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State of the Art Review: Colorectal Cancer Screening

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Abstract

Although colorectal cancer is the third leading cause of cancer-related deaths in the U.S., the burden of this disease could be dramatically reduced by increased utilization of screening. Evidence-based recommendations and guidelines from national societies recommend screening all average risk adults starting at age fifty. However, the myriad of screening options and slight differences in screening recommendations between guidelines may lead to confusion among patients and their primary care providers. This goal of this review is to briefly summarize the colorectal cancer screening guidelines issued by three major organizations, compare their recommendations, and address emerging issues in colorectal cancer screening.

Keywords

Colorectal Cancer; Screening; Recommendation/Guidelines

Introduction

With an individual's lifetime risk of developing colorectal cancer nearly six percent¹, colorectal cancer is the third leading cause of cancer among men and women and the third leading cause of cancer-related deaths in the U.S.² Projections for the year 2010 estimate that 142,570 new cases of colorectal cancer and 51,370 deaths will occur from this disease.² Although colorectal cancer contributes significantly to morbidity and mortality in the U.S., the disease burden could be dramatically decreased as an estimated 60% to 90% of colorectal cancer-related deaths are believed to be preventable with screening.^{1, 3}

Despite several effective methods and evidence-based recommendations for colorectal cancer screening⁴, a major barrier to decreasing colorectal cancer morbidity and mortality is poor utilization of screening.⁵ Although use of colorectal cancer tests has increased over the past several years, data from the CDC's Behavioral Risk Factor Surveillance System suggests that screening rates remain low with only 62.9% of respondents aged 50–75 years reporting having had a fecal occult blood test within the past year or lower endoscopy within the past ten years.⁶ Although multiple medical societies and organizations have published colorectal cancer screening guidelines, guidelines differ and may lead to confusion among primary care providers. The goal of this review, therefore, is to briefly summarize recently

updated guidelines issued by major societies, compare their recommendations, and address areas of potential uncertainty and discuss emerging issues in colorectal cancer screening.

The progression of colonic polyps to cancer is a key factor in considering colorectal cancer screening. The sequence of adenoma to carcinoma includes the progression of normal colonic mucosa to small adenomas, to adenomas with advanced histology, such as villous features and /or high-grade dysplasia, and finally to cancer.⁷ This progression from polyp to malignant lesion provides a somewhat unique opportunity for cancer control and prevention through screening as screening tests can detect polyps before malignant transformation or in early stage malignancies when they are potentially more treatable. Most sporadic colorectal cancers arise from adenomatous polyps which are found in up to 40% of people by the age of 60 years.⁷ However, not all colonic polyps are adenomas and although most colorectal cancers arise from adenomatous polyps the majority of these adenomatous polyps do not progress to cancer. The progression from adenoma to carcinoma is generally thought to take several years⁷ which is a key principle when considering screening and screening method.

What tests are available for colorectal cancer screening?

The goal of screening for colorectal cancer is to identify early, asymptomatic cancers or adenomas with advanced histologic features prior to their progression to cancer. There are several effective screening methods that meet this goal with varying levels of effectiveness and evidence to support each method. In general, screening tests can be divided into three categories: (1) stool studies, (2) radiologic studies, and (3) endoscopic studies.

Stool Studies

Fecal Occult Blood Tests—Of available tests, fecal occult blood testing (FOBT) has the strongest clinical evidence-base supporting its effectiveness as a screening test for colorectal cancer. Several randomized trials support FOBT as an effective method of reducing colorectal cancer mortality.^{8–10} In one study, after thirteen years of follow-up, rates of colorectal cancer mortality were 33% lower in a group randomly assigned to annual FOBT versus controls not assigned to screening.⁸ Two additional studies provided further support for FOBT by demonstrating 15% and 18% reductions in colorectal cancer mortality with biennial testing.^{9, 10}

Fecal occult blood tests are divided into two categories, guaiac-based FOBT (gFOBT) and fecal immunochemical tests (FIT). Guaiac-based tests detect the pseudoperoxidase activity of heme or hemoglobin while FIT-based FOBTs use antibodies specific to components found in human blood.¹¹ Although the prospective, randomized studies that provided the evidence for the efficacy of screening with FOBT used guaiac-based FOBT, newer high sensitivity gFOBT (such as Hemoccult Sensa) or FIT tests are now the preferred tests when using FOBT.¹² An additional consideration when using FOBT as a screening method for colorectal cancer is this method's low sensitivity and the importance of serial testing on an annual basis.¹³ Similarly, a single FOBT test following an in-office digital rectal exam is not sufficient even though a 2005 survey of primary care physicians indicated that this was a commonly used method to screen for colorectal cancer.¹⁴

Stool DNA—Fecal or stool DNA testing is another stool based screening option. These tests examine stool for known DNA alterations found in the adenoma-carcinoma sequence.¹² A potential benefit of testing stool for DNA alterations is that unlike detecting occult bleeding in the stool, which may be intermittent, DNA mutations are theoretically shed continuously. However, there are numerous potential DNA mutations that stool assays may need to identify and the small amounts of abnormal DNA found in stool poses a technical challenge.¹⁵ Although stool DNA testing holds considerable promise and is

recommended as a viable screening option by some experts, there is a relative paucity of evidence supporting its broader use.

Radiologic Studies

Whereas stool based studies primarily detect advanced adenomas or malignant colon lesions that are either bleeding or shedding DNA mutations, radiologic studies have the potential to identify polyps before they transition into more advanced lesions.

CT colonography—CT colonography, also known as virtual colonoscopy, uses specialized software and computed tomography (CT) to create structural images of the entire colorectum.¹⁶ These images can be viewed and manipulated by the examiner and with “fly through” software the colonic lumen can be viewed in a manner similar to optical colonoscopy. Polyps and other lesions can be identified, localized, and measured although tissue sample of polyps/lesions can not be obtained with CT colonography. Although patients undergoing CT colonography generally do not require sedation, they do require bowel preparations similar to those used for patients undergoing optical colonoscopy.

Several large studies have compared CT colonography to optical colonoscopy for screening asymptomatic adults for colorectal cancer. The results of these studies suggest that CT colonography is comparable to optical colonoscopy in terms of identifying larger adenomas and cancers.^{16–18} A major limitation to CT colonography is that optical colonoscopy is required if significant abnormalities are detected by CT colonography. Depending on the polyp size cut-off used, as few as 1 of 8 and as many as 1 of 3 patients undergoing CT colonography would be referred for optical colonoscopy and questions remain regarding how to manage small polyps that are not referred to optical colonoscopy.¹⁹ Further concerns associated with CT colonography include how to approach extra-colonic findings such as aortic aneurysms, renal and gall bladder stones, and asymptomatic cancers found outside the colorectum. There is also concern that the accuracy of CT colonography will be lower among community based radiologists in non-research settings. To date, CT colonography is not covered by the Centers for Medicare Services as a test for routine colorectal cancer screening.

Double-contrast barium enema (DCBE)—In a double-contrast barium enema, high density barium coats the mucosa of the colon and distends the colon with air via a catheter inserted in the rectum. Multiple radiographs are taken with the patient in various positions and the entire colon can be evaluated.¹² DCBE has been recommended as colorectal cancer screening option since 1997¹² although there are no published controlled trials that document the effectiveness of this test.¹³ While still recommended as a colorectal cancer screening option by some organizations, DCBE has largely been replaced by other colorectal cancer screening tests.

Endoscopic Studies

Flexible Sigmoidoscopy—Flexible sigmoidoscopy is an endoscopic procedure that examines the distal half of the colorectum. Flexible sigmoidoscopy requires a limited bowel preparation compared to that used in colonoscopy and is generally done without sedation. Since no sedation is needed, flexible sigmoidoscopies are commonly done in office-based settings.¹² In addition to identifying colonic polyps and lesions, this procedure allows for tissue resection and sampling.

The majority of evidence supporting the effectiveness of flexible sigmoidoscopy comes from observational studies, including high quality cohort and case-control studies,^{12, 13} and

from colonoscopy studies.¹² These studies suggest that compared to colonoscopy, flexible sigmoidoscopy is 60–70% as sensitive for detection of advanced adenomas and cancers.¹²

Colonoscopy—The entire colorectum to the cecum can be evaluated by a colonoscopy. Colonoscopic procedures require a full bowel preparation which includes a liquid diet 1 day prior to the procedure and oral lavage or laxatives. Patients typically receive a mild sedative prior to the procedure.¹² Colonoscopies are done in hospitals, ambulatory surgical and endoscopic centers, and in some physicians' offices. The majority of procedures are done by gastroenterologists and surgeons but a small percentage is done by primary care physicians.¹² As with sigmoidoscopic procedures, colonoscopy allows for the identification, sampling, and removal of polyps and more advanced colorectal lesions.

Assessing the accuracy of colonoscopy is difficult given that there is no true “gold standard”¹⁹ and colonoscopy is generally accepted as the reference standard when assessing other screening modalities. Despite no published prospective randomized controlled trials, the evidence supporting the effectiveness of colonoscopy as a screening exam is substantial. The reduction in colorectal cancer mortality seen in studies of FOBT is attributed to the colonoscopic procedures that were done in the evaluation of positive FOBT tests.¹³ Further evidence for colonoscopy comes from case-control studies of sigmoidoscopy with polypectomy given the similarity of the exams in examining the distal colon. Furthermore, cohort studies of adenomas and polypectomies after baseline colonoscopies provide additional evidence supporting screening colonoscopies to reduce colorectal cancer mortality.^{13, 20, 21}

In 2000 Medicare extended coverage to include screening colonoscopy²² and colonoscopy is now one of the most commonly performed medical procedures in the U.S.¹² Recent increases in colorectal cancer screening are largely attributed to this increased use of colonoscopy²² and the expansion of Medicare to cover screening colonoscopy has been associated with early stage of diagnosis for patients with proximal lesions.²³ However, how much screening colonoscopy reduces colorectal cancer mortality has been questioned²⁴ following a recently published large observational study that suggests that the mortality benefit from colonoscopy is primarily from cancers developing on the left side of the colon.²⁵ While there are several ongoing randomized trials examining flexible sigmoidoscopy, there are no randomized controlled trials examining screening colonoscopy. Estimates derived from the National Polyp Study suggest that the effect of screening colonoscopy on colorectal cancer incidence is up to 76–90%.^{20, 24} Although frequently referenced, this study did not include a concurrent control group so these estimates have been questioned.²⁴ More conservative estimates still suggest a 60–70% reduction in colorectal cancer mortality with high quality colonoscopy which is considerably higher when compared to the estimated 25% reduction in breast cancer with screening mammography or the lack of prostate cancer mortality reduction with prostate cancer screening.²⁴

Updated Colorectal Cancer Screening Guidelines

In 2008 the American Cancer Society, the U.S. Multi-Society Task Force on Colorectal Cancer, and the American College of Radiology published a joint guideline on colorectal cancer screening and surveillance intended to provide a “practical guideline for physicians to assist with informed decision making related to colorectal cancer screening.”¹² The United States Preventive Services Task Force also updated their colorectal cancer screening recommendations which were previously issued in 2002.⁴ These guidelines were followed by the release of the American College of Gastroenterology Guidelines for colorectal cancer screening published in early 2009. Although largely similar, there are differences among

these three sets of guidelines that should be considered when counseling patients about colorectal cancer screening. The following sections briefly summarize these recommendations and highlight important differences.

Joint Guidelines of the American Cancer Society, the US Multi-Society Task Force, and the American College of Radiology

The review process for updating these guidelines included dividing colorectal cancer screening tests into two phases. The first phase examined the evidence behind using stool tests which included guaiac-based FOBT (gFOBT), fecal immunohistochemical tests (FIT), and stool DNA tests (sDNA). The second phase focused on structural exams which included flexible sigmoidoscopy, colonoscopy, double-contrast barium enema (DCBE), and CT colonography (CTC).¹² The guidelines recommend colorectal cancer screening for all average-risk women and men aged 50 years and older. While the guidelines note that all of the above mentioned tests are acceptable choices, individuals should have the opportunity to make an informed decision regarding their choice of test. However, the guideline development committee felt that colon cancer prevention should be the goal of screening. Therefore, tests that are designed to detect early cancers as well as adenomatous polyps are encouraged over those tests that primarily detect cancer. Thus, structural exams, such as flexible sigmoidoscopy, colonoscopy, DCBE, and CTC, are preferred over stool based exams (gFOBT, FIT, sDNA).

As noted above, the guideline development committee encourages tests designed to detect both early cancer and adenomatous polyps. There are, however, multiple options in this category (sigmoidoscopy, colonoscopy, DCBE, and CTC) and the guidelines do not specify a preferred structural test. A key issue when discussing screening options with patients is that for all tests other than colonoscopy, colonoscopy is the recommended test to follow-up on any significant findings found using other screening methods. Another key issue is the recommended screening interval for each screening option.

Based on the 2008 joint guidelines, the recommended testing interval for flexible sigmoidoscopy is every 5 years. Additional important issues to consider with flexible sigmoidoscopy include: the need for a partial or full bowel preparation prior to the procedure, sedation is generally not used so discomfort during the procedure may be present, and that the protective effect of sigmoidoscopy is limited to the reach of the sigmoidoscope, the distal colon.

The recommended screening interval for colonoscopy is every 10 years. Key issues when considering colonoscopy are the need for a complete bowel preparation prior to the procedure and the use of sedation during the procedure. Conscious sedation is used during most colonoscopies so patients usually require a chaperone for transportation and will generally miss a day of work. Another important consideration is the risk of complications such as perforation and bleeding, most of which is associated with polypectomy.

The recommended time interval for CT colonography (CTC) is every 5 years. Similar to colonoscopy, a complete bowel preparation is required. Risks associated with CTC are low but colon perforation has been reported. Additional important issues to consider with CTC is the need for optical colonoscopy for patients who have polyps of ≥ 6 mm on CTC and the question of how to approach extracolonic abnormalities identified by CTC.

As noted above, while “structural” exams are preferred in the “joint guidelines”, tests that primarily detect cancer, gFOBT, FIT, and sDNA, are still viable screening options. Both gFOBT and FIT should be done on an annual basis. Given variability in the availability of stool tests, the guidelines highlight the importance of using high sensitivity tests as well as

the importance of programmatic, serial, annual testing with gFOBT or FIT if tests are negative. Key issues regarding sDNA include the cost of each test which is significantly higher than gFOBT or FIT tests and that the interval for sDNA testing following negative testing is uncertain. Again, any positive stool tests should be followed by a colonoscopic evaluation.

Guidelines from the U.S. Preventive Services Task Force (USPSTF)

The 2008 colorectal cancer screening recommendation statement issued by the USPSTF updated their previous recommendations issued in 2002. As part of the updated guidelines, the task force reviewed evidence related to gaps in knowledge identified since the 2002 recommendations.²⁶ In updating their recommendations, the USPSTF conducted a targeted systematic review of the test characteristics and potential harms of newer colorectal cancer screening tests (high-sensitivity FOBT, FIT, fecal DNA testing, and CT colonography). The updates task force guidelines also included the results of two analytical models that looked at (1) the optimal age at which to start and stop screening, and (2) the optimal screening intervals for different screening methods.⁴

In the 2008 update, the USPSTF recommends routine colorectal cancer screening for all average risk adults 50 to 75 years of age. Recommended tests include: annual high-sensitivity fecal occult blood tests (gFOBT or FIT), sigmoidoscopy every 5 years with interval high-sensitivity FOBT every 3 years, or colonoscopy every 10 years. The guidelines do not recommend a preferred test nor do they prioritize tests based on their ability to detect colorectal cancers versus polyps and cancers as does the joint guideline from the American Cancer Society/Multi-Society Task Force/ American College of Radiology. Unlike the ACS/Multi-Society Task Force/ American College of Radiology, the USPSTF does not recommend fecal DNA testing or CT colonography noting that there is insufficient evidence to assess the benefits and harms of these tests as screening methods for colorectal cancer.

Guidelines from American College of Gastroenterology for Colorectal Cancer Screening

Similar to the joint guidelines from the ACS/Multi-Society Task Force/ American College of Radiology, the updated American College of Gastroenterology²⁷ screening guidelines divided screening tests into two groups: (1) cancer prevention tests, such as colonoscopy, FS, CTC, and (2) cancer detection tests (high sensitivity FOBT, FIT, fecal DNA). Unlike the ACS/Multi-Society Task Force/ American College of Radiology and the USPSTF, the ACG specifies colonoscopy as the preferred test and recommends a screening interval of every 10 years beginning at age 50 years for average-risk individuals. The ACG also specifies annual FIT as the preferred cancer detection test. In addition, ACG guidelines provide specific recommendations for individuals with a family history and those at higher than average risk. (See below) Double contrast barium enema and older, guaiac-based fecal occult blood tests are replaced with newer tests and are no longer recommended by the ACG.

Topics for Special Consideration

As colorectal cancer screening is somewhat unique in terms of the number of viable screening options compared to other commonly performed cancer screening tests, there are a number of areas of uncertainty. The following section will introduce and address just a few questions regarding colorectal cancer screening that primary care physicians may encounter when counseling patients about colorectal cancer screening.

Do screening guidelines vary according to patient's racial/ethnic background?

Although colorectal cancer screening rates have increased over the past decade²⁸, it is important to recognize that disparities in screening between non-Latino Whites and minorities have not improved and, in some cases, may have increased.²⁹ These disparities in colorectal cancer screening are of particular concern given that when diagnosed with colorectal cancer racial and ethnic minorities are more likely than non-Latino Whites to be diagnosed with late stage disease.³⁰ Colonoscopy has become one of the most commonly performed medical procedures in the U.S.³¹ and recent increases in colorectal cancer screening are largely attributed to this increased use of colonoscopy.²² However, the increased use of colonoscopy as the “preferred” screening tool may further increase disparities.²² Given that colonoscopy is a limited resource³², there is growing concern about “underuse” of colonoscopy in certain populations and “overuse” (i.e. used more often than recommended or in persons not likely to benefit from screening because of co-morbidities) in other populations.³² Although some of the disparities in screening are attenuated when socioeconomic variables are considered, some populations face barriers to screening that are outside of socioeconomic status. For example, lack of knowledge and misperceptions of colorectal cancer risk may barriers to screening among some racial/ethnic groups^{33–35} and limited English proficiency has also been associated with lower colorectal cancer screening rates.³⁶

Black men and women have the highest age-adjusted incidence of colorectal cancer and also have the highest proportion of colorectal cancer occurring in proximal locations of the colon. In addition, African Americans are more likely to be diagnosed with colorectal cancer before the age of 50 and are less likely to be current with colorectal cancer screening recommendations.¹⁹ This has led some to recommend that colorectal cancer screening for African Americans begin earlier than in other racial/ethnic groups. In their guidelines, the American College of Gastroenterology recommends that colorectal cancer screening begins at age 45 for African Americans but also acknowledges that the quality of evidence supporting this recommendation is low.²⁷ In fact, others have suggested that the higher rates of colorectal cancer among African Americans is more likely due to lower health care utilization rather than biology.³⁷

How do screening guidelines vary in their recommendations based on patients' family history?

Although the USPSTF recommendations only apply to average risk individuals, both the American College of Gastroenterology and the American Cancer Society/Multi-Society Task Force/ American College of Radiology guidelines include recommendations for screening individuals with increased colorectal cancer risk. In their 2008 guidelines, the American College of Gastroenterology also updated their prior recommendations for screening based on family history of colorectal polyps and cancers (exclusive of those suggestive of Hereditary Non-polyposis Colorectal Cancer). The ACG now recommends that individuals with a single first-degree relative with an advanced adenoma (adenoma > 1 cm or advanced histology) or colorectal cancer diagnosed at age <60 years or two first-degree relatives with advanced adenomas or colorectal cancer be screened at age 40 or 10 years before the age of diagnosis of the youngest diagnosed relative. Colonoscopy every 5 years is the recommended screening modality and interval in this situation. For individuals with only one first-degree relative with advanced adenoma or colorectal cancer diagnosed after age 60 years, the ACG recommendations are the same as for average risk individuals, colonoscopy every 10 years starting at age 50. The ACG no longer recommends an increased level of screening for a simple family history of adenomas in a first-degree relative.²⁷

The 2008 American Cancer Society/Multi-Society Task Force/ American College of Radiology guidelines did not include updated recommendations based on family history but refer to prior guidelines which are still considered valid.¹² These guidelines published in 2003³⁸ recommend that for individuals with either adenomatous polyps or colorectal cancer in a first-degree relative before the age of 60 or in 2 or more first-degree relatives at any age screening start at age 40 or 10 years before the age of diagnosis of the youngest affected first-degree relative. Colonoscopy every 10 years is the recommended test and testing interval. For individuals with a single first-degree relative diagnosed with adenomatous polyps or colorectal cancer after age 60, screening should start at age 40. The screening options and intervals in this situation are the same as those recommended for average-risk individuals. Similarly, for individuals with two second-degree relatives diagnosed with colorectal cancer, screening should also start at age 40 but again the screening options and intervals are the same as those recommended for average-risk individuals. (A discussion of additional categories of increased colorectal cancer risk (i.e. patients with prior history of polyps or colorectal cancer, inherited syndromes) is beyond the scope of this paper. (See references #27 and #38)

At what age should colorectal cancer screening be discontinued?

With the 2008 screening recommendations, the USPSTF included an analysis to assess life-years gained and colonoscopy requirements for various colorectal cancer screening strategies.³⁹ Using two microsimulation models of colorectal cancer screening, they compared different screening methods (i.e. FOBT, sigmoidoscopy, and colonoscopy), at different testing intervals (i.e. FOBT every 1, 2, or 3 years and sigmoidoscopy and colonoscopy at every 5, 10, or 20 years) using different start and stop ages for screening.⁴⁰ They found that, assuming equally high adherence, colonoscopy every 10 years, Hemoccult SENSE or fecal immunochemical testing yearly, and sigmoidoscopy every 5 years with Hemoccult SENSE every 2–3 years provided similar life-years gained. They also found that lowering the stop age from 85 to 75 resulted in large reductions in colonoscopies required with only small reductions in life-years gained.⁴⁰ Based on these results, the USPSTF 2008 guidelines recommend discontinuing routine screening at age 75 after consecutive negative screenings since age 50. While there may be special circumstances to consider for individual patients age 76–85, the task force recommends against routine screening in this age group. For those age 85 and above, the task force recommends against colorectal cancer screening.

How can screening colonoscopy be improved?

With the trend of increasing use of colonoscopy as the “preferred” screening modality for many practitioners, it is important to consider the quality of the examinations being performed. This is particularly relevant given concerns about flat/depressed adenomas and the growing recognition of the malignant potential of serrated polyps. Since there is no true “gold standard” for evaluating colorectal cancer screening tests, colonoscopy is often considered as the gold standard. However, as shown in tandem colonoscopy⁴¹ as well as CT colonography studies^{16, 17}, colonoscopy is not infallible.¹² Quality measures may help to optimize the effectiveness of colonoscopy as a screening tool. For example, colonoscopy withdrawal times are associated with higher adenoma detection rates^{42, 43} and adenoma detection rate is an independent predictor of the risk of interval cancer development after screening colonoscopy.⁴⁴ The ACG highlights the importance of these and other quality measures for colonoscopy in an appendix to their 2008 screening guidelines. For example, the ACG recommends that colonoscopists measure their adenoma detection rates and suggest that one or more adenomas should be found in at least 15% of women and 25% of men over age 50. Similarly, the ACG recommends that colonoscopy withdrawal times (the time from cecal intubation to end of the exam) should average at least 6 minutes when no biopsy or polypectomy is performed.²⁷ Several expert groups have proposed quality

indicators for colonoscopy^{45, 46} and there have been calls for quality monitoring for colonoscopy, and other colorectal cancer screening tests, on state and local levels.³² Universal standards for assessing quality across several domains will likely optimize colonoscopy as a screening tool and capitalize on its ability to minimize the incidence of colorectal cancer.

What is the significance of a serrated polyp?

The majority of cases of colorectal cancer arise via the adenoma-carcinoma sequence. Until recently, hyperplastic polyps were considered as non-malignant lesions with no malignant potential.⁴⁷ There is now, however, convincing evidence of a hyperplastic polyp - serrated adenoma - adenocarcinoma pathway leading to colorectal cancer.⁴⁸ This “serrated polyp pathway” starts with hyperplastic polyps, progresses to an intermediate disordered hyperplastic polyp, which eventually develops dysplastic features (dysplastic serrated polyp), and finally leads to carcinoma.⁴⁹ With an estimated 20% of all colorectal cancers originating from the serrated polyp pathway⁴⁹, this pathway has become an important alternative model of colorectal carcinogenesis.⁴⁸ Although the lack of detailed, prospective studies examining the natural history of serrated polyps precludes evidence based screening recommendations, data suggest that surveillance colonoscopy intervals for sessile serrated adenomas should be at least as frequent as for conventional adenomas.⁴⁸ Sessile serrated polyps are often flat, right-sided, and may be more difficult to detect than adenomas which may lead to higher miss rates for sessile serrated polyps than for adenomas.⁴⁸ This highlights the importance of careful colonoscopy and the importance of monitoring colonoscopy quality measures.

What is the significance of a “flat” or “depressed” adenoma?

Another area of concern, although perhaps more controversial than serrated polyps, is the largely unknown prevalence of flat and depressed adenomas.¹⁹ These nonpolypoid colorectal neoplasms have been described in Japan since the 1980's but were thought to be uncommon in the U.S. However, a 2008 study in a US veterans hospital population suggested that “flat” or non-polypoid lesions, which are generally more difficult to detect than other adenomas, may be more common than previously believed and may have a greater association with carcinomas compared to polypoid lesions.⁵⁰ The use of dye-spraying and other colonoscopic techniques^{19, 50} may allow better detection of these polyps although the significance of flat and depressed lesions is controversial.^{51, 52} Regardless, the existence of flat and depressed polyps again emphasizes the importance of assuring high quality colonoscopy procedures.

Conclusion

Although the third most common cause of cancer-related deaths in the U.S., colorectal cancer is largely preventable through appropriate screening. Screening rates, however, are low despite several available screening test options and evidence-based recommendations provided by several organizations. Although there are some differences in screening guidelines with regards to test of choice, the guidelines agree on the importance and effectiveness of screening. Thus, when counseling patients about colorectal cancer screening, it is important to understand these differences as well as advantages and limitations of each individual screening test.

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