Screening and Surveillance of the Early Detection of Colorectal Cancer And Adenomatous Polyps

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Abstract

In the United States, colorectal cancer (CRC) is the third most common cancer diagnosed among men and women and the second leading cause of death from cancer. CRC largely can be prevented by the detection and removal of adenomatous polyps, and survival is significantly better when CRC is diagnosed while still localized. In 2006 to 2007, the American Cancer Society, the US Multi Society Task Force on Colorectal Cancer, and the American College of Radiology came together to develop consensus guidelines for the detection of adenomatous polyps and CRC in asymptomatic average-risk adults. In this update of each organization's guidelines, screening tests are grouped into those that primarily detect cancer early and those that can detect cancer early and also can detect adenomatous polyps, thus providing a greater potential for prevention through polypectomy. When possible, clinicians should make patients aware of the full range of screening options, but at a minimum they should be prepared to offer patients a choice between a screening test that is effective at both early cancer detection and cancer prevention through the detection and removal of polyps and a screening test that primarily is effective at early cancer detection. It is the strong opinion of these 3 organizations that colon cancer prevention should be the primary goal of screening.

Introduction

In the United States, colorectal cancer (CRC) is the third most common cancer diagnosed in men and women and the second leading cause of death from cancer (1). In 2008, it is estimated that 148,810 men and women will be diagnosed with CRC and 49,960 will die from this disease (1). Five-year survival is 90% if the disease is diagnosed while still localized (ie, confined to the wall of the bowel), but only 68% for regional disease (ie, disease with lymph node involvement), and only 10% if distant metastases are present (2). Recent trends in CRC incidence and mortality reveal declining rates, which have been attributed to reduced exposure to risk factors, screening's effect on early detection and prevention through polypectomy, and improved treatment (3). However, in the near term, even greater incidence and mortality reductions could be achieved if a greater proportion of adults received regular screening. Although prospective randomized trials and observational studies have demonstrated mortality reductions associated with early detection of invasive disease, as well as removal of adenomatous

polyps (4–7), a majority of US adults are not receiving regular age- and risk-appropriate screening or have never been screened at all (8,9).

The goal of cancer screening is to reduce mortality through a reduction in incidence of advanced disease. To this end, modern CRC screening can achieve this goal through the detection of early-stage adenocarcinomas and the detection and removal of adenomatous polyps, the latter generally accepted as nonobligate precursor lesions. Adenomatous polyps are common in adults over age 50 years, but the majority of polyps will not develop into adenocarcinoma; histology and size determine their clinical importance (10,11). The most common and clinically important polyps are adenomatous polyps, which represent approximately one-half to two-thirds of all colorectal polyps and are associated with a higher risk of CRC. Thus, most CRC screening studies evaluate the detection rate of invasive CRC, as well as advanced adenomas, which conventionally are defined as polyps greater than or equal to 10 mm or histologically having high-grade dysplasia or significant villous components. The evidence for the importance of colorectal polyps in the development of CRC is largely indirect, but nonetheless extensive and convincing, and has been described in detail (11–13).

Today there is a range of options for CRC screening in the average-risk population, with current technology falling into 2 general categories: stool tests, which include tests for occult blood or exfoliated DNA; and structural exams, which include flexible sigmoidoscopy (FSIG), colonoscopy, double-contrast barium enema (DCBE), and computed tomographic colonography (CTC). Stool tests are best suited for the detection of cancer, although they also will deliver positive findings for some advanced adenomas, while the structural exams can achieve the dual goals of detecting adenocarcinoma as well as identifying adenomatous polyps (14). These tests may be used alone or in combination to improve sensitivity or, in some instances, to ensure a complete examination of the colon if the initial test cannot be completed. Although screening tests for CRC vary in terms of the degree of supporting evidence, potential efficacy for incidence and mortality reduction, cost-effectiveness, and acceptability, any one of these options applied in a systematic program of regular screening has the potential to significantly reduce deaths from CRC.

Beginning in 1980, the American Cancer Society (ACS) first issued formal guidelines for CRC screening in average-risk adults (15). Since then, the ACS has periodically updated its CRC guidelines (16–19), including adding recommendations for high-risk individuals in 1997 (17). Other organizations also have issued recommendations for CRC screening, most notably the US Preventive Services Task Force (20,21), the American College of Radiology (ACR) (22,23), and the US Multi-Society Task Force on Colorectal Cancer (USMSTF) (12,24). Recently, the ACS and the USMSTF collaborated on an update of earlier recommendations for postpolypectomy and post-CRC resection surveillance in response to reports suggesting significant deviation from existing recommendations (25,26). Since 1997, the organizational guidelines for average-risk adults have grown increasingly similar and represent a broad organizational consensus on the value, options, and methods for periodic screening for CRC.
In the last decade, there has been an increase in the number of technologies available for CRC screening, and in the case of stool tests, there has been growth in the number of commercial versions of guaiac-based and immunochemical-based stool tests (gFOBT and FIT). This growth in options also has been accompanied by changing patterns in the proportion of adults using different tests, with FSIG rates declining, colonoscopy rates increasing, use of stool blood tests remaining somewhat constant, and use of the DCBE for screening now becoming very uncommon (8).

There are pros and cons to having a range of options for CRC screening. Despite the fact that the primary barriers to screening are lack of health insurance, lack of physician recommendation, and lack of awareness of the importance of CRC screening (27), the historical evidence shows that adults have different preferences and patterns of use among the available CRC screening tests (28–31). Although population preferences or resistance to a particular technology may change over time or may be influenced by referring physicians, it also may be true that over time some adults may persist in choosing one technology and rejecting another. Furthermore, at this time not all options are available to the entire population, and transportation, distance, and financial barriers to some screening technologies may endure for some time. Although in principle all adults should have access to the full range of options for CRC screening, the fact that simpler, lower-cost options are available in most settings, whereas other more costly options are not universally available, is a public health advantage. However, for average-risk adults, multiple testing options challenge the referring physician to support an office policy that can manage a broad range of testing choices, their follow-up requirements, and shared decision making related to the options. Shared decision making for multiple screening choices is both demanding and time consuming and is complicated by the different characteristics of the tests and the test-specific requirements for individuals undergoing screening (31). In addition, the description of benefits is complicated by different performance characteristics of the variants of the occult blood tests and uncertain differences between test performance in research settings and test performance in clinical practice. These challenges have been discussed in the past (19,32), and they still are with us today.

In this guideline review, we have reassessed the individual test evidence and comparative evidence for stool tests, including gFOBT, FIT, and stool DNA test (sDNA), and the structural exams, including FSIG, colonoscopy, DCBE, and CTC, the latter also known as virtual colonoscopy. We have sought to address a number of concerns about the complexity of offering multiple screening options and the degree to which the range of screening options and their performance, costs, and demands on individuals poses a significant challenge for shared decisions. An overriding goal of this update is to provide a practical guideline for physicians to assist with informed decision making related to CRC screening. These guidelines are for individuals at average risk. Individuals with a personal or family history of CRC or adenomas, inflammatory bowel disease, or high-risk genetic syndromes should continue to follow the most recent recommendations for individuals at increased or high risk (24–26).

Table 1. Testing Options for the Early Detection of Colorectal Cancer and Adenomatous Polyps for Asymptomatic Adults Aged 50 Years and Older

Tests that Detect Adenomatous Polyps and Cancer
Flexible sigmoidoscopy every 5 years, or Colonoscopy every 10 years, or Double-contrast barium enema every 5 years, or Computed tomographic colonography every 5 years
Tests that Primarily Detect Cancer
Annual guaiac-based fecal occult blood test with high test sensitivity for cancer, or Annual fecal immunochemical test with high test sensitivity for cancer, or Stool DNA test with high sensitivity for cancer, interval uncertain

Table 2. Guidelines for Screening for the Early Detection of Colorectal Cancer and Adenomas for Average-risk Women and Men Aged 50 Years and Older

The following options are acceptable choices for colorectal cancer screening in average-risk adults beginning at age 50 years. Since each of the following tests has inherent characteristics related to prevention potential, accuracy, costs, and potential harms, individuals should have an opportunity to make an informed decision when choosing one of the following options.

In the opinion of the guidelines development committee, *colon cancer prevention* should be the primary goal of colorectal cancer screening. Tests that are designed to detect both early cancer and adenomatous polyps should be encouraged if resources are available and patients are willing to undergo an invasive test.

Tests that Detect Adenomatous Polyps and Cancer

Test	Interval	Key Issues for Informed Decisions
FSIG with insertion to 40 cm or to splenic flexure	Every 5 years	• Complete or partial bowel prep is required • Sedation usually is not used, so there may be some discomfort during the procedure • The protective effect of sigmoidoscopy is primarily limited to the portion of the colon examined • Patients should understand that positive findings on sigmoidoscopy usually result in a referral for colonoscopy
Colonoscopy	Every 10 years	• Complete bowel prep is required • Conscious sedation is used in most centers; patients will miss a day of work and will need a chaperone for transportation from the facility • Risks include perforation and bleeding, which are rare but potentially serious; most of the risk is associated with polypectomy
DCBE	Every 5 years	• Complete bowel prep is required • If patients have one or more polyps >=6 mm, colonoscopy will be recommended; follow-up colonoscopy will require complete bowel prep • Risks of DCBE are low; rare cases of perforation have been reported

Table 2. Guidelines for Screening for the Early Detection of Colorectal Cancer and Adenomas for Average-risk Women and Men Aged 50 Years and Older *continued*

Tests that Detect Adenomatous Polyps and Cancer

Test	Interval	Key Issues for Informed Decisions
CTC	Every 5 years	• Complete bowel prep is required • If patients have one or more polyps >=6 mm, colonoscopy will be recommended; if same day colonoscopy is not available, a second complete bowel prep will be required before colonoscopy • Risks of CTC are low; rare cases of perforation have been reported • Extracolonic abnormalities may be identified on CTC that could require further evaluation

Tests that Primarily Detect Cancer

Test	Interval	Key Issues for Informed Decisions
gFOBT with high sensitivity for cancer	Annual	• Depending on manufacturer's recommendations, 2 to 3 stool samples collected at home are needed to complete testing; a single sample of stool gathered during a digital exam in the clinical setting is not an acceptable stool test and should not be done • Positive tests are associated with an increased risk of colon cancer and advanced neoplasia; colonoscopy should be recommended if the test results are positive • If the test is negative, it should be repeated annually • Patients should understand that one-time testing is likely to be ineffective
FIT with high sensitivity for cancer	Annual	
sDNA with high sensitivity for cancer	Interval uncertain	• An adequate stool sample must be obtained and packaged with appropriate preservative agents for shipping to the laboratory • The unit cost of the currently available test is significantly higher than other forms of stool testing • If the test is positive, colonoscopy will be recommended • If the test is negative, the appropriate interval for a repeat test is uncertain

Abbreviations: FSIG, flexible sigmoidoscopy; DCBE, double-contrast barium enema; CTC, computed tomography colonography; gFOBT, guaiac-based fecal occult blood test; FIT, fecal immunochemical test; sDNA, stool DNA test.

TESTS FOR THE DETECTION OF ADENOMAS AND CRC

Endoscopy Examinations of the Colon and Rectum—FSIG and Colonoscopy

FSIG

Conclusion and Recommendations. FSIG can result in the identification of the majority of prevalent CRC at the time of screening, when the examination reaches the splenic flexure or beyond 40 cm as a reasonable target for insertion and when adenomas in the distal colon are used as an indication for the need for colonoscopy. Although the appropriate interval between normal examinations is uncertain, FSIG is recommended to be performed for screening every 5 years in most clinical settings due to concerns about exam quality and completeness. FSIG can be performed alone, or consideration can be given to combining FSIG performed every 5 years with a highly sensitive gFOBT or FIT performed annually. In high-quality centers (such as the program operated by Kaiser Permanente in California) where procedures are conducted by properly trained and experienced endoscopists who document regular insertion beyond 40 cm with a good bowel preparation, a 10-year interval between negative exams may be reasonable.

Individuals should be informed about the limitations of FSIG, including the fact that it examines only the distal colon; that there is a risk, albeit small, of perforation; and that they may experience discomfort during and after the examination. Patients should also understand that the examination achieves higher quality when bowel cleansing follows the same protocol as that for colonoscopy. Finally, patients should be informed that positive test findings will need to be followed up with colonoscopy.

Colonoscopy

Conclusions and Recommendations. The evidence base to support screening colonoscopy, though indirect, is substantial. The appropriate interval between negative colonoscopy screening exams is uncertain because of lack of long-term follow-up data. At present, colonoscopy every 10 years is an acceptable option for CRC screening in average-risk adults beginning at age 50 years. Individuals should be informed about the limitations of colonoscopy, including the fact that it may miss some cancers and significant adenomas and that there is a risk, albeit small, of perforation, hemorrhage (following polypectomy), subsequent hospitalization, and in very rare circumstances, more serious harms. A full bowel cleansing is necessary prior to colonoscopy. Sedation usually is used to minimize discomfort during the examination, and thus a chaperone is required to provide transportation after the examination.

Imaging Examinations of the Colon and Rectum—DCBE and Computed Tomography

DCBE

Conclusions and Recommendations. DCBE every 5 years is an acceptable option for CRC screening in average-risk adults aged 50 years and older. Discussions with patients should include a description of the test characteristics, the importance of adherence to a thorough colon cleansing, test accuracy, the likelihood of a positive test, and the need for subsequent colonoscopy if the test is abnormal. The choice of DCBE for screening can be made on an individual basis, depending on factors such as personal preference, cost, and the local availability of trained radiologists able to offer a high-quality examination.

CTC

Conclusions and Recommendations. In terms of detection of colon cancer and advanced neoplasia, which is the primary goal of screening for CRC and adenomatous polyps, recent data suggest CTC is comparable to OC for the detection of cancer and polyps of significant size when state-of-the-art techniques are applied. In previous assessments of the performance of CTC, the ACS concluded that data were insufficient to recommend screening with CTC for average-risk individuals (19). Based on the accumulation of evidence since that time, the expert panel concludes that there are sufficient data to include CTC as an acceptable option for CRC screening.

Screening of average-risk adults with CTC should commence at age 50 years. The interval for repeat exams after a negative CTC has not been studied, and is uncertain. However, if current studies confirm the previously reported high sensitivity for detection of cancer and of polyps >=6 mm, it would be reasonable to repeat exams every 5 years if the initial CTC is negative for significant polyps until further studies are completed and are able to provide additional guidance. Until there is more research on the safety of observation, colonoscopy should be offered to patients whose largest polyp is 6 mm or greater. CTC surveillance could be offered to those patients who would benefit from screening but either decline colonoscopy or who are not good candidates for colonoscopy for one or more reasons. However, if colonoscopy is contraindicated because the patient is not likely to benefit from screening due to life-limiting comorbidity, then neither CTC nor any other CRC screening test would be appropriate.

SCREENING TESTS FOR THE DETECTION OF CRC

<u>Stool Blood Tests—gFOBT and FIT</u>

gFOBT

Conclusions and Recommendations. Annual screening with high-sensitivity gFOBT (such as Hemoccult SENSA) that have been shown in the published, peer-reviewed literature to detect a majority of prevalent CRC in an asymptomatic population is an acceptable option for colorectal screening in average-risk adults aged 50 years and older. Any positive test should be followed up with colonoscopy. Individuals should be informed that annual testing is necessary to achieve the fullest potential of this test and that they will need follow-up colonoscopy if test results are positive. Screening for CRC with gFOBT in the office following digital rectal exam or as part of a pelvic examination is not recommended and should not be done. Commonly used guaiac tests, with or without rehydration, that have not been shown in the literature to detect a majority of prevalent CRC at the time of testing are no longer recommended.

FIT

Conclusions and Recommendations. Annual screening with FIT that have been shown in the published, peer-reviewed literature to detect a majority of prevalent CRC in an asymptomatic population at the time of testing is an acceptable option for colorectal screening in average-risk adults aged 50 years and older. Any positive test should be followed up with colonoscopy. Adults should be informed that annual testing is necessary to achieve the fullest potential of this test and that they will need follow-up colonoscopy if test results are positive.

sDNA

Conclusions and Recommendations. In previous assessments of the performance of sDNA, both the ACS and the USMSTF concluded that data were insufficient to recommend screening with sDNA for average-risk individuals (19,24). Based on the accumulation of evidence since the last update of these guidelines, the panel concluded that there now are sufficient data to include sDNA as an acceptable option for CRC screening. As noted above, testing stool for molecular markers is an evolving technology. New iterations of these tests, either technological enhancements of existing tests or completely new test variants, should be carefully evaluated in order to determine that they meet the criteria of detecting a majority of cancers at the time of screening but also have acceptable performance in a screening cohort. While the manufacturer of the one test that is commercially available currently is recommending a 5-year interval for routine screening between examinations with normal results, the panel concluded that there were insufficient data upon which to endorse this interval. Such an interval was judged by the committee to be appropriate only for a test that has very high sensitivity for both cancer and adenomatous polyps—a standard that has not been documented for sDNA to date. At this time, further research is needed to determine the interval between negative sDNA exams. Based on current evidence, the appropriate interval is uncertain.

CONCLUSION

There is compelling evidence to support screening average-risk individuals over age 50 years to detect and prevent CRC. Screening of average-risk individuals can reduce CRC mortality by detecting cancer at an early, curable stage and by detecting and removing clinically significant adenomas. No CRC screening test is perfect, either for cancer detection or adenoma detection. Each test has unique advantages, each has been shown to be cost-effective (205–208), and each has associated limitations and risks. Patient preferences and availability of resources play an important role in the selection of screening tests. In this update of the guidelines for CRC screening, we have placed an emphasis on the value of preventing CRC, sought to address the importance of test sensitivity in the presence of low rates of programmatic screening, and attempted to provide improved guidance about test characteristics and quality issues to referring clinicians. Ideally, screening should be supported in a programmatic fashion that begins with risk stratification and the results from an initial test and continues through proper follow up based on findings. The effectiveness of any single test or combination of tests depends on high rates of programmatic adherence and quality. Based on differing incidence rates and observations of different patterns of polyp and cancer distribution in certain subsets of patients (ie, the elderly, women, and ethnic minorities, etc.), some experts have suggested that these groups may require different screening recommendations (209,210). The expert panel reviewed and discussed the evidence and rationale for and against including different screening recommendations in this update for various demographic subgroups that have been shown to be at somewhat higher or lower than average risk for disease or proximal lesions. After some consideration, this issue was postponed for further consideration at a later time for a number of reasons, although principally because 1) there are no current data to indicate that CRC incidence and mortality in these groups would be positively impacted by tailored screening recommendations; and 2) screening rates among all groups remain low under existing guidelines and providing different (and, in some cases, more limited) screening options has the potential to increase confusion, complexity, and workload, and thus might add additional barriers to screening that would affect all groups. This is an area of research that the collaborating organizations will continue to monitor closely.

In this update of the CRC screening guidelines, we have focused on screening in average-risk adults and have not reviewed recent literature on CRC screening or surveillance for individuals at increased and high risk. Individuals at increased risk due to a history of adenomatous polyps; a personal history of curative-intent resection of CRC; a family history of either CRC or colorectal adenomas diagnosed in a first-degree relative before age 60 years; or high risk due to a history of inflammatory bowel disease of significant duration or the presence of one of 2 hereditary syndromes should continue to follow recommendations issued previously by the ACS or USMSTF (18,24). These recommendations are summarized in Table 3.

Table 3. Guidelines for Screening and Surveillance for the Early Detection of Colorectal Adenomas and Cancer in Individuals at Increased Risk or at High Risk

Risk Category	Age to Begin	Recommendation	Comment
Increased Risk—Patients with History of Polyps at Prior Colonoscopy			
Patients with small rectal hyperplastic polyps (26)	—	Colonoscopy or other screening options at intervals recommended for average-risk individuals	An exception is patients with a hyperplastic polyposis syndrome. They are at increased risk for adenomas and colorectal cancer and need to be identified for more intensive follow up.
Patients with 1 or 2 small tubular adenomas with low-grade dysplasia (26)	5 to 10 years after the initial polypectomy	Colonoscopy	The precise timing within this interval should be based on other clinical factors (such as prior colonoscopy findings, family history, and the preferences of the patient and judgment of the physician).
Patients with 3 to 10 adenomas or 1 adenoma >1 cm or any adenoma with villous features or high-grade dysplasia (26)	3 years after the initial polypectomy	Colonoscopy	Adenomas must have been completely removed. If the follow-up colonoscopy is normal or shows only 1 or 2 small, tubular adenomas with low-grade dysplasia, then the interval for the subsequent examination should be 5 years.
Patients with >10 adenomas on a single examination (26)	<3 years after the initial polypectomy	Colonoscopy	Consider the possibility of an underlying familial syndrome.

Table 3. Guidelines for Screening and Surveillance for the Early Detection of Colorectal Adenomas and Cancer in Individuals at Increased Risk or at High Risk *continued*			
Risk Category	**Age to Begin**	**Recommendation**	**Comment**
Increased Risk—Patients with History of Polyps at Prior Colonoscopy			
Patients with sessile adenomas that are removed piecemeal (26)	2 to 6 months to verify complete removal	Colonoscopy	Once complete removal has been established, subsequent surveillance needs to be individualized based on the endoscopist's judgment. Completeness of removal should be based on both endoscopic and pathologic assessments.
Increased Risk—Patients with Colorectal Cancer			
Patients with colon and rectal cancer should undergo high-quality perioperative clearing (25)	3 to 6 months after cancer resection, if no unresectable metastases are found during surgery; alternatively, colonoscopy can be performed intraoperatively	Colonoscopy	In the case of nonobstructing tumors, this can be done by preoperative colonoscopy. In the case of obstructing colon cancers, CTC with intravenous contrast or DCBE can be used to detect neoplasms in the proximal colon.

Table 3. Guidelines for Screening and Surveillance for the Early Detection of Colorectal Adenomas and Cancer in Individuals at Increased Risk or at High Risk *continued*			
Risk Category	**Age to Begin**	**Recommendation**	**Comment**
Increased Risk—Patients with Colorectal Cancer			
Patients undergoing curative resection for colon or rectal cancer (2)	1 year after the resection (or 1 year following the performance of the colonoscopy that was performed to clear the colon of synchronous disease)	Colonoscopy	This colonoscopy at 1 year is in addition to the perioperative colonoscopy for synchronous tumors. If the examination performed at 1 year is normal, then the interval before the next subsequent examination should be 3 years. If that colonoscopy is normal, then the interval before the next subsequent examination should be 5 years. Following the examination at 1 year, the intervals before subsequent examinations may be shortened if there is evidence of HNPCC or if adenoma findings warrant earlier colonoscopy. Periodic examination of the rectum for the purpose of identifying local recurrence, usually performed at 3- to 6-month intervals for the first 2 or 3 years, may be considered after low-anterior resection of rectal cancer.
Increased Risk—Patients with a Family History			
Either colorectal cancer or adenomatous polyps in a first-degree relative before age 60 years or in 2 or more first-degree relatives at any age (24)	Age 40 years or 10 years before the youngest case in the immediate family	Colonoscopy	Every 5 years

Table 3. Guidelines for Screening and Surveillance for the Early Detection of Colorectal Adenomas and Cancer in Individuals at Increased Risk or at High Risk *continued*

Risk Category	Age to Begin	Recommendation	Comment
Increased Risk—Patients with a Family History			
Either colorectal cancer or adenomatous polyps in a first-degree relative >=age 60 years or in 2 second-degree relatives with colorectal cancer (24)	Age 40 years	Screening options at intervals recommended for average-risk individuals	Screening should begin at an earlier age, but individuals may choose to be screened with any recommended form of testing.
High Risk			
Genetic diagnosis of FAP or suspected FAP without genetic testing evidence (24)	Aged 10 to 12 years	Annual FSIG to determine if the individual is expressing the genetic abnormality and counseling to consider genetic testing.	If the genetic test is positive, colectomy should be considered.
Genetic or clinical diagnosis of HNPCC or individuals at increased risk of HNPCC (24)	Aged 20 to 25 years or 10 years before the youngest case in the immediate family	Colonoscopy every 1 to 2 years and counseling to consider genetic testing	Genetic testing for HNPCC should be offered to first-degree relatives of persons with a known inherited MMR gene mutation. It should also be offered when the family mutation is not already known, but 1 of the first 3 of the modified Bethesda Criteria is present.
Inflammatory bowel disease, (24) chronic ulcerative colitis, and Crohn's colitis	Cancer risk begins to be significant 8 years after the onset of pancolitis or 12 to 15 years after the onset of left-sided colitis	Colonoscopy with biopsies for dysplasia	Every 1 to 2 years; these patients are best referred to a center with experience in the surveillance and management of inflammatory bowel disease

Abbreviations: FSIG, flexible sigmoidoscopy; DCBE, double-contrast barium enema; CTC, computed tomographic colonography; FAP, familial adenomatous polyposis; HNPCC, hereditary nonpolyposis colon cancer; MMR, mismatch repair.

There appears to be a clear need for institutionally based quality-assurance programs to improve the quality of CRC screening. This guideline update emphasizes issues for quality assurance across colorectal screening modalities, spanning training requirements, optimal techniques to complete examination, screening intervals, and appropriate recommendations for follow up. In contrast, cost-effectiveness is not specifically discussed in this document, based on the numerous complexities of adequately addressing this topic, including understanding real costs in different environments, differences in test performance and interpretation, and wide variability of screening intervals in different settings. It is hoped that compliance with improvements in quality assurance will both improve quality and promote cost-effectiveness. Clearly, better definition of the target lesion of clinical importance is needed across modalities. As new technologies evolve that detect but do not remove polyps, multidisciplinary consensus is needed to best manage a patient programmatically for follow-up polypectomy versus surveillance intervals. Although there are some ongoing studies of the natural history of small polyps, evidence-based data will probably take 10 to 20 years to meaningfully translate into clinical-practice recommendations. In this interim, the current recommendations try to address these issues with expert consensus based on existing data. Multidisciplinary groups, such as the National Colorectal Cancer Roundtable, may be able to serve as an effective forum for the development of a consensus across specialties

In conclusion, it is our hope that these new recommendations will facilitate increased rates of CRC screening and that referring clinicians find these new guidelines ease some of the challenges they have experienced in promoting CRC screening to their patients.