



# A Gastroenterologist's Guide To Bowel Preparation



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**A**s the leading gastrointestinal procedure in the United States, colonoscopy is an important tool for colorectal cancer screening, post-polypectomy surveillance, guidance in managing inflammatory bowel disease, and diagnosis of symptoms.<sup>1</sup>

High-quality colonoscopy depends on several factors, including cecal intubation and adequate inspection of the mucosa for adenomas and other pathology, which, in turn, are dependent on adequate withdrawal time and bowel preparation quality.

An updated 2024 guideline from the American College of Gastroenterology/American Society for Gastrointestinal Endoscopy (ACG/ASGE) continues to emphasize the importance of bowel preparation by raising the target for optimal cleansing from 85% to 90%, while also increasing the minimum adenoma detection rate (ADR) to 35% and setting a new 6% benchmark for sessile serrated lesion detection.<sup>2,3</sup>

However, approximately 20% to 25% of the more than 15 million colonoscopies performed annually are limited by inadequate preparation, which has consequences for patients and the healthcare system.<sup>4</sup> Patients may suffer from increased pain, missed adenomas, subsequent cancers, repeat colonoscopies, with associated missed days of work and lost wages, and increased complications.<sup>5-12</sup> System implications include increased intra-procedural time, reduced ability to perform other procedures, and increased costs.<sup>5,13</sup>

This article reviews currently available bowel purgative agents for colonoscopy and other bowel preparation-related procedures.

**Table 1. FDA-Approved Agents for Bowel Cleansing Before Colonoscopy**

Name	Total volume/instructions	Average retail price without discounts <sup>a</sup>
<b>PEG-based regimens</b>		
CoLyte (Mylan) Gavilyte-G (generic) Gavilyte-N (generic) GoLyteLy (Braintree) (PEG + electrolytes)	4 L Large 4-L container with slight variations of powdered electrolytes depending on the product; patient fills container with lukewarm water and shakes until powder dissolves; flavor packets also can be added; 240 mL of solution is ingested every 10 min, either in 1 sitting the morning of the exam or in split-prep fashion (2 L evening before, 2 L morning of exam)	CoLyte: \$40.50 Gavilyte-G: \$28.86 Gavilyte-N: \$41.47 GoLyteLy: \$40.50
SUFLAVE (Braintree) (PEG-3350, sodium sulfate, potassium chloride, magnesium sulfate + sodium chloride) <sup>14,15</sup>	3 L 2 1-L bottles and 2 “flavor-enhancing” packets; patient empties 1 packet into 1 bottle and then fills bottle with lukewarm water and shakes until powder dissolves; store in refrigerator until ready to drink; solution is ingested at 240 mL every 15 min until empty; patient then consumes an additional 475 mL of water. Process is repeated with second packet the morning of the procedure.	\$158.52
MoviPrep (Salix) (PEG-3350, sodium ascorbate, sodium sulfate, sodium chloride, potassium chloride + ascorbic acid [PEG-ELS + ASC])	3 L 4 packets labeled A (2) and B (2) and a 1-L container; evening before exam: mix contents of pouch A and pouch B (1 each) in container; ingest 240 mL every 15 min until complete, then drink additional 500 mL of clear liquid (1.5 L total); repeat process morning of exam	\$117.13
Plenvu (Salix) (PEG-3350, sodium ascorbate, sodium sulfate, sodium chloride, potassium chloride + ascorbic acid [PEG-ELS + ASC])	2 L 1 pouch labeled dose 1, and 2 additional pouches (dose 2 pouch A and dose 2 pouch B) and 500-mL container; evening before exam: mix pouch labeled dose 1 in the container and drink solution over 30 min; then drink an additional 500 mL of clear fluid over 30 min; repeat process morning of exam with packets labeled dose 2	\$209.34
<b>Sodium sulfate–based regimens</b>		
SUPREP (Braintree) (sodium sulfate, potassium sulfate, magnesium sulfate)	3 L 2 small (180 mL) flavored bottles; evening before exam: dilute 1 bottle with water to 500 mL and drink; then drink 1 L of water over the next hour; repeat process morning of exam	\$115.66
SUTAB (Braintree) (sodium sulfate, magnesium sulfate, potassium chloride)	3 L 24 tablets; evening before exam: take 12 tablets followed by 1.5 L of water over the next 2.5 h; repeat morning of exam	\$214.65
<b>Sodium phosphate regimen</b>		
OsmoPrep (Salix) (sodium phosphate)	~1.9 L (2 quarts) 32 tablets; evening before exam: take 4 tablets with 240 mL of water every 15 min until 20 tablets are taken (5 doses); morning of exam: take 4 tablets every 15 min with 240 mL of water until 12 tablets are taken (3 doses)	\$319.02
<b>Sodium picosulfate–based regimen</b>		
Clenpiq (Ferring) (sodium picosulfate, magnesium oxide, citric acid [SPMC])	~2.5 L 2 bottles; night before exam: drink the first bottle (160 mL), followed by 1.2 L of water; morning of exam: drink the second bottle (160 mL) followed by 945 mL of water	\$218.42

<sup>a</sup> Prices are before discounts, coupons, and/or insurance and, thus, actual cost may be less than prices listed. For potential savings, go to [moviprep.salix.com](http://moviprep.salix.com), [plenvu.copaysavingsprogram.com](http://plenvu.copaysavingsprogram.com), [sufflave.com/savings](http://sufflave.com/savings), [suprepkit.com](http://suprepkit.com), [sutab.com/savings](http://sutab.com/savings), and [clenpiq.com/hcp/savings](http://clenpiq.com/hcp/savings).

Sources: Drug information, including dietary considerations, obtained via Lexicomp. Price information obtained from GoodRx “average retail price” and drugs.com.

	Contraindications/cautions	Palatability	Dietary considerations
	Contraindicated in obstruction, perforation, gastric retention, ileus, toxic colitis/megacolon; caution in heart failure, CKD, end-stage liver disease, IBD, and with certain medications (diuretics, ACEIs, ARBs, NSAIDs)	Rapid drinking preferred to small amounts; can put on ice, use straw, or suck on lemon/sugar-free candy to improve tolerability  CoLyte: can be obtained in flavored options; Gavilyte-N: sulfate-free for improved, less salty, taste	Ideally NPO 3-4 h before starting prep, but absolutely no solid intake 2 h before
		Lemon-lime flavored	A low-residue breakfast on day of prep; clear liquids permitted up to 2 h before colonoscopy
	Contraindicated in obstruction, perforation, gastric retention, ileus, toxic colitis/megacolon; caution in G6PD deficiency due to the presence of sodium ascorbate/ascorbic acid; avoid in phenylketonuria due to the presence of phenylalanine; caution in heart failure, CKD, end-stage liver disease, IBD, those aged >65 y, and with certain medications (diuretics, ACEIs, ARBs, NSAIDs)	Rapid drinking is preferred to small amounts; can put on ice, use straw, or suck on lemon/sugar-free candy to improve tolerability	Can eat clear liquids, soup, plain yogurt for dinner before starting prep; finish eating 1 h before start of prep
		First half of prep is mango flavored; second half of prep is fruit punch flavored	If using split dose, light lunch to be completed 3 h before starting prep; for morning-only dose, NPO after 8 PM
	Contraindicated in obstruction, perforation, gastric retention, ileus, toxic colitis/megacolon; caution in heart failure, CKD, end-stage liver disease, IBD, and those aged >65 y, or taking certain medications (diuretics, ACEIs, ARBs, NSAIDs); may increase in uric acid and precipitate gout flare	Berry/cherry flavored	Light breakfast or clear liquids allowed the morning before starting the prep
	Contraindicated in obstruction, perforation, gastric retention, ileus, toxic colitis/megacolon; caution in heart failure, CKD, end-stage liver disease, IBD, and those aged >65 y, or taking certain medications (diuretics, ACEIs, ARBs, NSAIDs)	No flavor; patient must be able to swallow 24 pills	Low-residue breakfast or clear liquids allowed the day before the exam
	Contraindicated in obstruction, perforation, gastric bypass, ileus, toxic colitis/megacolon; boxed warning of rare but serious acute phosphate nephropathy; caution in seizure disorders, hypovolemia, active colitis, CKD, and those aged >65 y or taking certain medications (diuretics, ACEIs, ARBs, NSAIDs)	No flavor; patient must be able to swallow 32 pills	Clear liquid diet before and during tablet administration; rehydrate before and after exam
	Contraindicated in obstruction, perforation, gastric retention, ileus, toxic colitis/megacolon, severe renal impairment; caution in heart failure, CKD, end-stage liver disease, and those at risk for electrolyte imbalances, aged >65 y, or taking certain medications (diuretics, ACEIs, ARBs, NSAIDs)	Cranberry-flavored ready-to-drink solution	Do not ingest solid food, dairy, red or purple liquids, alcohol, or other laxatives while taking Clenpiq

ACEIs, angiotensin-converting enzyme inhibitors; ARBs, angiotensin receptor blockers; ASC, ascorbic acid; CKD, chronic kidney disease; G6PD, glucose-6-phosphate dehydrogenase; IBD, inflammatory bowel disease; NPO, nothing by mouth; NSAIDs, nonsteroidal anti-inflammatory drugs; PEG-ELS, polyethylene glycol electrolyte solution.

**Table 2. Non–FDA-Approved Agents Used for Bowel Cleansing Before Colonoscopy**

Name	Total volume/instructions	Average retail price <sup>a</sup>	Contraindications/cautions	Palatability	Dietary considerations
Magnesium citrate	2.5 L (3 bottles + 1.5 L water) No standard dosing, but experts suggest 1-1.5 bottles (300-450 mL) followed by 720 mL water; repeat same day (if single-day dosing) or morning of exam (if split dosing)	\$22.98 (\$7.66 per bottle)	Avoid in heart failure, CKD, end-stage liver disease, and in those at risk for electrolyte imbalances	Bitter taste may be improved if chilled before use	None given; off-label use
PEG-3350 + sports drink + bisacodyl	1.9 L (64 oz) 238 g (8.3 oz bottle), mixed into 64 oz of sports drink (do NOT use red) until dissolved; generally, bisacodyl delayed-release oral tablet to be taken before PEG-3350	\$14.86	Avoid with known or suspected bowel obstruction; possible increased rates of hyponatremia	Generally preferred over PEG-ELS; chill in refrigerator to increase palatability	

CKD, chronic kidney disease; PEG-3350, polyethylene glycol-3350; PEG-ELS, PEG electrolyte solution.

<sup>a</sup> Prices are before discounts, coupons, and/or insurance and, thus, actual cost may be less than prices listed.

Sources: Drug information, including dietary considerations obtained via Lexicomp. Price information obtained from GoodRx “average retail price” and drugs.com.

## Choosing an Agent

An ideal bowel preparation regimen should be maximally efficacious, safe, and tolerable, as well as affordable and easy to use.<sup>3</sup> Tables 1 and 2 list available FDA-approved and non–FDA-approved regimens, respectively.<sup>14,15</sup> All US gastroenterology societies advise individualizing the preparation regimen for each patient, taking into consideration comorbidities, medications, and patient preferences and not endorsing any specific regimen (Table 3).<sup>3,16,17</sup>

The lack of endorsement of any single agent likely is due to comparable performance among bowel purgatives when they have been compared head-to-head. This was well demonstrated in one large prospective comparative effectiveness study of more than 4,000 patients in which investigators compared bowel preparation regimens with respect to efficacy and tolerability.<sup>18</sup> Adequate cleansing (defined as a Boston Bowel Preparation Scale [BBPS] score of >6, with each segment BBPS >2) was found in 92.5% of patients using polyethylene glycol-3350 (PEG-3350) with a sports drink; 91.7% with sodium phosphate; 91.1% with PEG-3350, sodium sulfate, sodium chloride, potassium chloride, sodium ascorbate, and ascorbic acid for oral solution (MoviPrep, Salix); 90.7% with sodium picosulfate, magnesium oxide, and anhydrous citric acid (Prepopik/Clenpiq, Ferring); 90.6% with sodium sulfate, potassium sulfate, and magnesium sulfate (SUPREP, Braintree); 90.6% with magnesium citrate; and 84% with PEG-3350 and electrolytes oral solution, (GoLyteLy, Braintree). After adjusting for various preparation, procedure, endoscopist, and patient-level factors, PEG-3350 with a sports drink was the only agent that demonstrated statistically significant superior cleansing compared with GoLyteLy.

In terms of tolerability (defined as the percentage of patients who reported finishing the entire regimen), Prepopik/Clenpiq (99.1%); magnesium citrate (98.1%); SUPREP (94.4%); (sodium phosphate monobasic

monohydrate and sodium phosphate dibasic anhydrous, (Osmoprep, Salix) (92.7%); PEG-3350 with a sports drink (92.6%); and MoviPrep (91.4%) were rated as more tolerable than GoLyteLy (82.9%). Multivariable logistic regression analysis found that patients were less likely to complete GoLyteLy than any other option.<sup>18</sup>

Further studies have continued to demonstrate comparable efficacy among purgative agents, indicating that most agents likely will result in adequate cleanliness if adhered to properly.<sup>19-22</sup>

## Patient Safety

Safety is a crucial factor in the selection of a bowel prep regimen because risk profiles vary based on the mechanism of action, with agents typically classified as isotonic, hypertonic, or hypotonic.

Isotonic options such as GoLyteLy work by retaining fluid within the bowel lumen and generally cause minimal fluid shifts.<sup>23</sup> Despite the challenges typically associated with drinking large volumes of PEG, these agents generally are considered the preferred option for patients who cannot tolerate fluid or electrolyte shifts (eg, patients with congestive heart failure or chronic kidney disease).<sup>24</sup>

In contrast, hypertonic options such as sodium phosphate and magnesium citrate work by causing large paracellular fluid shifts into the bowel lumen.<sup>23</sup> These agents traditionally have been avoided in patients with comorbid renal disease, cardiac disease, hepatic disease, and those who are advanced in age.<sup>25</sup> Sodium phosphate, in particular, has been documented as a cause of acute phosphate nephropathy, for which it carries an FDA black box warning. For this reason, sodium phosphate should not be used as a routine preparation option.<sup>26,27</sup> Although caution should be used when considering a hypertonic preparation, some of the newer agents in this class, such as Clenpiq, have not demonstrated any significant effects on cardiac conduction, magnesium levels, renal function, or glucose levels,

even when used in populations with chronic kidney disease and diabetes.<sup>28,29</sup> Further research on hypertonic agents highlights their comparable safety profiles and favorability among patients, suggesting the potential for increased use in the future.<sup>30</sup>

Although hypotonic PEG-3350 with a sports drink is considered safe, there have been documented reports of prep-induced hyponatremia occurring at higher rates than with traditional PEG, albeit infrequently and possibly with minimal clinical consequence.<sup>31</sup> Although PEG-3350 with a sports drink lacks a significant amount of long-term safety data because it is not FDA approved, historically, gastroenterologists have preferred this option before colonoscopy in pregnant patients, and it may be considered, if necessary.

## Special Populations

There is limited literature guiding bowel preparation selection in special populations, such as patients with IBD, older adults, and pregnant and lactating women.

### Inflammatory Bowel Disease

Most bowel preparation studies exclude patients with IBD. Furthermore, patients with a history of ulcerative colitis frequently are evaluated with flexible sigmoidoscopy and receive minimal oral preparation, and those with Crohn's disease can have additional challenges related to active inflammation, bowel resections, and stricturing disease.<sup>32</sup> The few studies that compare different preparatory agents in IBD patients found minimal difference in efficacy, and lower volume options were associated with increased compliance, tolerance, and willingness to repeat the preparation in the future.<sup>33,34</sup> Many of these studies are limited by the exclusion of patients with active or severe IBD, previous colonic resection, and recent or active GI bleeding, thus limiting any generalization of the results across a heterogeneous population of patients with IBD.<sup>35</sup>

An important consideration is knowing which agents to avoid in these patients. In trials of patients without IBD, preparation-induced mucosal lesions increased 10-fold with sodium phosphate or sodium picosulfate, magnesium, and citric acid regimens compared with PEG.<sup>36</sup> This potential for strong osmotic laxatives to cause minor mucosal damage, potentially mimicking Crohn's disease, has been well documented, leading to their scant use in patients with IBD.<sup>37</sup> However, as newer agents continue to demonstrate safety, there may be a paradigm shift toward their use in patients with IBD whose inflammation is well controlled.<sup>38</sup>

### Older Patients

Older adults have higher rates of inadequate preparation, possibly related to diet, colonic transit time, increased comorbidities, and medications.<sup>39</sup> When comparing agents in this population, multiple studies seem to suggest improved success in older patients who are given the option of a lower volume agent, with otherwise similar safety outcomes.<sup>40,41</sup> One insightful study recommended a combined strategy for older adults at risk for inadequate preparation that includes a low-fiber diet for 3 days, a split-dose regimen, and completion of preparation within 5 hours

of colonoscopy start. This technique resulted in successful cleansing in 87.4% to 91.7% of patients, versus 45.6% when these strategies were not used.<sup>42</sup>

### Pregnant and Lactating Patients

Careful consideration also is needed when selecting a bowel purgative for pregnant and lactating patients, given the potential for fetal hypoxia, premature labor, trauma, and teratogenesis secondary to endoscopic evaluations.<sup>43</sup> When feasible, clinicians should postpone exams until the postpartum period, although certain clinical situations such as GI bleeding, refractory diarrhea, or suspicion of a colon mass require urgent evaluation, as outlined by the 2012 ASGE guidelines.<sup>44</sup> No comparative efficacy trials exist, but in light of the physiologic volume changes associated with pregnancy, avoiding fluid shifts is encouraged, so isotonic solutions such as PEG are more appropriate for these patients.<sup>45,46</sup>

Even the efficacy and safety of well-established prep regimens such as GoLyteLy have not been studied extensively in animal reproduction models, and it is not known whether these agents cause fetal harm or are excreted in human milk.<sup>47</sup> Although the FDA is rolling out new categories for medication pregnancy and lactation labeling, according to the old nomenclature, both PEG and sodium phosphate are category C (shows potential adverse effects on fetus but insufficient data exist for pregnant women).<sup>3,48</sup> Nonetheless, PEG in particular has long been safely used in pregnancy to improve constipation and could be considered, if necessary.<sup>49</sup> Historical trends show gastroenterologists prefer recommending PEG-based solutions before colonoscopy.<sup>50</sup> For now, recommendations from GI societies are limited to tap water enemas before flexible sigmoidoscopy pending further large-scale studies.<sup>3,16</sup>

### Bowel Preparation Timing

Although the literature does not support one best agent, there are ample data to support split-dose preparation, a process in which half to three-fourths of the purgative is ingested the night before the procedure, with the remaining half to one-fourth completed the morning of the procedure. Split-dose preparation is associated with higher rates of adequate preparation, increased patient tolerance (less nausea and vomiting), improved detection of colonic lesions, and lower rates of incomplete or aborted exams.<sup>51-57</sup> Despite its superiority in cleaning, a split-dose approach may not be acceptable for all patients, particularly those worried about sleep disturbance, travel interruption, or fecal incontinence on the way to the procedure.<sup>58</sup> Another option is same-day preparation, a process in which the entire purgative is ingested in the morning before an afternoon colonoscopy. Multiple large studies have demonstrated comparable cleanliness, cecal intubation rates, and ADR with same-day prep and split-dose regimens.<sup>59,60</sup>

Ultimately, the biggest timing consideration with either split-dose or same-day preparation is the "runway time," defined as the interval between the last dose of laxative and the initiation of the exam. A large meta-analysis that included 20 studies and 10,341 patients found higher rates

**Table 3. Guidelines on Colonoscopy Preparation From Selected Professional Societies**

Parameter	US Multi-Society Task Force (2014)
Agent selection	<ul style="list-style-type: none"> <li>• Selection should consider medical history, medications, and, if available, adequacy of bowel prep in prior colonoscopies</li> <li>• Split-dose 4 L PEG-ELS provides high-quality cleansing</li> <li>• In healthy nonconstipated patients, 4L PEG-ELS is not superior to lower-volume PEG</li> <li>• OTC agents have variable efficacy depending on the agent, dose, timing, etc</li> </ul>
Timing/dosing	<ul style="list-style-type: none"> <li>• Use of a split-dose regimen is strongly recommended; second dose of split regimen should begin 46 h before exam with completion 2 h before start</li> <li>• Same-day regimens are acceptable alternatives for patients undergoing afternoon exams</li> <li>• Regardless of OTC selected, efficacy and tolerability are enhanced with split-dose regimen</li> </ul>
Diet	<ul style="list-style-type: none"> <li>• When using split dose, low-residue or full liquids until the evening before exam</li> </ul>
Tolerability	<ul style="list-style-type: none"> <li>• Split dose is associated with greater willingness to repeat regimen compared with day-before regimen</li> <li>• Low-volume agents are associated with greater willingness to undergo repeat colonoscopy</li> </ul>
Education	<ul style="list-style-type: none"> <li>• Oral and written patient instructions for all components of the prep, with emphasis on the importance of compliance should be provided</li> </ul>
High risk for prep failure/special populations	<ul style="list-style-type: none"> <li>• Additional bowel purgatives should be considered in patients with risk factors for poor prep</li> <li>• Use low-volume prep or extended time delivery for high-volume prep after bariatric surgery</li> <li>• Tap water enemas should be used before sigmoidoscopy in pregnant women</li> </ul>
Safety	<ul style="list-style-type: none"> <li>• Although OTC regimens are generally safe, exercise caution when using these agents in certain populations (ie, magnesium-based preps should be avoided in patients with CKD)</li> <li>• Sodium phosphate regimens should be avoided in older patients, children &lt;12 y, and in patients with known or suspected IBD</li> </ul>
Adjunctive agents	<ul style="list-style-type: none"> <li>• Routine use of adjunctive agents is not recommended</li> </ul>

CKD, chronic kidney disease; IBD, inflammatory bowel disease; OTC, over the counter; PEG-ELS, polyethylene glycol electrolyte solution. Based on references 3, 16, and 17.

of adequate cleanliness with shorter runway times: less than 5 hours before the exam (94%), 6 to 10 hours prior (92%), and more than 11 hours before (85%). Shorter runway times also were associated with higher polyp detection rates compared with longer runway times (47% vs 30%).<sup>61</sup> Practices should instruct patients to complete their preparation with “5 golden hours” of runway time and no later than 2 hours before the start of the procedure to minimize aspiration risk, according to guidelines by the American Society of Anesthesiologists (ASA).<sup>56,62</sup>

## Diet Considerations

Dietary recommendations related to bowel preparation typically involve using a clear liquid diet (CLD) or a low-residue diet (LRD) in the days leading up to the exam. An LRD is neither clearly defined nor consistently applied in clinical studies, but is loosely characterized as a low-fiber diet that restricts dietary fiber to fewer than 10 g per day.<sup>63-66</sup> A large meta-analysis including 13 randomized controlled trials and 2,587 patients reported no difference between the adequacy of bowel prep with CLD versus LRD.<sup>67</sup> Of note, patients reported fewer adverse effects and improved tolerability with LRD. In terms of duration of LRD, a meta-analysis of 6 randomized controlled trials including 2,469

subjects compared 1-day LRD versus multiple-day LRD.<sup>68</sup> They found no improvement in bowel prep, ADR, or withdrawal time in the extended LRD, so endoscopy units should consider 1-day LRD.

## Patient and Provider Education

In addition to patient-friendly educational handouts that are written at no higher than a sixth-grade level, visual presentations and reminder calls have been shown to significantly affect the adequacy of bowel prep and cecal intubation.<sup>69,70</sup> Technology-based tools also appear to have a role in enhancing bowel preparation education, with computer-based education demonstrating noninferiority compared with nursing education.<sup>71</sup> One pragmatic benefit of using computer- or internet-based strategies is lower time and cost burdens on clinical staff, with similar outcomes.<sup>72</sup> Another approach already in the palm of patients' hands includes smartphone apps and artificial intelligence, which may significantly improve bowel prep, ADR, and polyp detection.<sup>73,74</sup> Any form of enhanced patient education (eg, cartoons, phone calls, mobile apps, etc) results in improved rates of detection of polyps, adenomas, and sessile serrated lesions.<sup>75</sup>

With an understanding that bowel cleanliness among

	American Society for Gastrointestinal Endoscopy (2015)	European Society of Gastrointestinal Endoscopy (2019)
	<ul style="list-style-type: none"> <li>• Prep should be individualized based on efficacy, cost, safety, and tolerability balanced with the patient's overall health, comorbid conditions, and preferences</li> </ul>	<ul style="list-style-type: none"> <li>• High- or low-volume PEG and non-PEG-based agents that have been clinically validated are acceptable</li> </ul>
	<ul style="list-style-type: none"> <li>• Split-dose regimen for all patients</li> <li>• Same-day preps are acceptable for afternoon exams if taken within 38 h of exam</li> </ul>	<ul style="list-style-type: none"> <li>• Split-dose regimen for elective exams</li> <li>• For afternoon exams, same-day prep is acceptable</li> <li>• Start last dose within 5 h of exam, and complete at least 2 h before start of exam</li> </ul>
	<ul style="list-style-type: none"> <li>• Low-residue diet</li> </ul>	<ul style="list-style-type: none"> <li>• Low-fiber diet day before exam</li> </ul>
	<ul style="list-style-type: none"> <li>• Split dosing or same-day prep may enhance patient tolerance</li> </ul>	<ul style="list-style-type: none"> <li>• Tolerance not addressed directly</li> </ul>
	<ul style="list-style-type: none"> <li>• Verbal counseling should be provided along with simple and easy-to-follow written instructions</li> </ul>	<ul style="list-style-type: none"> <li>• Enhanced instructions for bowel prep</li> <li>• Specific verbal or written instructions to patients and clinic staff caring for hospitalized patients to improve prep</li> </ul>
	<ul style="list-style-type: none"> <li>• Consider intensive education more aggressive than standard prep for patients with predictors for inadequate prep</li> </ul>	<ul style="list-style-type: none"> <li>• No specific prep recommendations in patients with constipation</li> <li>• PEG-based regimen in IBD</li> <li>• PEG-based regimen vs tap water enemas in pregnancy</li> </ul>
	<ul style="list-style-type: none"> <li>• Do not use sodium phosphate and magnesium citrate prep routinely</li> <li>• Do not use sodium phosphate or magnesium citrate in older adults with renal disease or those taking meds that alter renal blood flow or electrolyte excretion</li> </ul>	<ul style="list-style-type: none"> <li>• In patients at risk for hydroelectrolyte disturbances, choice of laxative should be individualized</li> <li>• Recommends against the routine use of oral sodium phosphate</li> </ul>
	<ul style="list-style-type: none"> <li>• No adjunctive agents routinely recommended</li> </ul>	<ul style="list-style-type: none"> <li>• Add oral simethicone to prep</li> <li>• Recommends against routine use of enemas for prep</li> </ul>

inpatients preparing for colonoscopy is generally suboptimal to that of outpatients, targeting education toward inpatient providers and patients may improve outcomes.<sup>76</sup> This could include the usage of a standardized dot phrase and/or targeted education of ward nurses and physicians in the form of leaflets and lectures.<sup>77,78</sup> Ideally, all patients and providers could benefit from receiving enhanced education, but tailoring of resources to patients with lower education levels should be prioritized.<sup>79</sup>

## Improving the Odds

Recognizing which patients are at risk of having inadequate preparation and tailoring strategies accordingly will help increase rates of adequate bowel preparation above the 90% target. Older age, male sex, inpatient status, type 2 diabetes, hypertension, cirrhosis, narcotic use, chronic constipation, history of stroke, and tricyclic agent use all were associated with inadequate prep in a meta-analysis of 50,000 patients.<sup>80</sup> Specifically, in older patients, a history of abdominal surgery, constipation, diabetes, dietary non-compliance, incomplete purgative intake, and inadequate exercise during preparation independently predicted inadequate bowel cleanliness.<sup>81</sup> Several other well-documented risk factors include lower socioeconomic class, afternoon

colonoscopy, ASA class greater than III, pre-procedure nausea and vomiting, and obesity.<sup>82,83</sup> Given the significant increase in use of glucagon-like peptide-1 receptor agonists, these agents also were recently found to negatively affect the BBPS.<sup>84</sup>

Several prediction tools accounting for many of these factors have been developed.<sup>85-87</sup> Although early models had disappointing performance, with receiver operating characteristic curves in the 60s, more tools are emerging with improved results and may become more widespread in clinical use.<sup>88-90</sup>

A prospective, multicenter study of 1,000 patients in 10 Italian hospitals evaluated factors associated with negative symptoms during the bowel preparation process. According to a 36-question survey, being female (odds ratio [OR], 3.64), heavier working hours (OR, 1.13), previous GI symptoms (OR, 7.81), somatic symptoms (OR, 2.19), and a day-before regimen (OR, 2.71) were associated with negative symptoms, whereas age older than 60 years and a baseline good mood were protective factors against negative symptoms.<sup>91</sup> Recognizing these potential risk factors may help in the selection of the purgative agent and allow for extra education about what to expect during the preparation process.

## Conclusion

Achieving high-quality bowel preparation is possible. When choosing an agent, discuss the various options with the patient and engage in a shared decision-making process, allowing them to help select a preparation that best aligns with their goals (taste, volume, cost). Use a split-dose regimen when possible, reserving same-day preparation

for afternoon exams only. Don't forget the 5 golden hours or the low-fiber diet when counseling patients. Finally, be sure to leverage the endoscopy units' staff and technology to enhance patient education, particularly in patients at high risk for inadequate preparation or a negative preparation experience based on known risk factors.

## References

1. Shaukat A, et al. *Am J Gastroenterol*. 2021;116(3):458-479.
2. Rex DK, et al. *Gastrointest Endosc*. 2024;100(3):352-381.
3. Johnson DA, et al. *Gastroenterology*. 2014;147(4):903-924.
4. Joseph DA, et al. *Cancer*. 2016;122(16):2479-2486.
5. Chan WK, et al. *BMC Gastroenterol*. 2011;11:86.
6. Moein HR, et al. *Cureus*. 2021;13(6):e16065.
7. Calderwood AH, et al. *Gastrointest Endosc*. 2015;81(3):691-699.
8. Kluge MA, et al. *Gastrointest Endosc*. 2018;87(3):744-751.
9. Kaminski MF, et al. *N Engl J Med*. 2010;362(19):1795-1803.
10. Kaminski MF, et al. *Gastroenterology*. 2017;153(1):98-105.
11. Clark BT, et al. *Am J Gastroenterol*. 2014;109(11):1714-1724.
12. Dong MH, et al. *Dig Dis Sci*. 2011;56(7):2114-2119.
13. Rex DK, et al. *Am J Gastroenterol*. 2002;97(7):1696-1700.
14. SUFLAVE. Accessed February 10, 2025. <https://www.suflave.com/>
15. Bhandari R, et al. *J Clin Gastroenterol*. 2023;57(9):920-927.
16. European Society of Gastrointestinal Endoscopy (ESGE). Accessed February 10, 2025. [https://www.esge.com/assets/downloads/pdfs/guidelines/2019\\_a\\_0959\\_0505.pdf](https://www.esge.com/assets/downloads/pdfs/guidelines/2019_a_0959_0505.pdf)
17. ASGE Standards of Practice Committee, et al. *Gastrointest Endosc*. 2015;81(4):781-794.
18. Gu P, et al. *Am J Gastroenterol*. 2019;114(2):305-314.
19. Jung Y, et al. *J Korean Med Sci*. 2024;39(48):e301.
20. Park JH, et al. *J Clin Med*. 2024;13(23):7493.
21. Maida M, et al. *Dig Liver Dis*. Published online December 14, 2024. doi:10.1016/j.dld.2024.11.019
22. Serradesanferm A, et al. *Gastrointest Endosc*. 2025;101(1):158-167.
23. Martens P, et al. *Acta Gastroenterol Belg*. 2014;77(2):249-255.
24. DiPalma JA, et al. *Am J Gastroenterol*. 1989;84(9):1008-1016.
25. Samad N, et al. *Endocrinol Diabetes Metab Case Rep*. 2017;2017:16-0119.
26. Rex DK. *Ann Pharmacother*. 2007;41(9):1466-1475.
27. Davies MRP, et al. *Intern Med J*. 2018;48(9):1141-1144.
28. Bertiger G, et al. *Clin Exp Gastroenterol*. 2015;8:215-224.
29. Mankaney GN, et al. *Ther Adv Gastroenterol*. 2021;14:17562848211024458.
30. Hagen R, et al. *J Clin Gastroenterol*. Published online December 18, 2024. doi:10.1097/MCG.0000000000002124
31. Matro R, et al. *Aliment Pharmacol Ther*. 2014;40(6):610-619.
32. Maratt JK, et al. *Dig Dis Sci*. Published online November 27, 2022. doi:10.1007/s10620-022-07775-3
33. Rueda García JL, et al. *Scand J Gastroenterol*. Published online December 15, 2022. doi:10.1080/00365521.2022.2153618
34. Chatterjee A, et al. *J Gastrointest Liver Dis*. 2024;33(2):245-253.
35. Maida M, et al. *Dig Liver Dis*. 2021;53(9):1171-1177.
36. Lawrance IC, et al. *Endoscopy*. 2011;43(5):412-418.
37. Rejchrt S, et al. *Gastrointest Endosc*. 2004;59(6):651-654.
38. Pellegrino R, et al. *World J Gastroenterol*. 2023;29(46):6022-6027.
39. Lukens FJ, et al. *Am J Gastroenterol*. 2002;97(7):1722-1725.
40. Arellano EP, et al. *Gastrointest Endosc*. 2022;95(6):AB104.
41. Kang HS, et al. *J Gastroenterol*. 2024;59(5):402-410.
42. Maida M, et al. *Diagnostics (Basel)*. 2022;12(11):2867.
43. Savas N. *World J Gastroenterol*. 2014;20(41):15241-15252.
44. Shergill AK, et al. *Gastrointest Endosc*. 2012;76(1):18-24.
45. Soma-Pillay P, et al. *Cardiovasc J Afr*. 2016;27(2):89-94.
46. ClinicalKey. Accessed January 26, 2025. <https://www-clinicalkey-com.proxy.lib.duke.edu/#/content/playContent/1-s2.0-S1052515724000321?scrollTo=%23bib14>
47. GoLyteLy. September 2013. [https://www.accessdata.fda.gov/drugsatfda\\_docs/label/2013/019011s0251bl.pdf](https://www.accessdata.fda.gov/drugsatfda_docs/label/2013/019011s0251bl.pdf)
48. FDA. March 5, 2021. Accessed February 10, 2025. <https://www.fda.gov/drugs/labeling-information-drug-products/pregnancy-and-lactation-labeling-drugs-final-rule>
49. Shin GH, et al. *Am J Gastroenterol*. 2015;110(4):521-529.
50. Vinod J, et al. *World J Gastroenterol*. 2007;13(48):6549-6552.
51. Al Alawi S, et al. *Saudi J Gastroenterol*. 2021;27(4):234-239.
52. Millien VO, et al. *Curr Gastroenterol Rep*. 2020;22(6):28.
53. Kallestrup K, et al. *Gastroenterol Nurs*. 2021;44(1):14-20.
54. Di Nardo G, et al. *Dig Endosc*. 2023;35(5):606-612.
55. Kilgore TW, et al. *Gastrointest Endosc*. 2011;73(6):1240-1245.
56. Bucci C, et al. *Gastrointest Endosc*. 2014;80(4):566-576.
57. Tariq H, et al. *BMJ Open Gastroenterol*. 2019;6(1):e000254.
58. Radaelli F, et al. *Gut*. 2017;66(8):1428-1433.
59. Cheng YL, et al. *J Clin Gastroenterol*. 2018;52(5):392-400.
60. Bucci C, et al. *Gastroenterol Res Pract*. 2019;2019:7476023.
61. Gao Y, et al. *Turk J Gastroenterol*. 2023;34(1):26-34.
62. Early DS, et al. *Gastrointest Endosc*. 2018;87(2):327-337.
63. Cunningham E. *J Acad Nutr Diet*. 2012;112(6):960.
64. Park DI, et al. *J Gastroenterol Hepatol*. 2009;24(6):988-991.
65. Alvarez-Gonzalez MA, et al. *Dis Colon Rectum*. 2019;62(4):491-497.
66. Vanhauwaert E, et al. *Adv Nutr*. 2015;6(6):820-827.
67. Ahumada C, et al. *Surg Endosc*. 2022;36(6):3858-3875.
68. Putri RD, et al. *Clin Endosc*. 2025;58(1):63-76.
69. Nawaz MS, et al. *Can J Gastroenterol Hepatol*. 2021;2021:7532905.
70. Arslanca G, et al. *Rev Lat Am Enfermagem*. 2022;30:e3626.
71. Veldhuijzen G, et al. *Endoscopy*. 2021;53(3):254-263.
72. Trasolini R, et al. *J Can Assoc Gastroenterol*. 2020;3(6):274-278.
73. Li P, et al. *J Gastroenterol Hepatol*. 2022;37(7):1349-1359.
74. Zhong H, et al. *Scand J Gastroenterol*. Published online December 22, 2024. doi:10.1080/00365521.2024.2443520
75. Tian X, et al. *JMIR Mhealth UHealth*. 2020;8(6):e17372.
76. Ness RM, et al. *Am J Gastroenterol*. 2001;96(6):1797-1802.
77. Kurin M, et al. *Cureus*. 2024;16(11):e74040.
78. Gkolfakis P, et al. *Gastroenterol Res Pract*. 2019;2019:5147208.
79. Donovan K, et al. *J Cancer Educ*. 2022;37(4):1083-1088.
80. Mahmood S, et al. *Eur J Gastroenterol Hepatol*. 2018;30(8):819-826.
81. Zhang Y, et al. *Int J Nurs Stud*. 2024;149:104631.
82. Yadlapati R, et al. *Dig Dis Sci*. 2015;60(11):3482-3490.
83. Laurie BD, et al. *Int J Colorectal Dis*. 2022;37(12):2451-2457.
84. Yao R, et al. *Am J Gastroenterol*. 2024;119(6):1154-1157.
85. Dik VK, et al. *Gastrointest Endosc*. 2015;81(3):665-672.
86. Gimeno-García AZ, et al. *Endoscopy*. 2017;49(6):536-543.
87. Fuccio L, et al. *Clin Gastroenterol Hepatol*. 2021;19(2):339-348.
88. Yuan X, et al. *Int J Colorectal Dis*. 2022;37(6):1223-1229.
89. Gu F, et al. *Clin Transl Gastroenterol*. 2024;15(5):e00694.
90. Zhang N, et al. *BMC Cancer*. 2024;24(1):341.
91. Collatuzzo G, et al. *Dig Liver Dis*. 2022;54(11):1554-1560.