

How to improve colon cancer screening rates

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Abstract

Colorectal carcinoma is a common cause of death

throughout the world and may be prevented by routine control, which can detect precancerous neoplasms and early cancers before they undergo malignant transformation or metastasis. Three strategies may improve colon cancer screening rates: convince the population about the importance of undergoing a screening test; achieve higher efficacy in standard screening tests and make them more available to the community and develop new more sensitive and efficacious screening methods and make them available as routine tests. In this light, the present study seeks to review these three means through which to increase colon cancer screening rates.

Key words: Colon cancer screening; Colon cancer; Screening tests; Colonoscopy; New technology

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Core tip: Colorectal carcinoma is a common cause of death and may be prevented by convincing the population about the importance of undergoing a screening test; achieve higher efficacy in standard screening tests and develop new more sensitive and efficacious screening methods.

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INTRODUCTION

Colorectal carcinoma (CRC) is a common cause of death throughout the world in both men and women. Many forms of CRC may be prevented by routine control, which can detect precancerous neoplasms

and early cancers before they undergo malignant transformation or metastasis^[1]. Consensus evidence-based recommendations call for screening of all people, beginning at age 50. Some screening tests have proven to be effective and are recommended at varying intervals, depending on each patient's risk of developing CRC^[2]. Unfortunately, colorectal screening is underused, and at least 40% of age-eligible adults do not adhere to up-to-date screening guidelines^[3]. So what can be done to improve screening rates in colon cancer?

Three strategies may increase compliance on colon cancer screening rates: (1) convince the population about the importance of undergoing a screening test; (2) achieve higher efficacy in standard screening tests and make them more available to the community; (3) develop new more sensitive and efficacious screening methods and make them available as routine tests. In this light, the present study seeks to review these three means through which to increase colon cancer screening rates.

CONVINCING PROFESSIONALS AND EDUCATION FOR POPULATION

Multiple strategies have improved CRC screening rates, including media education and medical publications^[4,5]. Electronic medical records (EMR), for example, provide specific information necessary to improve screening rates.

Increasingly, investigators are recognising that enhancements of primary care practices require changes in physician and staff roles in order to produce effective medical teams, with medical assistants (MAs) playing a key role^[6].

The National Colorectal Cancer Roundtable has disclosed guidelines that recommend the colon cancer screening, using reminder systems that are mainly controlled by physician. Screening guidelines and personal experience are useful to detect early tumors, primarily in patients with a high risk of CRC, using only local resources^[7]. EMR-based reminders have improved the CRC screening rates and should be disseminated to the population and medical practitioners by physicians and medical societies by making a recommendation, developing a screening policy, using the reminder systems and measurements, and even improving one's own performance. All of these tools are important in the struggle to increase colon cancer screening rates.

Making a recommendation

A recommendation from a physician is the most influential factor in determining whether a patient is screened for CRC. The evidence supporting the vital role of a physician's recommendation derives from many types of research-based and population sources, and is geographically constant^[8].

Physicians are increasingly aware of the importance of screening to reduce mortality caused by CRC^[9]. In

fact, 98% of primary care physicians responding to a national survey reported that they screen for CRC. While this is encouraging, many patients do not receive this needed recommendation when they are visiting their doctor. Assessing the patient's risk status, discussing their needs, and offering several test options can all serve to increase the likelihood of a patient receiving the proper screening. At minimum, a physician should offer the patient a choice between a high-sensitivity, multiple sample stool blood test (FOBT or FIT) and a colonoscopy^[10].

Developing a screening policy

Office policy is the foundation of a systematic approach to cancer screening. Only a systematic approach will achieve the goal of a recommendation for every appropriate patient^[9].

Consider the following when developing your screening policy: (1) national screening guidelines; (2) realities of your practice; (3) patient history and risk level; (4) patient preferences and insurance coverage; and (5) local medical resources^[10].

As part of a high-quality screening program for your practice, develop a policy for an annual stool blood test (FOBT/FIT). There is no evidence from randomized controlled trials that one specific screening method is the "best". However, based on modeling studies that assume 100% patient adherence for stool testing and colonoscopy, years of life saved through annual high-quality stool-blood screening programs are comparable to high-quality colonoscopy-based screening programs when positive stool tests are followed by colonoscopy^[11,12].

Reminders

Implementation of EMR-based reminders or prompts has been shown to improve CRC screening rates, although provider compliance with prompts is variable. Reminder systems can be directed towards physicians or patients or both. Reminders directed at patients are further endorsed by strong evidence in that they have proven to be effective in screening for both breast cancer and CRC. Chart prompts, ticklers and logs, and electronic medical records can all provide cues for physicians and their teams to take action. Postcards, letters, prescriptions, in-person conversations, and phone calls can encourage patients to follow through with screening^[13,14]. To achieve high screening rates with take-home stool blood tests, reminder and tracking systems are therefore essential^[9-12].

Measuring and improving performance

During staff meetings, allow time for your team to report what is working well, what can be done differently, whether or not documentation procedures need improvement, and if there are additional ways to support the members of the team. Elicit feedback from your team and your patients to learn valuable

information about any and all opportunities to improve your system^[4,9,10].

It is essential to complete one review that will serve as a baseline comparison for all future investigations. An initial audit can be completed simultaneously with the baseline review. Audits are not complicated, and the simplest audit involves reviewing a specified number of patient records and documenting key elements^[9].

SCREENING TESTS

The perfect knowledge of each exam limits and periodicity is necessary to make the CRC screening test more efficacious. People with a high risk for CRC should not be included in a routine screening used for the general population. Their screening must be started early in a shorter period, and using various tests. Those with previous CRC are not included in screenings, but rather in either follow-up or surveillance.

Recently published guidelines grouped CRC screening tests into cancer prevention and detection tests. Prevention methods have the potential to detect both cancer and polyps, whereas detection methods generally show a low sensitivity for polyps and an even lower sensitivity for cancer. However, these are easier to execute and are more cost efficient. The United States Preventive Task Force recommends CRC screening for the average at-risk population, using an annual fecal occult blood test (FOBT), a periodic flexible sigmoidoscopy (FS), or a colonoscopy^[15,16].

CRC detection methods

The FOBT can be easily executed. Guidelines recommend the collection of two to three stool samples. Dietary restrictions and suspension of medication, such as aspirin, is controversial. FOBT must be done annually. Patients with positive results should receive a medical referral to undergo a colonoscopy^[17].

Fecal immunochemical test (FIT) is one of the favorite detection tests. FIT has proven to produce a more effective performance than the guaiac-based FOBT^[18]. This test must be done annually, and patients with positive results should receive a medical referral to undergo a colonoscopy^[17].

A stool DNA test detects exfoliated-DNA from neoplastic cells in stool samples. This test is more costly than other stool tests. Moreover, intervals and periodicity of the exam is still uncertain^[17].

Methods of CRC prevention

Flexible sigmoidoscopy requires partial or total bowel preparation, which may cause some discomfort when executed without anaesthesia. FS evaluates only the distal colon, where most of the lesions are located. However, some patients with only right colon lesions may receive a misdiagnosis. Patients with positive results in FS must undergo a colonoscopy to fully examine the colon to identify synchronous lesions. Negative results do not guarantee the absence of polyps or cancer on

the proximal colon. The recommended interval is every 5 years.

Colonoscopy requires total bowel preparation and usually intravenous sedation (conscious or deep). At least one working-day is missed and a companion is necessary. These tests present low risks (perforation, bleeding), usually associated with polypectomy. Nevertheless, this procedure still offers a great advantage over other methods, as it is able to detect both early and advanced lesions and allows for immediate treatment in early cases. The interval recommended for the average risk population is every 10 years, which may vary, depending on the findings and personal risk^[17].

Double-contrast barium enema is an alternative method for a full colon examination. This procedure requires complete bowel preparation. Patients with positive results receive a medical referral to undergo a colonoscopy. The sensitivity of this exam is lower than that of a conventional colonoscopy, and the impact on mortality reduction is uncertain. The recommended interval is every 5 years^[17].

Computed tomography colonography (virtual colonoscopy) requires a complete bowel preparation. Patients with positive results receive a medical referral to undergo a colonoscopy. Despite radiation exposure, the risks are still quite low. The recommended interval is every 5 years^[17].

If any of the above tests have positive results the patient receive a medical referral to undergo a colonoscopy^[19].

Different guidelines recommend CRC screening for the average risk population, using annual FOBT, periodic FS, or colonoscopy, beginning at 50 years of age and continuing with follow-up exams until 75 years of age if negative results are found^[15,16,20]. The high risk population may begin colonoscopy examinations at an earlier age, with shorter intervals than average at-risk patients.

COLONOSCOPY

Colonoscopy is largely used to evaluate the colon. In 2010, in the United States alone, it is estimated that over 3.3 million colonoscopy were performed^[21]. As a major advantage, this test frequently allows for the treatment of some affections immediately upon diagnosis (e.g., polypectomy, dilatation, hemostasis), behaving as a propedeutic and therapeutic method.

When properly executed by a well-trained professional, under adequate bowel preparation, a colonoscopy can be considered safe, precise, and easily tolerated by patients. As an operator-dependent method, where results may vary largely from one professional to other, quality indicators (QI) should be observed. These indicators were established by the American Society for Gastrointestinal Endoscopy (ASGE) and the American College of Gastroenterology Task Force on Quality in Endoscopy in 2006 and updated in 2012^[21]. The aim is to improve the quality of the exam

and reduce complications, especially the number of missed lesions.

QI in colonoscopy were organized in three moments: before, during, and after the procedure. Every endoscopist must understand and target each item. Knowing the technique is not enough; it must also be well-executed. The main value of a colonoscopy as a screening method depends on the quality of the exam, as the findings (particularly polyps) are definitive to determining the interval of future colonoscopies.

QUALITY INDICATORS

Before the exam

Recommendation: Colonoscopies should be properly recommended and respect adequate intervals. Target: $\geq 80\%$ ^[19].

Informed consent: Patients or their guardian must sign an informed consent form. Risks, benefits, and alternative methods must be discussed and well understood before the exam. Target: $\geq 98\%$ ^[19].

Follow-up: Colonoscopy intervals must be respected, based on the findings (normal exam, polyps, cancer). Target: $\geq 90\%$ ^[19].

Inflammatory bowel disease surveillance - Chronic disease and ulcerative colitis: Adequate colonoscopy intervals must be respected. ASGE recommends that patients undergo an annual or bi-annual colonoscopy 8-10 years after the disease has been diagnosed due to a higher CRC risk^[22]. Target: $> 90\%$ ^[19].

During exam

Quality of bowel preparation: Endoscopists must register the quality of bowel preparation (QBP) on the exam report. Terms used can be "excellent, good, fair, poor", "adequate ou inadequate" or the Boston Bowel Preparation Scale or Ottawa Bowel Preparation Scale can be used. QBP directly influences the interval between future colonoscopies. Exams with inadequate bowel preparations should be repeated at one-year intervals. Target: $> 98\%$ ^[19].

Adequate bowel preparation: Colon must be properly cleansed to perform a colonoscopy. The index of patients recommended to repeat the colonoscopy in one year should not exceed 15%. Target: $> 85\%$ patients with adequate bowel preparation^[19].

Cecum intubation documented with photography: Exams must reach the cecum with the proper identification of anatomical masks and photographic documentation. Target: $> 90\%$ all exams and $> 95\%$ screening exams^[19].

Adenoma detection rate in asymptomatic average risk patients: Adenoma detection rate (ADR) must

be over 25% in screened populations with gender differentiation ($> 30\%$ for males and $> 20\%$ for females)^[19].

Withdrawal time: Withdrawal time should be routinely measured. Target: $> 98\%$ ^[19].

Screening exams with normal results: The withdrawal time must be above 6 min. This indicator attempts to guarantee that the colon is appropriately examined, given that there is a clear association between the withdrawal time and the ADR. Target: $> 6 \text{ min}$ ^[19].

Polypectomy: Pedunculated polyps and sessile polyps of up to 2 cm should undergo endoscopic resection. Only in cases of failure or the impossibility of resection should these patients receive a referral for surgery. Target: $> 98\%$ ^[19].

After exam

Complications: Perforation incidence in all colonoscopies should be $< 1:500$ exams. In the case of screening colonoscopy, this value should be $< 1:1000$. The bleeding incidence for post-polypectomy should be $< 1\%$, considering both immediate and late bleeding.

Management of post-polypectomy: $> 90\%$ of post-polypectomy bleeding cases should be resolved regardless of the type of intervention.

Surveillance recommendation: Interval before subsequent colonoscopy should be logged in the patient's medical records and sent to the patient after histological evaluation. Target: $> 90\%$ ^[19].

Ideally, all endoscopists should measure, register, and interpret their own quality indicators in colonoscopy. If an indicator target is not reached, the entire exam process should be analyzed in order to identify the failure and optimize the quality of the test. Colonoscopy, to be cost-effective as a CRC screening method, must be executed according to quality indicator parameters^[19].

Bowel preparation for colonoscopy

In addition to playing an important role in the quality of the exam, bowel preparation is a common reason for low adherence to screening programs. During the pre-colonoscopy evaluation, the endoscopist should explain, in detail and as many times as necessary, the importance of colon cleansing, clarify the proper procedures to go about it, and elucidate the questions surrounding the subject in an attempt to demystify this step in the exam process.

The drugs used for bowel preparation may be different from one medical service to another. The choice must be based on the patient's profile, understanding capacity and comorbidities. Some principles, however, are applicable to all cases: (1) dietary restrictions: One to four days before exams, associated with the use of

Table 1 Recommendations for colonoscopy intervals according to previous exam findings^[22]

Post-polypectomy follow-up	
No polyps	10 yr
Hyperplastic polyps in rectum/sigmoid	10 yr
Low risk adenoma	
1-2 tubular adenomas, < 10 mm	5-10 yr
High risk adenoma	
3-10 adenomas	3 yr
> 10 adenomas	< 3 yr
Villous adenoma(s) or tubular adenoma (s) ≥ 10 mm	3 yr
Adenoma with high graded dysplasia	3 yr
Serrated polyps/lesions	
Serrated poliposis	1 yr
≥ 10 mm or with dysplasia or traditional serrated adenoma	3 yr
< 10 mm in proximal colon and without dysplasia	5 yr

laxative drugs^[23]; (2) anti-hemetic: Metoclopramide and ondansetron are commonly administered before laxatives to improve one's tolerance to bowel preparation. Evidence of the benefits of these drugs in tolerance and quality of bowel preparation are controversial^[23]; (3) oral hydration: Clear liquids should be ingested to prevent dehydration and optimize colon cleansing; (4) walking: Patients restricted to bed may have poor bowel preparation; (5) split dosis: In addition to the patient's better tolerance, split dose bowel preparation usually promotes better colon cleansing than does a single dose^[23].

Post-colonoscopy follow-up

Colonoscopy intervals are a key-points in CRC screening. This interval is often a decision made by the physician who requested the first exam. However, not all non-endoscopists know how to correctly interpret the results of colonoscopy exams and hystological findings to determine the best interval. In these situations there is a tendency to shorten intervals. Unnecessary and early request of colonoscopy commits its cost-effectiveness, exposes patients to unnecessary risks, and operates the health care system.

The most recent recommendation regarding post-polypectomy surveillance was published in 2012^[24] and adapted as a clinical decision tool from AGA in 2014. They recommend follow-up based on endoscopic and histological findings (Table 1).

Only recently, however, were serrated lesions surveillance recommendations actually published. Many endoscopists and even pathologists do not know this entity. However, it is known that this group of lesions passes through a different neoplasm transformation sequence at the proximal colon and, therefore, should undergo strict surveillance.

To follow the recommendations above, a complete exam (up to the cecum) must be performed, with excellent quality of bowel preparation and the complete removal of all polyps. If any of these criteria are not attained, future exam intervals must be reduced^[22].

NEW SCREENING METHODS AND TECHNOLOGY

The need to detect colorectal adenomas and cancer has led to the implementation of new methods and in upon current colonoscopy technology.

Stool DNA testing (Fecal DNA testing - COLOGUARD)

Cologuard is the first stool-based test intended for the qualitative detection of colorectal neoplasia associated with DNA markers and with the presence of occult hemoglobin in human stool samples. A positive result may indicate the presence of CRC or advanced adenoma (AA), and should be followed by diagnostic colonoscopy. Cologuard is recommended in the screening of adults of either sex, 50 years of age or older, who are at a typical average risk for CRC. Cologuard is not intended to replace diagnostic colonoscopies or surveillance colonoscopies in high-risk individuals. The test is an automated assay aimed at detecting tumor-specific DNA changes, including aberrant methylated *BMP3* and *NDRG4*, a mutant form of *Kras*, beta-actin, and hemoglobin^[23].

The safety and effectiveness of Cologuard was established in a clinical trial that screened 10023 subjects in a cross-sectional study at 90 sites throughout the United States and Canada. The trial compared the performance of Cologuard to the FIT, a commonly used non-invasive screening test that detects blood in stool samples. Of the 9989 participants evaluated in this study, 65 (0.7%) presented colorectal cancer and 757 (7.6%) presented advanced precancerous lesions (AA or sessile serrated polyps measuring ≥ 1 cm in their largest dimension) in their colonoscopy exams. The sensitivity for detecting colorectal cancer was 92.3% with DNA testing and 73.8% with FIT ($P = 0.002$). The sensitivity for detecting advanced precancerous lesions was 42.4% with DNA testing and 23.8% with FIT ($P < 0.001$). The rate of detection of polyps with high-grade dysplasia was 69.2% with DNA testing and 46.2% with FIT ($P = 0.004$); the rates of detection of serrated sessile polyps measuring 1 cm or more were 42.4% and 5.1%, respectively ($P < 0.001$). Specificities with DNA testing and FIT were 86.6% and 94.9%, respectively, among participants with nonadvanced or negative findings ($P < 0.001$); these values were 89.8% and 96.4%, respectively, among those with negative results in colonoscopy exams ($P < 0.001$). The numbers of people who needed to be screened to detect one type of cancer were 154 with colonoscopy, 166 with DNA testing, and 208 with FIT. This method was not investigated in patients with a history of colorectal cancer, adenomas, or other related cancers, nor in patients who have been diagnosed with a relevant family (hereditary) cancer syndrome, such as hereditary non-polyposis colorectal cancer syndrome (HNPCCC or Lynch Syndrome) and in Inflammatory Bowel Disease^[24]. The United States FDA approved Cologuard in 2014. It is important to stress

custs and availability of this method. Nevertheless, no data is available regarding changes in guidelines for CRC screening.

Check cap

Prepping for a colonoscopy requires people to swallow foul-tasting liquids designed to cleanse the colon. The preparatory process is burdensome and uncomfortable, and the colonoscopy procedure requires sedation. Currently, all available screening technologies require patients to compromise accuracy (as with fecal occult blood testing) or safety and comfort (colonoscopies and virtual CT scans). The newest method in colon cancer screening - capsule endoscopies - requires patients to go through bowel preparation that is even more intense than what they would normally go through for a colonoscopy. As a result, far too many people forgo screening or postpone it for years, thus diminishing their chances to be among those who survive colon cancer. It is clear that high-accuracy, non-intrusive screening methods are needed^[25,26].

Check-Cap^[27] is a new technology that is currently in development for CRC imaging. Check-Cap is a capsule device that produces images of the colon using low dose radiation (total dose equivalent to a single plain abdominal radiograph) and creates a 3-dimensional reconstructed image of the colon surface. The imaging capsule is swallowed by the patient and moves passively through the gastrointestinal tract. The capsule employs x-rays and patients drink an oral contrast solution to label fecal material, but they are not required to take any laxative preparation. Data from the Check-Cap is captured on a hand-worn data receiver, which is reviewed later by a gastroenterologist. Patients continue their daily routines after Check-Cap ingestion. The clinical performance of the Check-Cap device is currently under investigation (see also the Check-cap website).

According to Chatrath *et al.*^[28], more data are needed to establish the safety and efficacy of the Check-Cap System before its implementation as a CRC screening modality. However, their survey suggests that Check-Cap, or a device with similar characteristics and performance, could contribute significantly to screening adherence among patients who refuse to undergo a colonoscopy exam.

Colon capsule endoscopy

Colon capsule endoscopy was introduced in 2006 as a wireless, minimally invasive technique for the imaging of the large bowel that does not require sedation or gas insufflation. Its high procedural costs, the need for extensive bowel cleansing in order to gain reasonable polyp detection rates, and the inability to take biopsies, thus requiring additional conventional colonoscopy to confirm finding and remove polyps, has limited its use^[29].

Colon capsule endoscopy has proven to be a feasible and exceptionally safe procedure to view the entire colon. Diagnostic accuracy of colon capsule

endoscopy for the detection of significant colon polyps (> 6 mm) can be compared to conventional colonoscopy reported sensitivities and specificities for the detection of significant polyps in the range of 39.0%-87.5% and 54.0%-88.0%, respectively^[30].

Current indications target patients on whom conventional colonoscopy cannot be or has been incompletely performed^[29]. Other potential applications, such as colorectal cancer screening or the diagnostic surveillance of inflammatory bowel disease still require further clarification^[31].

Technological advances in colonoscopy

Inadequate colon preparation, inability to reach the cecum (e.g., incomplete colonoscopy), quick withdrawal times (< 6 min), and patient-related factors are some of the important causes of overlooked lesions. Despite the quality indicator in colonoscopy exams, the primary reason for missing colorectal adenomas and early cancers is poor visualization of the proximal aspect of colonic folds, anatomical flexures, and the area around the ileocecal valve^[32]. These anatomical sites tend to be hidden from the standard forward-viewing colonoscope (140°-170° angle of view) and can often only be seen through endoscopist manipulation of the colonoscope, including efforts to flatten folds and straighten flexures, as well as the prolonged retroflexion of the colonoscope itself^[32,33].

Third Eye[®] technology (retroscope and panoramic)

The Third Eye retroscope is an auxiliary, through-the-scope device able to retroflex 180° while extended from the working channel of any standard colonoscope and is intended to detect polyps located on the proximal folds and at the anatomical flexures of the colon. A miniaturized video camera is located in the tip of the device as well as a light-emitting diode (LED) illumination that provides a continuous retrograde image during the examination process.

In two prospective, multicenter studies, including $n = 249$ and $n = 298$ human subjects, respectively, incremental polyp detection rates with the third eye were 14.8% for all polyps and 16.0% for adenomas, as compared to 13.2% for all polyps and 11.0% for adenomas in the second study^[34,35].

Leufkens *et al.*^[36], in a prospective, randomized, international multicenter trial including $n = 349$ subjects, demonstrated an additional detection rate of 29.8% for all polyps and 23.2% for adenomas.

The third eye panoramic is a novel prototype, single-use video cap containing two side viewing lenses fitted onto a standard colonoscope. Only one feasibility study performed with 17 patients is available in the literature, but no data regarding polyp detection is available^[37].

Fuse[®] full spectrum endoscopy[®] colonoscopy platform

The Fuse[®] Full Spectrum Endoscopy[®] colonoscopy platform is a standard flexible, reusable, reprocessable colonoscope that provides a high resolution, 330° field

of view achieved by the use of three imagers and LED groups positioned at the front and on the sides of the colonoscope tip, from which images are displayed on three contiguous video monitors^[38]. Gralnek *et al.*^[38] compared the adenoma miss rates resulting from Fuse colonoscopies using a standard forward-viewing (SFV) colonoscopy, concluded that Fuse colonoscopy has the potential to improve the efficacy of CRC screening and surveillance (7.5%) as well as SFV (40.8%) adenoma miss rates, $P < 0.0001$. Despite this, there is an important point to consider: The difficulty to resect polyps in very difficult positions.

Extra-wide-angle-view colonoscope

A prototype extra-wide-angle-view colonoscope (144°-232° lateral-backward-viewing lens that works in tandem with a standard 140° forward-viewing lens), when compared to standard forward-viewing colonoscopy (140° angle of view), is able to identify significantly more polyps (68% vs 51%; $P < 0.0001$)^[39]. However, the same authors reported in an abstract manner that no significant difference was observed in adenoma detection rates (ADR mean 1.1 vs 1.0, per patient, $P = 0.36$) between the prototype and standard colonoscopes when compared to another study^[40,41].

NaviAid™ G-EYETM balloon colonoscope

The NaviAid™ G-EYE™ System is a colonoscope with a balloon, which can be inflated, attached to the flexible tip of a standard colonoscope^[41]. The mechanical flattening and straightening of haustral folds with the inflated balloon allows one to view hidden anatomical areas, thus increasing adenoma detection.

Gralnek *et al.*^[41] assessed safety and feasibility of this device in a prospective cohort study performed with patients who had received a referral for CRC screening and concluded that the NaviAid™ G-EYE™ balloon colonoscope appeared to be safe and feasible for use in colonoscopies.

Shpak *et al.*^[42] reported that the NaviAid™ G-EYE™ balloon colonoscopy detected 81% more adenomas ($P < 0.001$) than did the standard colonoscope. Moreover, there was only a 7.5% adenoma miss rate reported with balloon colonoscopy. In addition, the authors reported that the "first pass" adenoma detection rate using standard colonoscopy was 25.9% as compared to 40.4% using NaviAid™ G-EYE™ balloon colonoscopy ($P = \text{NS}$). Time to the cecum and cecal intubation rates were similar between groups. There were no adverse events reported.

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