

Barriers and Facilitators to a Good Bowel Preparation for Colonoscopy in Children: A Qualitative Study

*Lara Hart, †Humaira Nael, †Natasha M. Longmire, and *Mary Zachos

ABSTRACT

Background: A well-visualized colon during colonoscopy has a direct impact on interpretation of findings and need for repeat procedure. Studies have been conducted in the adult population to assess factors contributing to improved bowel preparation. The primary aim of this study was to determine barriers and facilitators to good preparation in children.

Methods: A qualitative descriptive approach was utilized. Children age 2 to 18 years old, and their parents were recruited from the McMaster University Gastroenterology clinic from May 2015 to January 2016. Semistructured interviews were conducted assessing the understanding of the preparation protocol, and the compliance and tolerability of the preparation. A thematic analysis was conducted.

Results: Eleven families participated (7 children and 14 parents). Fifty percent of the children were under 11 years of age, and 73% were undergoing bowel preparation for the first time. Participants identified 26 subthemes, which were categorized into 4 broad themes. Barriers included confusion regarding mixing of the preparation and allowable diet during the preparation day, as well as lack of clarity on expected stool end goals. Facilitators included ease of access of the gastroenterology team, small volume of liquid mixed with the preparation, few adverse effects, and the provision of an understandable handout. Parental motivation to achieve a good outcome was also a facilitator.

Conclusions: This is the first qualitative study focusing on children undergoing a home bowel preparation for a colonoscopy. Being able to identify barriers and facilitators will allow gastroenterologists to improve the quality of bowel preparation and overall experience for the pediatric population.

Key Words: bowel preparation, children, colonoscopy

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From the *Division of Gastroenterology, and the †Department of Pediatrics, McMaster University, Hamilton, Ontario, Canada.

Address correspondence and reprint requests to Mary Zachos, MD, Department of Pediatrics, Division of Gastroenterology, Hepatology and Nutrition, McMaster Children's Hospital, 3A, 1280 Main Street West, Hamilton, ON, Canada L8S 4K1 (e-mail: zachosm@mcmaster.ca).

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What Is Known

- A well prepared bowel for colonoscopy directly impacts the success of the procedure, the risk of adverse events, and the interpretation of the findings.
- Pediatric bowel preparation can be challenging, given the unpalatable taste of the medication, the requirement for clear liquid diet, and the adverse effects.

What Is New

- Facilitators to a good bowel preparation include providing families with both verbal and written instruction, ensuring easy communication with the gastroenterology team, and keeping parents involved and motivated for success.
- Barriers to a good bowel preparation include parental confusion regarding mixing of the preparation, a lack of clarity on expected stool end goals, and lack of familiarity of pharmacists with pediatric bowel preparation.

The number of children undergoing colonoscopy continues to increase in pediatric gastroenterology (GI), and a well-prepared bowel for colonoscopy is of utmost importance. It has a direct impact on the success of the procedure, the interpretation of the findings, and the need for repeat procedure. Inadequate bowel preparation may be associated with missed diagnoses, procedure-related complications, and increased resources (1–3). In both the pediatric and adult literature, up to one-third of the colonoscopies have been associated with suboptimal bowel preparation (4,5).

Studies have been conducted in the adult population to assess factors contributing to improved bowel preparation. These studies have shown that educational booklets and cartoon aids, as well as telephone re-education before colonoscopy have all improved the quality of the preparation (6–8). In addition, verbal (face-to-face) education was significantly helpful (9). In adult patients, barriers to a good preparation include factors such as obesity, older age, previous colorectal surgery, diabetes, and constipation (10,11). Additional barriers include the patient's lack of ability to manage his own health (known as “patient activation”) (12), and inability to follow preparation instructions (5). At present, neither facilitators nor barriers have been studied in the pediatric population.

The primary aim of this study was to determine if there are barriers and facilitators to a good pediatric bowel preparation for children.

METHODS

Study Design

The study followed the qualitative methodology of Interpretive Description, which presumes that theoretical knowledge, clinical knowledge, and a scientific basis inform the study (13). Institutional review board approval was obtained by the Hamilton Integrated Research Ethics Board.

Participants and Setting

Participants were recruited from the McMaster Children's Hospital Pediatric Gastroenterology Clinic (Hamilton, ON) between May 2015 and January 2016. Participants aged 2 to 18 years undergoing elective colonoscopy within the past 6 months, and their parents, were invited to participate in an interview exploring the perceived barriers and facilitators to a successful colonoscopy. Participants undergoing emergency colonoscopy, acutely ill patients, hospitalized patients, and children who were allergic to Pico-Salax were excluded. If English was not the family's spoken language, a translator was provided.

All patients received an evidence-based effective preparation (14,15), which is the current standard regimen at our center: 1 dose of bisacodyl 2 days before the procedure; 2 doses of Pico-Salax (1/4–1 sachet each, based on age) the day before the procedure. Pico-Salax is composed of sodium-picosulfate, magnesium oxide and citric acid. One full sachet is mixed with 150 mL water (with volumes varying based on the dose used). All families received information from the gastroenterologist about the bowel preparation protocol (a written handout and verbal face-to-face information) at the appointment preceding the colonoscopy. Clinic appointments took place 4 to 12 weeks before a nonurgent colonoscopy and within 2 weeks of an urgent colonoscopy. Clinic nurse and after-hours physician contact information was provided for questions arising from the process, allowing for further clarification to be made over the phone.

Data Collection and Analysis

A member of the research team approached eligible participants in the clinic to obtain written consent. Consenting participants completed a one-on-one interview in person. An interview guide was used to direct the discussion (See Supplemental Digital Content, <http://links.lww.com/MPG/B292>). Each semistructured interview lasted 20 to 30 minutes, and included open-ended questions followed by probing questions. The discussion was aimed at exploring impressions regarding timing, method (verbal, written information) and content of the education material, as well as need for additional resources. In addition, interviews explored tolerability of the bowel cleansing protocol and adverse symptoms. Demographic data and reason for colonoscopy were collected from medical records. The interviews continued until the point of saturation, where no new concepts were elicited from subsequent interviews. For qualitative interviews, evidence suggests that data saturation can occur within 10 interviews, with themes arising as early as 6 interviews (16).

All interviews were recorded digitally and transcribed verbatim. Before transcription, each participant was de-identified and assigned a number to maintain confidentiality and anonymity. Data collection and analysis took place concurrently, allowing researchers to review the interview guide and refine emerging codes and categories. Analysis involved line-by-line coding of transcripts in Microsoft Word, allowing for the identification of recurrent themes and patterns. The codes were categorized into conceptual themes

TABLE 1. Participant demographics

Number of interviews	11
Participants (n = 21)	
Children (2–18 years old)	7
Parents	14
Gender of child undergoing colonoscopy	
Male	7
Female	4
Age of child undergoing colonoscopy	
≤11 years old	6
>11 years old	5
Previous colonoscopy	
Yes	3
No	8
Diagnosis	
Inflammatory bowel disease	5
Polyps	2
Other	1
No diagnosis yet	3

and domains using constant comparison. These themes and domains were then used to refine the preliminary conceptual framework. Coding was performed independently by 2 team members (L.H., H.N.), and confirmed by a third (N.L.). Once the data was fully coded, the barriers and facilitators were identified. Microsoft Excel was used to manage the data.

RESULTS

Eleven families consented to participate and interviews were completed with 21 participants: 7 children and 14 parents. Only one family declined participation, citing a lack of interest in being involved. Fifty percent of the children were under 11 years, and 8 of 11 (73%) were undergoing the bowel preparation for the first time (Table 1). All 11 children had adequate cleanouts that led to complete colonoscopies (with terminal ileum intubation). Participants identified 26 subthemes, which were categorized into 4 broad themes: information needs, process of care, access to care, and preparation experience (Table 2).

Information Needs

Information needs was the most common theme reported. This refers to comments related to the protocol brochure, overall satisfaction with the information, confusion regarding instructions, and advice to others.

The majority of the participants were satisfied with the information they received. Furthermore, most participants felt the layout, language, and content were appropriate and thorough. Despite reporting that the protocol brochure was well done, when questioned further, most participants could find a component of the content that could cause misunderstandings. They therefore provided suggestions on how to improve the preparation sheet. They recommended writing more examples of clear fluids, describing what the end results should be, highlighting/bolding the times that the child can/cannot eat, and clarifying how to mix the solution (especially if the child was taking less than a full sachet). In regards to additional resources, half of them felt a website could be helpful, especially if they misplaced the handout. A quarter felt they could benefit from a video, and that younger children could benefit from a cartoon.

Some of the parents were unclear what to expect by the end of the preparation. They were unsure if the child should still be passing stool the morning of the colonoscopy and what the stool

TABLE 2. Emerging themes from interviews

Theme	Subtheme	N = 21	Example quotes
Information	Satisfaction with information received	5	<i>The information was good. . . I thought it was pretty clear, easy to follow and straight forward.</i>
	Confusion regarding diet, nutrition, medicine	25	<i>The instructions on the box say to mix the whole package (of Pico-salax). Whereas the instruction sheet says he has a quarter of a sachet. So do I just use a quarter sachet or do I mix the whole thing and then just give him a quarter of the large quantity?</i>
	Confusion regarding end goal (what to expect)	6	<i>She was wondering if she should still be going to the bathroom when we were ready to leave for the hospital. The last few bowel movements – should they be perfectly clear or is it okay if they are still colored?</i>
	Protocol brochure clarity and layout	45	<i>I just followed what it said. It seemed straightforward. It was easy to understand. It helped make things more clear.</i>
	Requesting additional types of information	19	<i>Cartoons would be good for kids at a younger age. A website might be useful.</i>
Process of care: bowel preparation	Advice regarding the preparation experience	14	<i>Make sure you're close to a bathroom and don't plan anything that day. It's not as bad as you think. It's just the taste is the worst part and once you drink the small amount, it's okay.</i>
	Bad taste of the medication	10	<i>I did not like the sour taste. It was kinda gross, but it was the orange flavored one – really sour.</i>
	Ability to finish the medication	10	<i>I mixed it up for him and I was like 'buddy you have to slam it back' and he did. I took all the medication.</i>
	Presence of side effects	16	<i>I vomited. Every time she drank, it made the cramping much more intense.</i>
Access to care	Absence of side effects	6	<i>I don't recall him having any pain or bloating.</i>
	Accessibility to GI team	7	<i>I called the on-call pediatric GI person. He called me back in like 2 minutes.</i>
	Involvement of pharmacy team	16	<i>The pharmacy couldn't advise me because there were no instructions for children. The pharmacy tried to help me but they were thrown because they don't have too many kids going for colonoscopy. They were scared to advise me.</i>
Preparation experience	Overall experience as expected	14	<i>We had a pretty good idea of what to expect overall though.</i>
	Overall experience better than expected	14	<i>I'm going to say obviously the experience wasn't going to be pleasant overall. So, I mean, we achieved the goals, we were able to get the scope done. . . I thought it went better than I thought it would.</i>
	Challenges to the cleanout	5	<i>The hardest part is getting her to take the medication. There was only so much I could do, like I can't make him drink. It took a while for my body to just drink fluids and keep drinking. The most challenging part is just fasting a child.</i>
	Anxiety, stress, frustration, confusion	8	<i>At night, the stool was yellow. But the next morning, there was more stool, so I was really kind of apprehensive at that point. I was getting stressed out. I didn't want it to reflect on him.</i>

GI = gastroenterology.

should look like in the hours leading up to the procedure. Without knowing the end goals, these parents were unsure if the child was fully cleaned out.

Children were asked what advice they would provide to others going through the same experience. All advice was encouraging, with participants offering comments such as “don't worry about it,” “it's not as bad as you think.” More specifically, the children wanted others to know that the taste is the worst part, and that it is important to have easy access to a bathroom.

Process of Care: Bowel Preparation

Process of care was the second most common theme and describes the participant's experience on the day of the bowel

preparation. All participants were able to complete the full Pico-Salax doses orally, with only one child needing it syringed into her mouth. Surprisingly, 3 children thought it tasted “okay” and “like orange crush,” while the majority disliked the taste, calling it “sour” or “kind of gross.” Half of the participants did not notice any adverse effects. The remainder commented on side effects including cramping abdominal pain, bloating and gas, perianal discomfort, nausea and vomiting, or overnight wakening. Of the latter group, most experienced at least 2 adverse effects each.

Preparation Experience

Preparation experience, the third most common theme, refers to the family's perceptions about the bowel preparation and

associated challenges. Half felt the bowel preparation went just as expected and half had a better experience than anticipated. While all the children successfully completed the preparation, some parents found it challenging to get the child to drink the medication. Some parents also commented on challenges such as drinking enough clear fluids and not eating solids during the preparation day.

This theme also includes the emotions parents had during the preparation experience. Some of the parents were anxious for the clean out to go well, as they did not want the child to go through the experience again. A few felt an incomplete clean out would reflect poorly on them. Further, if the process was not going as they planned, a few felt confusion about whether or not they had followed the instructions correctly.

Access to Care

Access to care was the fourth most common theme, and encompasses the family's ability to reach out to the GI team and pharmacists. All of the participants found the GI team very helpful and most commented that they were able to reach a team member easily. Of the parents who approached the pharmacist with questions, all found that the pharmacists were generally unfamiliar with bowel preparation for children and were unable to provide guidance.

Bowel Preparation Barriers and Facilitators

Barriers included confusion regarding mixing of the preparation and allowable diet during the preparation day, as well as lack of clarity on expected stool end goals. Some of the parents mentioned that they found pharmacists unfamiliar with the bowel preparation for children. Facilitators included ease of access of the GI team to answer questions, small volume of liquid mixed with the preparation, few adverse effects, and the provision of a handout that was understandable. Parental motivation to achieve a good preparation outcome was also a facilitator (Table 3).

Findings Based on Patient Age

Taking into account the patient's age, the families of the younger children (≤ 11 years old) had more confusion regarding

allowable fluids during the preparation and these parents were more unsure of what to expect as the end point. These families expressed more anxiety and frustration than the older group (≥ 12 years old). Furthermore, younger children were expected to take 1/4 or 1/2 sachet Pico-Salax; therefore, it was this group that approached the pharmacists for assistance, but encountered difficulty receiving advice due to a lack of familiarity of pharmacists with pediatric bowel preparation. All age groups provided similar comments about the protocol brochure language and content, and the ease of accessibility to the GI team. Interestingly, the younger group did not mind the taste of the medication, but had more adverse effects, such as abdominal pain and vomiting. The older group were surprised that the experience was better than expected, and provided advice such as "don't worry, it's easy" and "it's not as bad as you think."

DISCUSSION

In this qualitative study, we examined the bowel preparation experience for pediatric patients undergoing colonoscopy. One-on-one interviews with parents and children allowed for a better understanding of the family's experience from beginning to end. The most surprising finding was the role of parental motivation and anxiety in the bowel preparation process. Parents felt a sense of pressure to achieve an effective cleanout and this acted as a facilitator to a successful preparation. Other unique findings include pharmacists' lack of familiarity with pediatric preparation medication, and for the younger patients, uncertainty of what to expect as the end point of the preparation. They also had relatively little objection to the taste of the medication. For the older patients, the preparation experience was reported as better than anticipated.

Emerging themes focused on participants' informational needs. Research indicates that ensuring the families fully understand the bowel preparation process is one of the most important components to ensuring an effective cleanout (17). In keeping with this, providing verbal and written information acted as a facilitator to a good preparation. Furthermore, education literature indicates that utilizing both the visual-pictorial channel of information processing (written) and the auditory-verbal pathway (verbal) lead to better gains in knowledge than either one alone (18). Given that both pathways were utilized through written handout and verbal information, it is not surprising that the participants were satisfied with the information received. Participants, however, provided topics that either needed further clarification or should be included in the protocol document. It was important to elicit this feedback, as collaborating with families is an important component of the patient-centered approach. Furthermore, family participation in quality improvement initiatives lead to more effective use of health care resources (19). We should therefore continue to encourage and facilitate opportunities for families to be involved in patient care, education initiatives, and program development.

Although access to the GI team was a facilitator, local pharmacists inexperience with pediatric patients was a barrier to a good preparation. The former is consistent with adult data that telephone re-education of patients improves outcome (6). Regarding the latter, pharmacists recognize that providing medication information is a professional responsibility, and for common conditions, they have appropriate expertise (20). When Munzenberger et al, however, surveyed 95 pharmacists about their pediatric training, they did not feel knowledgeable enough to educate about less common conditions. Hence, while the prevalence of pediatric colonic diseases have been increasing, they remain "less common" conditions, and understandably, pharmacists may feel uncomfortable advising about colonoscopy preparation. Therefore, we would

TABLE 3. Barriers and facilitators to a good bowel preparation

Barriers to a good bowel preparation	Confusion regarding mixing of the preparation
	Confusion regarding allowable diet during the preparation
	Lack of clarity on expected end goals of the preparation
	Pharmacists lack of familiarity with bowel preparations for children
Facilitators of a good bowel preparation	Ease of access to the GI team to answer questions
	Small volume of liquid mixed with the preparation itself
	Few side effects
	Education handout that was understandable and with a good layout
	Parental motivation to achieve a good preparation

GI = gastroenterology.

recommend providing very clear mixing instructions to parents or providing pharmacists with further education on pediatric bowel preparations.

Specific to the day of the preparation, all patients reported disliking the taste of the medicine; however, they were all able to finish both doses of Pico-Salax. Hunter and Mamula (21) reviewed data on bowel preparation medications for children. Beyond efficacy, they concluded that bad taste, large volume and diet restrictions during clean out all decrease compliance. Hence, the ideal preparation would be palatable, low volume and effective. Vejzovic et al, who conducted a qualitative assessment of children's experience with in-hospital bowel preparations, found similar results. The children had difficulties ingesting a large volume of preparation (PEG3350) and described the taste as "disgusting, bad, awful" (22). Since Pico-Salax led to completed colonoscopies in all of our participants, using a low volume medication may be a facilitator to a successful preparation, and we would recommend it be more widely used.

Another facilitator to a good bowel preparation was the presence of few adverse effects from the medication. Only half of the participants experienced side effects, and they were still able to complete the preparation. One other prospective study (23) cited similar findings, whereby, using PEG3350 bowel preparation, only 30% had mild adverse effects. Similar to our study, the main side effects also noted by Hunter and Mamula, were abdominal pain, bloating, vomiting, and sleep disturbance (21). Interestingly, despite the side effects, the patients rated the experience to be "as expected" or "better than expected." Hence, they recognized the necessity of the bowel preparation, but realized that it may not be pleasant. In fact, when explaining what made the experience "as expected" or "better than expected," participants commented on the bad taste of the medication and the frequency of the bowel movements, rather than the side effects. Therefore, if side effects do not prevent patients from having a successful cleanout, it may be worthwhile to continue to focus efforts on how to make the preparations more palatable.

A few parents found the experience to be very anxiety provoking, as they were unsure what to expect by the end of the preparation, leading them to question if they had followed the instructions correctly. Most interestingly, they felt a sense of pressure to complete the cleanout successfully. Without endorsing parental anxiety, parental motivation to achieve a complete cleanout acted as a facilitator to a successful bowel preparation. This goes in accordance with the study of Vejzovic et al on parental perceptions during an in-hospital bowel preparation. Similar to our study, the parents feared the colonoscopy would not be completed if the bowel was not clean enough, and the family would risk having to go through the process again. Although Vejzovic et al (24) found that parents perceived themselves as mean, feeling "forced to force" the child to drink, the parents in our study, however, did not describe their experience in such extreme terms. They were creative in their methods of providing the child with liquids and they were impressed by the child's ability to comply with the instructions. Parental motivation and involvement in the process can therefore be extremely helpful in ensuring success, and is highly recommended in these situations. Furthermore, providing families with a list of creative methods to help the children drink the liquids may be another way to help improve outcomes.

The qualitative approach enabled us to examine the real experiences of children undergoing colonoscopy. We, however, recognize there are limitations to our study. This was a single-center study, using only one bowel preparation protocol. Therefore, it is difficult to determine if the same barriers and facilitators would hold true had other protocols been used. Only the volume,

taste, and mixing instructions (on the box) directly pertain to the type of medications used; therefore, we can, however, expect the remainder of the results to be generalizable. In addition, there may have been selection bias as we were unable to interview patients who could not complete the preparation process. We therefore hope that our findings will inspire larger studies to explore similar bowel preparation-related themes in the pediatric population and correlate them with objective bowel cleanliness during colonoscopy.

This is the first qualitative study identifying the challenges children face when undergoing bowel preparation in the home setting. The participants focused most on their informational needs, particularly around bowel preparation instructions, description of diet requirements, and understanding of the appropriate end point of the cleanout. We recommend providing families with such details, in both verbal and written instructions, to ensure optimal outcomes. Parental involvement in the process was an asset, as was low volume preparation and few adverse effects. While the type of preparation may be dependent on availability by country, keeping parents involved and motivated is essential to ensure success. Furthermore, we should continue to provide opportunities for families to be involved in patient care and education initiatives. With the identification of barriers and facilitators, more focused quality improvement measures for pediatric colonoscopy preparation may be undertaken.

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