

Enhancing Bowel Preparation for Screening Colonoscopy: An Evidence-based Literature Review

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ABSTRACT

Colorectal cancer (CRC) is the second leading cause of cancer-related deaths in the United States. CRC is preventable through the detection and removal of precancerous polyps during colonoscopy and is curable if diagnosed in the early stages. Successful completion of colonoscopy depends on the quality of the bowel preparation. However, the amount of fluid consumption limits patients' ability to comply frequently, resulting in inadequate bowel preparation. Therefore, an extensive literature review was conducted to evaluate currently available bowel preparation products. The results indicated that a 2-L split-dose polyethylene glycol solution provided better patient compliance and tolerability.

Keywords: bowel cleansing, colonic polyps, colonoscopy, colorectal, inadequate bowel preparation, polyethylene glycol

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Colorectal cancer (CRC) is the third most common cancer and the second leading cause of cancer-related deaths in the United States.¹ CRC is preventable through the detection and removal of precancerous polyps and is curable if diagnosed in the early stages.² In 2011, the incidence of CRC was reported as 43.7 per 100,000 per year, and the death rate was 15.9 per 100,000 per year.² The Surveillance, Epidemiology, and End Results Program estimated that there were 1,162,426 people with CRC in the US.³ The symptoms of CRC often do not manifest until the disease has progressed and chances of survival from the disease have decreased. Despite evidence supporting the effectiveness of CRC screening and the availability of various tests, only half of the US population 50 years old and older had been screened with the recommended testing in 2002, reaching only 58.6% in 2010 according to the National Health Interview Survey data.¹ However, according to the Behavioral Risk Factor Surveillance Survey data, the CRC screening rate has increased to 65.4% in 2010, still lagging behind in reaching the

2020 target of 70.5%.¹ Detecting and removing colonic polyps could prevent 40% of CRC. Therefore, the American Cancer Society (ACS) guidelines recommends regular screening of both men and women for colorectal cancer, starting at age 50 years and continuing until age 75 years, by any of the following 3 regimens: annual high-sensitivity fecal occult blood testing, sigmoidoscopy every 5 years combined with high-sensitivity fecal occult blood testing every 3 years, or screening colonoscopy at intervals of 10 years.^{4,5} Colonoscopy is considered the gold standard in detecting and preventing CRC with a high sensitivity (99.3%) and specificity (91.3%) for the detection of precancerous polyps and cancer.⁶

BACKGROUND AND SIGNIFICANCE OF COLONOSCOPY

Effective detection of colonic polyps/lesions during colonoscopy is dependent on the percentage of visualization of the colonic mucosa. The quality of the bowel preparation is 1 of the most important contributors to the effectiveness of colonoscopy as a cancer prevention tool.⁷ In addition to visualization

of the colon, the cecal intubation rate is an important indicator of colonoscopy quality and successful completion of the colonoscopy procedure. The American Society for Gastrointestinal Endoscopy recommends cecal intubation rates above 90% for all colonoscopies and above 95% for screening colonoscopies.⁵ However, 30% of colonoscopies still fail, despite reports of high cecal intubation rates by experienced endoscopists.⁷ The consequences of poor bowel preparation are serious including failed cecal intubation, prolonged procedure duration and scope withdrawal time, and increased number of repeated procedures at shorter surveillance intervals with increased cost.⁸ In addition, studies showed that an inadequate bowel preparation at the time of screening colonoscopy results in an adenoma miss rate of 33% to 46%.⁷ An unsuccessful colonoscopy may cause a delay in diagnosis and can be extremely stressful for the individual. Furthermore, some patients who experienced unsuccessful colonoscopy might not be willing to undergo a repeat attempt that could potentially result in failure to detect CRC, leading to poor outcomes.

REVIEW ON BOWEL PREPARATION AGENTS

The ideal bowel preparation agent should be safe, effective, and well tolerated by the patients. Before 1990, bowel preparation products required patients to ingest isotonic saline with or without a combination of enemas, laxatives, and suppositories. This resulted in a significant absorption of fluid and salt, and some patients were unable to excrete the large salt and fluid load that resulted in potential adverse effects including peripheral edema and pulmonary edema. During the last decade, GoLytely (Braintree Laboratories, Inc. Braintree, MA) and Nulytely (Braintree Laboratories, Inc. Braintree, MA), which are 4-L polyethylene glycol (PEG)-based solutions, were designed to decrease salt and water absorption. The newest class of these preparations includes MoviPrep (Salix Pharmaceuticals, Inc, Raleigh, NC), which comes as a 2-L split-dose PEG preparation.⁹ Although, 2-L PEG is as effective as 4-L PEG, it has superior tolerability as reported by patients.¹⁰ However, no bowel preparation is considered a gold standard and/or recommended by the current clinical guidelines.⁵ Patients receiving a prescription

for a bowel preparation largely depend on the prescriber's preference. However, patients' compliance to the prescribed regimen of bowel preparation remains a major determinant for quality of bowel preparation and colonoscopy outcomes. Patient inability to tolerate the volume or taste of the bowel preparations and side effects such as nausea/vomiting are the main reasons why patients do not comply with the regimen and have poor bowel preparation that results in unsuccessful procedures.¹¹

REVIEW ON FOCUSED QUALITY OF BOWEL PREPARATION OUTCOME MEASURES

The quality of bowel preparation is determined by the duration of procedure, scope withdrawal time, adequate visualization of the colon, and cecal intubation indicating the successful completion of the procedure.⁸ A completely clean colon allows meticulous inspection of the colonic mucosa, which combined with appropriate scope withdrawal time, is associated with higher adenoma detection rates. Cecal intubation improves the sensitivity of screening colonoscopy because that indicates the examination of the entire colon and successful completion of the procedure.⁸

The quality of colon visualization is often determined by using the Boston Bowel Preparation Scale (BBPS), which is 1 of the bowel preparation scales that offer a summary of the findings of colon visualization. The BBPS is applied during colonoscopy with summation of 3 individual colonic segment scores (right, transverse, and left colon) to indicate the degree of bowel visualization. The BBPS showed a good inter-rater reliability (intraclass correlation coefficient = .91) and substantial intrarater reliability (weighted kappa = .78; 95% confidence interval [CI], .73-.84) among 983 colonoscopies.¹¹ Adequate visualization of the entire colon is essential to recommend procedure intervals properly and enhances patient safety during colonoscopies. Although various other scales are available, we selected to use the BBPS because it has been used in our gastroenterology practice. These focused outcome measures were used as criteria for the inclusion of articles in this review. The aim of this article is to conduct an evidenced-based review of existing bowel preparations with the goal of identifying one that may improve the quality of colonoscopy as well as improve patient compliance.

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