Bowel Preparation for Colonoscopy: Escalating the One-Prep-Fits-All Approach

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We have all heard our patients say, “The colonoscopy was a great experience except for the horrible bowel prep. There has to be an easier way!”

Patient anxiety about bowel purging prior to colonoscopy remains a barrier to complete adherence to recommended colorectal cancer screening guidelines. Up to 24% of bowel prep regimens have been found to be just fair or poor in quality, which is clinically significant because there is a clear link between adequate bowel prep and polyp detection, including detection of advanced adenomas.

There are a number of bowel prep choices, including low-volume solutions that make the experience less unpleasant. Individualizing bowel preps to meet patients’ preferences will improve both acceptability and compliance. Features of an ideal bowel prep include safety and tolerability for the patient and effectiveness in producing a clean colon. Unfortunately, there is no one preparation that uniformly meets all these objectives for all patients.

Current FDA-approved regimens for bowel preparation for colonoscopy are listed in the Table. To get consented, bowel prep regimens include 4-L polyethylene glycol (PEG) 3350 electrolyte solutions, including Golytely® and colyte® with flavor packs, TriLyte® with flavor packs and NuLYTELY® with flavor packs are 4-L PEG-ES without sulfates, which have better taste profiles. Low-volume 2-L PEG-ES preparations include Halotine® and Bisacodyl Tablet Bowel Prep Kit and Moviprep®, with ascorbic acid, which has an additional osmotic effect and is as effective as a 4-L PEG solution (total bowel preparation equals 3 L since an additional 1 L of clear liquids must be ingested). SUPREP® Bowel Prep Kit is a split-dose, osmotic oral solution, whose effectiveness, tolerability and liquid ingestion requirements are similar to those of Moviprep. SUPREP® Bowel Prep Kit demonstrates improved efficacy compared with NuLYTELY® given in a single dose. These preparations also have sulfate, however, which adversely affects flavor.

Aqueous sodium phosphate bowel prep solutions received a black box warning from the FDA for acute phosphate nephrotoxicity, and oral sodium phosphate laxatives were subsequently withdrawn in 2008; however, sodium phosphate OsmoPrep® Tablets and Visicol® Tablets remain available. Compared with Visicol, OsmoPrep leaves fewer residues, which can obscure the mucosa, and the tablets are slightly smaller and thus easier to swallow. A number of studies have compared sodium phosphate with PEG solutions, finding better bowel prep, patient tolerance, and compliance with sodium phosphate preparations; meta-analyses of randomized controlled trials (RCTs) have supported that conclusion. However, there are also adverse reports of hyperphosphatemia and renal dysfunction with use of sodium phosphate tablets; women of below-average weight seem to be at higher risk for adverse events.

PEG-3350 without added electrolytes (Mira-LAX®), which is mixed as 238 g of PEG with 64 ounces of Gatorade® in a 2-L preparation, is not FDA-approved as a bowel preparation for colonoscopy. It lacks the balanced electrolytes found in PEG-ES preparations. Enestvedt et al compared the efficacy and tolerability of 4-L Golytely® with 238 g Mira-LAX® in 64 ounces of Gatorade and four 5-mg bisacodyl (Dulcolax) tablets. The efficacy of the bowel preparations employed the 10-point Boston Bowel Preparation Scale (0-9), with 83% judging the Golytely® prep either good or excellent (ie, ≥7). When asked to describe the overall tolerability of the bowel prep, 81% of those who received the Golytely® and 82% of those who received the Mira-LAX® preparations felt the overall experience was either easy or acceptable. Hjelkrem et al found that split-dose Mira-LAX® with Gatorade was not as effective for bowel cleansing as 4-L split-dose Golytely®, a usage that is currently not approved by the FDA (see Table).

An over-the-counter magnesium citrate preparation combined with bisacodyl (LoSo Prep®) administered as 2 split doses has been described as safe and effective compared with sodium phosphate, although bisacodyl may cause cramping. This solution is also not FDA-approved as a bowel preparation for colonoscopy.

Split-Dose Preparations

It is well established that the time interval between completion of the bowel prep and start of the colonoscopy affects adequate cleansing, with shorter intervals creating cleaner colons. RCTs have demonstrated that split dosing of PEG solutions improves patient tolerance and provides better bowel preps. (See Table for approved uses.)

The American College of Gastroenterology Guidelines for Colorectal Cancer Screening recommend using split-dose bowel preparations to improve the quality of colonoscopy and note that the longer the interval between the last dose of bowel prep and the colonoscopy itself the greater the probability of a poor preparation.

Moviprep and SUPREP® Bowel Prep Kits are the only bowel preparations that are FDA-approved for split dosing. It is recommended to either split the PEG solution dose or, in the event of an afternoon procedure, give the entire prep the morning of the procedure. The exact timing of the dosing protocol depends on the appointment time, but typically the patient should take the first dose at 6 hr prior to the procedure and take the second dose about 4 to 5 hours before the scheduled procedure time. While some practitioners split-dose 4-L PEG bowel preparations, that use is currently not approved by the FDA.

Case Examples

The 3 cases presented here address practical approaches to individualizing bowel preparation in different patient populations in order to achieve better quality preparations and better patient tolerability.

Patient 1 is a generally healthy 50-year-old man presenting for an initial routine colorectal cancer screening exam. He has hypertension and hyperlipidemia; his medications include atorvastatin, metoprolol, and 81 mg aspirin. The first step in choosing a bowel preparation is evaluating the patient’s medical history and medication list to see if certain bowel preparations would be contraindicated. If the patient has had a previous colonoscopy, it is helpful to ask about his or her earlier experience with bowel preparation. If records are available, the efficacy of the previous bowel preparation can be ascertained. If the patient took a regimen that worked well in the past without significant complaints, then sticking with what has worked often is the best option.

Because this is the patient’s first exam, and there are no preparations that are contraindicated based on medical history, all of the bowel preps would be reasonable options. It should be determined if the patient feels he would have difficulty swallowing pills or drinking large volumes of fluid. Often, patients presenting for their first exam have already heard stories about how friends or family members have had difficulty with certain preps, or they already may be anxious about having to drink a 4-L PEG electrolyte solution. Additionally, increasing numbers of patients are requesting specific bowel preparations.

Another aspect worth discussing with patients is the timing of the bowel preparation. If they do not want the prep to interfere with their work schedule the day before the exam, or if they are worried about the prep interfering with their sleep schedule, they might not want to take a split-dose regimen. Instead, one option is to take a full dose of prep in the morning when the exam is scheduled for the afternoon. Discussing these different options and understanding patient preferences also enables the patient to be part of the decision-making process.

In this case if no preferences are voiced, I will offer a 2-L PEG solution with split dosing. If the patient has diabetic diarrhea, 2-L PEG solutions may be preferable, whereas if the patient suffers from constipation, I prefer using larger volumes.

Patient 2 is a 45-year-old man who underwent a screening colonoscopy 1 year previously because of his father’s diagnosis at age 50 of colon cancer. One-year follow-up was recommended because of poor bowel preparation at the time of the patient’s initial exam.

The patient who previously had a poor bowel prep presents a particular challenge. It is important first to identify the reasons for the poor preparation. Was it because the patient had nausea or vomiting after a large-volume prep? Was the dosing schedule difficult to follow? Was the patient unable to complete the prep due to taste or other tolerability problems? Or did the patient comply with the instructions and was simply not able to purge the bowels effectively?

This is a young patient with no comorbidities, so no contraindication exists to any prep regimen. If the patient had a large-volume PEG-ES solution at the time of initial exam and had difficulty tolerating it due to nausea or vomiting, then using SUPREP Bowel Prep Kit or sodium phosphate tablets (OsmoPrep or Visicol) likely would be better tolerated and thus produce better results. If the patient had a 2-L PEG solution, another 2-L PEG solution would be given. If the patient had a PEG-ES prep, another PEG-ES prep would be given.
### Table: FDA-Approved Bowel Preparations for Colonoscopy2-11

<table>
<thead>
<tr>
<th>Bowel Prep</th>
<th>Contents</th>
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<tr>
<td>4-L PEG 3350 ES</td>
<td>2-L PEG 3350 ES/2-L PEG With bisacodyl</td>
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<tr>
<td><strong>Brand name(s)</strong></td>
<td><strong>References</strong></td>
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### Tolerability

- High-volume solutions are less well tolerated; may cause nausea, abdominal fullness, bloating.7
- May cause discomfort, abdominal fullness, and cramping, nausea, and vomiting.9
- May be split-dosed; may cause malaise, nausea, abdominal pain, and vomiting.9
- Split-dose regimen; may cause discomfort, abdominal distension or pain, nausea, and vomiting.9

### Safety concerns

- Contraindicated in patients with ileus, GI obstruction, gastric retention, bowel perforation, toxic colitis, and toxic megacolon.2,5
- Contraindicated in patients with ileus, GI obstruction, gastric retention, bowel perforation, toxic colitis, and toxic megacolon.2
- Fluid and electrolyte disturbances can lead to serious AEs, including cardiac arrhythmias, seizures, and renal impairment.8
- Serious AEs may occur as a result of electrolyte abnormalities, including arrhythmias, seizures, renal impairment; use with caution in patients with renal dysfunction.8
- Contraindicated in patients with ileus, GI obstruction, gastric retention, bowel perforation, toxic colitis, and toxic megacolon.2 Fluid and electrolyte disturbances can lead to serious AEs, including cardiac arrhythmias, seizures, and renal impairment.7
- Rare reports of phosphate nephrotoxicity.5,11 Fluid and electrolyte disturbances can lead to serious AEs, including cardiac arrhythmias, seizures, and renal impairment.11

### Comments

- Sulfate-containing formulas (GoLYTELY and colyte) are less palatable.4 Not FDA-approved for split dosing. Use with caution in elderly.2
- HalLyte not FDA-approved for split dosing. Use with caution in elderly.7
- 3 L are ingested overall: 2 L Moviprep and 1 L clear liquid8
- May cause temporary elevation in uric acid; use with caution in patients with renal impairment.9
- 2 quarts of clear liquids ingested overall. Avoid in patients with renal disease, CHF, or concomitant medications that can affect renal function.11 Use with caution in elderly.10,11

### References


AE, adverse event; CHF, congestive heart failure; ES, electrolyte solution; GI, gastrointestinal; PEG, polyethylene glycol.