrassed. Rectal exam is consistent with encopresis and the child has palpable stool on abdominal exam. You decide to admit the patient for an inpatient cleanout.

What are your options?

Can detail options within inpatient constipation cleanout protocol. Discuss NG Golytely, Fleet's Phosphosoda, Magnesium citrate.

What are your discharge criteria?

Clear bowel movements x2
AXR showing patient is clear versus repeat rectal exam
Outpatient management plan in place
Patient able to tolerate oral medicines
Further studies to evaluate etiologies of constipation (e.g. MRI, manometry) if needed
Follow-up arranged

Suggested Reading:

Evaluation and treatment of constipation in infants and children: recommendations of the North American Society for pediatric gastroenterology, hepatology, and nutrition. *J Pediatr Gastroenterol Nutr*. 2006 43(3):e1-13

Walia R et al, Recent advances in chronic constipation. *Curr Opin Pediatr*. 2009. 21(5):661-6.

Youssef NN et al, Dose response of PEG 3350 for the treatment of childhood fecal impaction. *Journal of Pediatrics* 2002. Sep; Volume 141 (3): 410-4.