University of Rochester Department of Pediatrics
Pediatric Fellowship Programs
Quality Improvement Project

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Project Title: **Bowel Prep Conundrum**

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Introduction:

Colonoscopy is a fundamental diagnostic procedure for the evaluation and treatment of lower gastrointestinal pathologies in children. Poor or incomplete visualization of the colon reduces the yield of screening colonoscopies and increases the rate of aborted procedures (1). The quality of the bowel preparation plays a key role in the success for completing the colonoscopy and therefore a well visualized colon has a direct impact on interpretation of findings. In order to accomplish a successful clean out, patient compliance is extremely important during the bowel preparation. This is particularly challenging in pediatrics as kids find it difficult to tolerate the large volume or taste of cleaning solutions/ laxatives. Anecdotally, abdominal discomfort, nausea or vomiting has been reported. Polyethylene glycol (PEG) is the most commonly used solution for bowel preparation along with stimulant laxatives for example Dulcolax or Ex-lax. Inadequate bowel preparation will lead to the concealment of lesions ultimately leading to missed diagnoses and treatment. In addition, endoscopy in children is carried out under general anesthesia; a failed examination will not only increase the risk and pain of children but also affect the emotions of families and increase health care costs resulting in a waste of medical resources.

Aim:

We performed a quality improvement project on Pediatric Gastroenterology patients that were scheduled for a colonoscopy at Golisano Children's Hospital. Our aim of the study was to:

a) improve the quality of the bowel preparation by seeing an improvement in the Boston Bowel Preparation Score (BPPS) by 2 points over a one-year period
b) achieve a BPPS goal of 8 and above
c) identify factors impacting the quality of bowel preparation

Methods:

Preintervention phase:

Children who underwent colonoscopy at Golisano Children's hospital from October 2018 to July 2019 were enrolled in the study. Polyethylene glycol (Miralax) + Bisacodyl (dulcolax) was primarily used for bowel preparation in all children. A questionnaire was formulated to assess the timing of the commencement of the clean out, the timing of the passage of clear stools along with any experienced discomfort. This questionnaire was completed by either the patient or the parent before sedation for colonoscopy in the 4th floor surgical endoscopy suite. Factors

measured in the questionnaire include: age, sex, reason for getting a colonososcopy and previous history of constipation In order to evaluate the efficacy of bowel cleansing, we used the Boston Bowel Preparation Scale(BPPS), which is a validated scoring tool for bowel preparation(2). BPPS was recorded by the endoscopist for each patient in their respective charts. Data was recorded on excel sheet as preintervention phase/ baseline.

BOWEL PREP QUESTIONNAIRE

1) Is your child a male or female? Male ☐ Female ☐

2) What is your child's age? ____________________

3) What is your child's grade in school? ____________________

4) Why is your child getting a colonoscopy? ____________________

5) Does your child have any past medical / surgical history of GI disorders? ___________________

6) Please rate the level of discomfort your child experienced while doing the bowel prep? Severe ☐ Moderate ☐ Mild ☐ None ☐

   Please specify_________________________

7) What time did your child start the clean out? ____________________AM/PM

8) How many hours did it take for your child to finish drinking the bowel prep? ____________________

9) What did your child take for the clean out? (Please circle on of the options)
   Miralax
   Magnesium citrate
   Lactulose
   Dulcolax
   Other _____________________

10) Around what time did your child start to pass clear stools? ____________________

11) Does your child have a history of constipation (previously diagnosed or treated)?
    Yes ☐ No ☐

12) Usually, does your child take a long time in the bathroom to pass a stool? Yes ☐ No ☐

13) Usually, are his/ her stools hard? Yes ☐ No ☐

14) Usually, are his/her stools very large? Yes ☐ No ☐

15) Does your child strain / push hard to have a bowel movement? Yes ☐ No ☐

16) Has your child ever had "accidents" or stool soiling of underclothing? Yes ☐ No ☐

17) On the average, how frequent are your child's "accidents"? _________________

18) Has your child ever used a stool softner (before the bowel prep)? Yes ☐ No ☐

19) If Yes, please name the stool softner ___________________

20) Did you follow the instructions given in the stool card? Yes ☐ No ☐

BBPS		3	2	1	0
3=Excellent 2=Good 1=Poor 0=Inadequate					
LC	☐	☐	☐	☐	☐
TC	☐	☐	☐	☐	☐
RC	☐	☐	☐	☐	☐
BBPS= ☐					

Fig. 3. Boston bowel preparation scale (BBPS). LC: Left colon. TC: Transverse colon. RC: Right colon.

PDSA 1:

8/1/19 – 2/2/20. Weight based stool cards were created for the 1st PDSA cycle in order to standardize cleanout procedure. By standardizing the cleanout process, we anticipated that bowel preparation would allow for improvement in BPPS toward goal. Clear, step wise instructions were written in the stool card guiding patients when to start the clean out, what to expect if the stool consistency and color remain the same and the next steps to improve the clean out. These stool cards were given to the patients at the time of their clinic visit or mailed to them before their scheduled procedure. In anticipation of PDSA 1, the Bowel Prep Questionnaire was handed over to the families on the day of the procedure when they arrived to the Endoscopy suite. The survey was collected by the nursing staff at the endoscopy unit before the patient was sent for the procedure. The performing endoscopist recorded BPPS in the procedure note for all patients undergoing colonoscopy in their respective charts.

BOWEL PREP CARD (weight = less than 66 pounds) 💩

(PREP TO BE DONE THE DAY BEFORE YOUR SCHEDULED COLONOSCOPY)

8:00 AM

Light breakfast followed by clear liquid diet

12:00 PM

1 Dulcolax (Bisacodyl) tablet by mouth or 1 Ex-lax square by mouth

Note: You may crush the tablet if you have any difficulty in swallowing.

1:00 PM

Mix 7 capfuls of Miralax (Polyethylene glycol) in 32 ounces of clear liquid and drink over 2-3 hours

5:00 or 6:00 PM

Take 1 Dulcolax (Bisacodyl) tablet or 1 Ex-lax square by mouth

8:00 or 9:00 PM

If the stools continue to be pasty brown or hard brown/ green, please take 5 oz of Magnesium Citrate and continue to drink clear liquids until midnight

8:00 or 9:00 PM

If the stools are watery, clear, greenish/yellowish, you may continue to drink clear liquids until midnight

BOWEL PREP CARD (weight = more than 66 pounds)

(PREP TO BE DONE THE DAY BEFORE YOUR SCHEDULED COLONOSCOPY)

8:00 AM

Light breakfast followed by clear liquid diet

12:00 PM

2 Dulcolax (Bisacodyl) tablets by mouth or 2 Ex-lax squares by mouth

Note: You may crush the tablets if you have any difficulty in swallowing.

1:00 PM

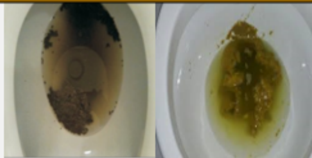
Mix 15 capfuls of Miralax (Polyethylene glycol) in 64 ounces of clear liquid and drink over 2-3 hours

5:00 or 6:00 PM

Take 2 Dulcolax (Bisacodyl) tablets or 2 Ex-lax squares by mouth

8:00 or 9:00 PM

If the stools continue to be pasty brown or hard brown/ green, please take 10 oz of Magnesium Citrate and continue to drink clear liquids until midnight



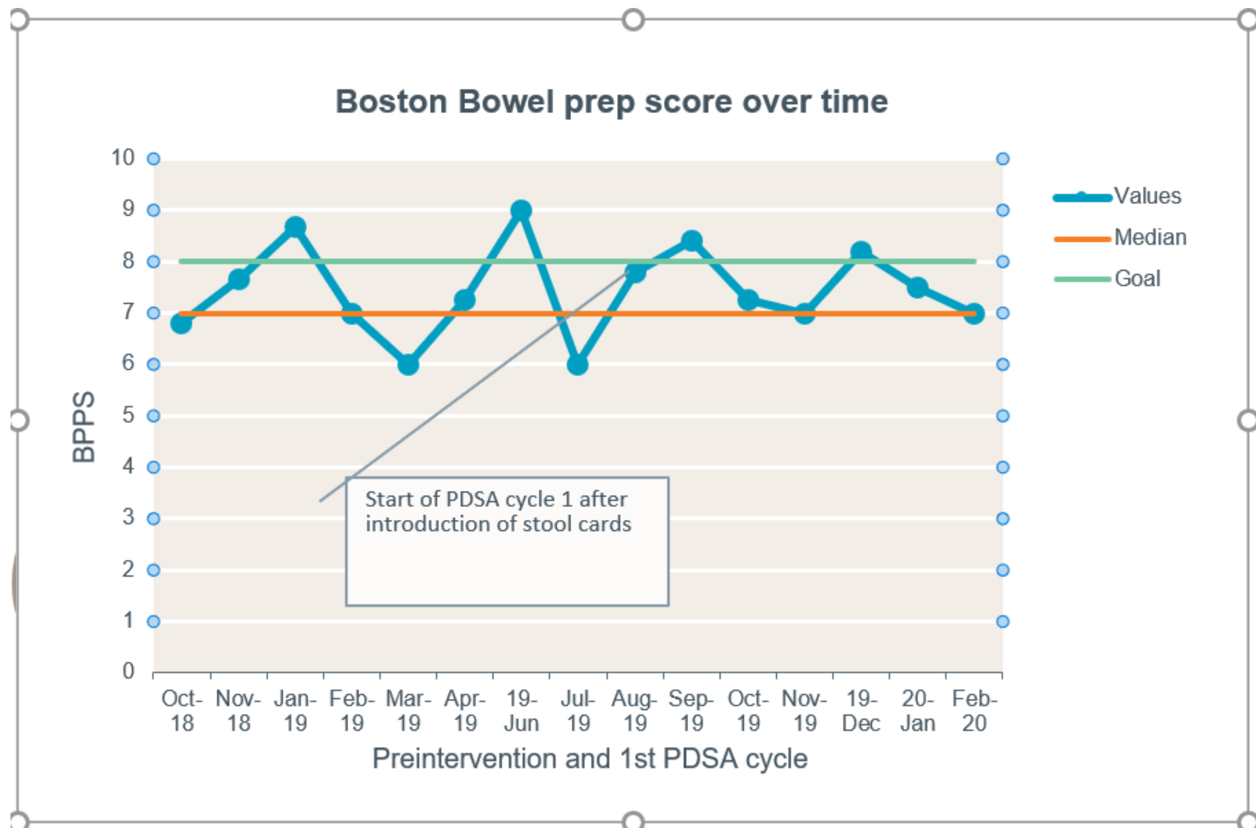
8:00 or 9:00 PM

If the stools are watery, clear, greenish/yellowish, you may continue to drink clear liquids until midnight

Results:

A run chart was used to analyze our primary aim i.e to improve the Boston Bowel prep score by x-number of points over a y-year period. We did not find any runs or shifts or trends in these run

charts. In the pre-intervention phase, most of the values were found to be scattered away from the median value. However, after introduction of the stool cards, we noticed that the numbers became tighter around the median value (PDSA1). We found that 62.5% of the values were above the median in the pre-intervention phase whereas after the introduction of stool card 100% of the values were above the median. It was also noteworthy that 28.5% of the values were found to be above the goal of 8 after the first PDSA cycle as compared to 25% in the pre-intervention phase.



Discussion:

In this study, there was a significant increase in the quality of bowel cleansing and improvement of BBPS (from 62.5% to 100%) after the introduction of stool cards. It is noteworthy however that the goal to improve the BPPS above 8 was only achieved in 28.5% of the cases. Additionally, another aim was to determine the factors that impact the quality of bowel prep as part of the 2nd PDSA cycle. In order to achieve that we had proposed to split the bowel prep into half and measure the BPPS in those patients. Unfortunately, because of COVID-19 we were not able to carry out the 2nd PDSA cycle.

The strengths of our study include the use of the weight-based stool card with simple language guiding the parents/ patients in a step wise approach how to troubleshoot. Also, the use of validated BBPS provides reliable evaluation of the bowel cleanliness and also captures variation in cleanliness among the different colon segments.

Despite these strengths, we acknowledge certain limitations. Our study was limited to a single institution, potentially limiting the generalizability of our results. One of the limitations include information on withdrawal times or the time taken to complete the colonoscopy. Also, there

could have been few uncontrolled factors which might have affected the results such as timing of procedure (morning versus afternoon) and operator dependent results of the BBPS.

The stool cards have been implemented as part of the standard pre-procedure clean out protocol at Golisano Children Hospital. We plan to convene a group of stakeholders including parent, patient, GI provider and GI nurse as members of a QI team to enact future PDSA cycles.

References:

1) Tutar E, Bayrak NA, Volkan B, Ertem D. Bowel Preparation for Colonoscopy in Children: 1 Day PEG-3350 with Bisacodyl versus 3 Day Sennosides. *Dig Dis*. 2019;37(4):334-342. doi:10.1159/000497819

2) Lai EJ, Calderwood AH, Doros G, Fix OK, Jacobson BC. The Boston bowel preparation scale: a valid and reliable instrument for colonoscopy-oriented research. *Gastrointest Endosc*. 2009;69(3 Pt 2):620-625. doi:10.1016/j.gie.2008.05.057