



Reducing Suboptimal Bowel Preparation

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Abstract

Achieving adequate bowel cleansing is essential to ensuring safe and effective colonoscopy. Yet, among hospitalized patients, suboptimal bowel preparation is a common problem leading to diagnostic delay, increased cost, and patient dissatisfaction. All patients, inpatient and outpatient, presenting with inadequate bowel preparation prior to procedure require repeat colonoscopy sooner than needed with successful bowel preparation.

Keywords: Bowel Preparation; Quality Improvement; Inpatient Colonoscopy; Education Intervention; Nursing Care Impact

Introduction

In 2015, an estimated 11 million colonoscopies were completed in the United States. By 2017, this number increased to 19 million and the number of colonoscopies completed annually is projected to continue this ascent because of the aging population [1]. Colonoscopy is the preferred procedure for colorectal cancer screening because it allows direct visualization and of colonic mucosa and provides the opportunity to remove potentially precancerous polyps [2]. Additionally, colonoscopy procedures are widely performed to evaluate and treat symptoms such as chronic diarrhea, unexplained abdominal pain, weight loss, anemia, and suspected acute lower gastrointestinal bleeding [1]. Importantly, a high quality, efficacious colonoscopy depends upon adequate bowel cleansing to facilitate the visualization of the mucosal surface of the colon.

Even though successful colonoscopies require adequate preparation, between 18% and 30% of all patients undergoing colonoscopy procedures may not achieve needed optimal bowel cleansing [3]. Worse yet are rates of inadequate bowel preparation found among hospitalized patients. Despite receiving the support and supervision of nurses, suboptimal bowel preparation among hospital inpatients occurs from 20% to 50% of the time [4]. All patients, inpatient and

outpatient, presenting with inadequate bowel preparation prior to procedure require repeat colonoscopy sooner than needed with successful bowel preparation. Suboptimal bowel cleansing increases the duration of colonoscopy procedures and risk for complications, such as bowel perforation [3]. Inadequate cleansing decreases lesion detection, patient satisfaction, and the rate of completed procedures [5]. Among hospitalized patients repeat colonoscopies, often caused by lack of comprehension of instructions and non-compliance, contribute to increased length of stay. For all these reasons, improving the quality of inpatient bowel preparations positively influences health care costs, quality of care, and patient safety and satisfaction.

Cost

Gastrointestinal (GI) diseases account for substantial morbidity, mortality among United States citizens and contribute substantially to health care costs. Annual total expenditures for GI diseases is estimated to be \$135.9 billion dollars [1]. In 2014, GI hemorrhage alone, accounted for more than 500,000 hospitalizations and approximately 2.2 million days of hospitalization. As previously stated, investigation and treatment of GI hemorrhage is a leading indication for colonoscopy among hospitalized patients. Additionally, GI hemorrhage is a significant cause of hospital readmission

[1]. The increased economic burden associated with poor bowel preparation is also significant and causes both direct and indirect costs assumed by patients and providers. Poor bowel preparation among hospitalized patients may increase the costs by 12% to 22% [6]. Further, a single-center study suggests acute care hospital savings of \$150,000 to \$200,000 dollars annually by reducing the number of repeat procedures due to poor inpatient colon cleansing [7].

Importance of Adequate Bowel Cleansing

A colonoscopy is a procedure performed by a physician to examine the lower gastrointestinal (GI) tract. Colonoscopies are completed using an endoscope, which consists of a long, narrow flexible tube equipped with its own light source and camera. In addition to allowing visualization and imaging of the colon from the cecum to the rectum, the flexible scope contains an auxiliary water channel, an air and water nozzle, and an instrument channel for biopsy forceps or other instruments to remove polyps, take biopsies, cauterize bleeding or perform other procedural therapies [8]. For this reason, providers use colonoscopy to perform both diagnostic and therapeutic interventions.

The US Multi-Society Task Force of Colorectal Cancer (MSTF), which represents the American College of Gastroenterology, the American Gastroenterological Association, and the American Society for Gastrointestinal Endoscopy, recommends colonoscopy as the preferred, first tier screening procedure for colorectal cancer, for surveillance of patients with previously detected precancerous polyps or lesions, and to detect dysplasia in persons with inflammatory bowel diseases of the colon [2]. In fact, it is estimated that routine screening colonoscopies may prevent up to 65% of all colorectal cancers [9]. In addition to investigations related to inflammatory bowel disease and colorectal cancer, colonoscopy is used to diagnose and treat unexplained abdominal pain, anemia, and lower gastrointestinal bleeding [10].

The success of colonoscopy is fully dependent on the quality of bowel preparation prior to procedure. Not surprisingly, poor bowel cleansing is the leading cause of failed colonoscopies [7]. Yet, multiple studies indicate that between 18% to 30.5% of patients undergoing colonoscopy have suboptimal bowel cleansing [11]. Compared to outpatient populations, hospitalized patients typically have poorer quality bowel preparations. As a matter of fact, up to 60% of inpatient colonoscopies are associated with inadequate bowel preparation [12]. Specifically, one major retrospective study, reviewing the electronic reports of nearly 30,000 colonoscopies occurring over a 10-year period, found the inpatient setting among the most prominent factors associated with suboptimal bowel preparation [13].

Factors Impacting Quality of Bowel Preparation

Colonoscopy requires complete cleansing of the colon. A variety of bowel cleansing regimens are commonly in use, but most have in common a clear liquid diet for 24 to 48 hours before the procedure and some type of laxative preparation. A thorough understanding of stool consistency, color, and presence of sediment is helpful to assess the level of bowel cleansing preparation. Quality of bowel cleansing depends on the ability to visualize the mucosa of the colon once retained stool and fluid have been eliminated. Best practice recommends endoscopists include the quality of preparation for each colonoscopy; however there is no standardized definition for terms used to characterize bowel preparations [6].

Nonmodifiable Risk Factors

Many research studies have identified barriers that impact patient's ability to successfully complete bowel preparations for colonoscopy. These studies consistently find an association with older age and diabetes and inadequate bowel preparation. Increased age is associated with multiple comorbidities, such as chronic constipation, and multiple surgeries while diabetes decreases gut motility increasing the transit time for bowel preparation [12]. Additionally, Ydlapati, et al. identified African American race, and tricyclic antidepressant use as risk factors for inadequate inpatient preparation.

Modifiable Risk Factor

One modifiable risk factor for inadequate preparation is the selection of bowel preparation solution used for individual patients. Several different bowel preparations are in current use. The ideal agent should be convenient to use, cleanse the bowel, and be well tolerated with minimal side effects. The common bowel solutions administered before colonoscopy are polyethylene glycol-electrolyte lavage solutions (PEG-ELS), oral sulfate solutions, sodium picosulfate, or sodium phosphates with magnesium citrate [14]. Since they are isotonic, PEG-ELS solutions such as GoLytely, are considered the preferred agents to use in patients less likely to tolerate fluid shifts, such as patients with renal insufficiency, congestive heart failure, and advanced liver disease. Thus, PEG-ELS solutions are currently the most frequently administered agent used for preparations for hospitalized patients [14]. Further, a recent prospective and randomized pilot study compares the efficacy of high-volume PEG-ELS solutions to medium and low volume preparation regimens among hospitalized patients undergoing colonoscopy procedures, found no statistical difference in the adequacy of bowel cleansing. A later 2018 study, also conducted

by Yadlapati, demonstrated a significance increase in the adequacy of bowel preparation among hospitalized patients using a split-bowel preparation. However, this study initiated the use of an order set for split bowel preparation, automated orders for rescue medications, and nursing bowel preparation checks. Since this was an interdisciplinary effort to reduce repeated colonoscopy procedures the authors recognize that there is no way to recognize the independent impact of the split dose regimen [15].

Pre-procedure nausea and vomiting which prevents consumption of the preparation agent and afternoon colonoscopies other modifiable determinants associated with inadequate bowel preparation [16]. Colonoscopy procedures occurring before noon are associated with enhanced quality compared to afternoon procedures [12]. Runway time is defined as the interval between the last ingestion of the preparation and the start of the colonoscopy procedure. Interestingly, bowel preparation quality is inversely related to this interval [12]. This phenomenon helps explain the recommendation for split dose preparations noted in clinical practice guidelines [14]. Thus, in hospital settings important considerations include identifying and treating underlying nausea to facilitate compliance with preparation and completing colonoscopy procedures within optimal runway time.

Nursing

Interestingly, education interventions are not restricted to patients. The importance of providing sufficient information to patients and nurses about colonoscopy and following the recommended schedule of bowel preparation cannot be overemphasized [12]. One recent analysis of possible reasons for inadequate bowel preparations in a university hospital identified communication failures among health care teams, lack of step-by-step-instructions for the nursing staff, and nurses' lack of knowledge as contributing factors to suboptimal bowel cleansing [17]. Consumption of the large volume of preparation solution is a difficult for patients. For this reason, it is important nurses understand the cleansing process and its importance, so they can encourage patient persistence and vigilance with preparation administration.

Educational Interventions to Improve Bowel Preparation

Current practice guidelines recommend healthcare professionals provide oral and written patient education instructions for all components of the colonoscopy preparation and emphasize the importance of compliance [14]. While many intrinsic factors cannot be changed with interventions, patient compliance can be improved through enhanced communication. Nearly 20% of patients with poor

bowel preparation failed to follow preparation instructions [11]. Patient education is crucial because the inability to follow instructions on consuming bowel preparation is an independent predictor of inadequate bowel preparation [12]. Further, education is a viable and low-cost strategy for quality improvement for colonoscopy preparation [18].

Patient centered bowel preparation has been explored in numerous studies to improve patient outcomes and has yielded mixed results [19]. In the current research, enhanced educational interventions, such as videos and educational booklets with visual aids, are more concise and intuitive than traditional instructions. Plus, educational videos are suitable for patients with a low reading ability and across larger ranges of educational and health literacy levels [3]. Further, the use of novel educational materials on pre-colonoscopy preparation consistently results in better bowel preparation scores than those achieved using conventional instruction [14]. Finally, in their systematic review of strategies to improve inpatients' quality of bowel preparation for colonoscopy Gkolfakis, Tziatzios, Papanilolau, and Triantafillou (2019) conclude educational interventions are more significant than bowel preparation solution selection in improving inpatient's bowel preparation quality. Providing inpatients with detailed instructions is an example of an evidence-based practice that is often overlooked among hospitalized patients. Knowledge about adequate preparations, hardships with completing the cleansing regime, and multiple patient related factors impact the efficacy of preparation. Park, et al. [20] designed a bowel preparation video emphasizing the importance of adhering to bowel preparation instructions., educational interventions have been shown to improve patient satisfaction [17]. Thus, implementing use of enhanced educational materials likely improves the quality of inpatient bowel preparation and increases patient satisfaction [21-23].

Conclusion

Adequate bowel preparation is essential for optimal procedure outcomes. Findings from the review of literature reveal optimal assessment of the large bowel with colonoscopy requires minimal fecal contamination. Yet, most hospitalized patients continue to have suboptimal bowel preparation for colonoscopy procedures. An inadequately prepared bowel leads to missed diagnosis, need for repeat procedures and investigations causing a significant financial impact to both the patient and healthcare systems [7]. Education is a common theme of successful quality improvement programs in gastroenterology [18]. Additionally, providing inpatients with detailed instructions is an example of an evidence-based practice that is often overlooked among hospitalized patients. Knowledge about adequate preparations, hardships with completing the cleansing regime, and multiple patient related factors impact the efficacy of

preparation. Educational interventions have been shown to improve patient satisfaction [17]. Thus, implementing use of enhanced educational materials likely improves the quality of inpatient and outpatient bowel preparation and increases patient satisfaction [24,25].

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