

# National Institutes of Health State-of-the-Science Conference Statement: Enhancing Use and Quality of Colorectal Cancer Screening

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Colorectal cancer is the third most common type of cancer and the second leading cause of cancer death in the United States. Each year, nearly 150 000 persons receive a diagnosis of colorectal cancer, and 50 000 die. An effective way to reduce colorectal cancer mortality is to screen for it and its precursor, the adenoma. Although screening methods have been available for decades and new methods continue to develop, screening rates remain low. Our purpose was to analyze national colorectal cancer screening rates, identify barriers to screening, and propose solutions to increase screening rates. Evaluating or establishing the comparative effectiveness of the various colorectal cancer screening options was beyond the scope of the conference and was not part of the charge to this panel. Nonetheless, the panel recognized that high-quality evidence about the comparative effectiveness of the various current and emerging screening modalities is needed and must be a scientific priority.

To provide a comprehensive assessment of how colorectal cancer screening and surveillance are most appropriately implemented, monitored, and evaluated for U.S. populations at average risk, the National Cancer Institute

and the Office of Medical Applications of Research of the National Institutes of Health convened a State-of-the-Science Conference on 2–4 February 2010.

## WHAT ARE THE RECENT TRENDS IN THE USE AND QUALITY OF COLORECTAL CANCER SCREENING?

In the United States, colorectal cancer screening is underused. Data on colorectal cancer screening rates come from multiple sources, including patient and population surveys, administrative data, and chart reviews from health systems and medical practices. There has been a slow, steady increase in colorectal cancer screening rates for adults 50 years or older, with overall screening rates increasing from 20% to 30% in 1997 to nearly 55% in 2008. Despite this increase, millions of eligible persons are not screened.

Fecal occult blood testing (FOBT) and flexible sigmoidoscopy have historically been the most widely used screening tests for the general population; however, they have been supplanted by colonoscopy, the use of which increased rapidly after Medicare initiated coverage for it in July 2001. Conversely, since 2001 a nearly reciprocal decrease has occurred in the number of flexible sigmoidoscopies. Use of double-contrast barium enema is now rare. Use of FOBT has decreased more gradually, and immunochemical testing has increased relative to guaiac testing. These stool tests remain widely used in the U.S. Department of Veterans Affairs system and in some managed care

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\* Panel statement from an NIH State-of-the-Science Conference held on 2–4 February 2010 at the National Institutes of Health, Bethesda, Maryland. For a list of the members of the NIH State-of-the-Science Conference Panel and other participants, see the **Appendix** (available at [www.annals.org](http://www.annals.org)).

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systems nationwide. No population-based data are available on the use of newer screening techniques, such as computed tomographic colonography.

Despite the evidence for underuse of colorectal cancer screening, there is also evidence for overuse and misuse. Screening is overused when patients with severe comorbid conditions and limited life expectancy who are unlikely to benefit from prevention or early detection are screened or when colonoscopies are performed more frequently than most guidelines recommend. Screening is misused when it is done in a way that achieves no benefits—for example, FOBT done using in-office stool samples rather than the recommended home technique. Methods to address these quality issues are discussed later in this report.

## WHAT FACTORS INFLUENCE THE USE OF COLORECTAL CANCER SCREENING?

### What Is Known

#### Patient Factors

The most important factors related to colorectal cancer screening are having insurance, having access to a usual source of health care, or both. Two socioeconomic characteristics—higher income and education level—are important correlates of screening.

Screening rates differ across racial and ethnic groups. Relative to non-Hispanic white persons, black and Hispanic persons are less likely to be screened. Once socioeconomic characteristics are taken into account, the differences in screening rates are attenuated.

Immigrants, particularly those with shorter residency in the United States or who do not speak English as their primary language, are less likely to be screened. Overall, screening rates do not differ between sexes, although differences have been noted in some population subgroups. Older patients (aged 60 to 75 years) are more likely to be screened than younger patients (aged 50 to 59 years). Persons having more contact with the health care system are more likely to be screened, as are those who have been screened for other types of cancer (breast, cervical, or prostate cancer).

Additional patient factors positively associated with being screened are knowledge about the test, perceived risk for colorectal cancer, positive attitude about screening tests in general, and belief that the test is safe. Attitudes associated with not being screened include the invasiveness of endoscopy, anxiety about test outcomes, and belief that healthy persons do not need to be tested.

Although all of these factors have independent effects on screening rates, many of them are highly correlated. For example, a person who is more educated is likely to be more knowledgeable about the risks and benefits of colorectal cancer screening and to have higher income, health insurance, and a usual source of care.

### Physician Factors

A recommendation from a physician is the only physician-related factor that consistently predicts colorectal cancer screening. The effect of physician characteristics, such as age, sex, years of training, and specialty, on screening rates has not been well established.

### Systems Organization

Few studies have evaluated whether the way a practice is organized has an effect on whether patients are screened. However, some research suggests that practices that have electronic medical record reminder systems, ancillary personnel who can facilitate follow-up arrangements, and patient navigators have had the most success.

## WHICH STRATEGIES ARE EFFECTIVE IN INCREASING APPROPRIATE USE OF COLORECTAL CANCER SCREENING AND FOLLOW-UP?

### What Is Known

Effective patient-level interventions include reducing structural barriers (for example, direct mailing of FOBT kits), one-on-one interaction with a health care provider or health educator, and patient reminders (for example, phone calls and postcards).

Although few studies have assessed the effectiveness of provider interventions, the Veterans Affairs system has successfully increased colorectal cancer screening with a multimodality approach that includes provider training, computerized reminders, audit and feedback, and coordinated care between primary care physicians and gastroenterologists.

Effective interventions at the health care system level refer to the implementation of system-based changes to increase the number of referrals for screening. For example, Kaiser Permanente, the Department of Veterans Affairs, and the National Health Service in the United Kingdom have found that organized approaches to screening greatly increased rates of colorectal cancer screening. By using focused reminders, direct mailing of FOBT kits, and careful follow-up of positive results with colonoscopy, Kaiser Permanente achieved screening rates of 75% in their Medicare population. Similarly, the Department of Veterans Affairs has achieved screening rates of 80% in eligible populations. In addition, some studies have shown the effectiveness of patient navigators (or similar approaches) when they are used as part of a health care system's intervention.

### What Needs to Be Learned

The scientific evidence is mixed on the effectiveness of community-based interventions for increasing rates of colorectal cancer screening. There is also a need to understand whether health education, decision-making tools that incorporate patient preferences, patient or physician financial incentives, or mass-media messaging strategies can effectively motivate patients across diverse populations to participate in screening efforts. Some of the gaps in knowledge of effective interventions for increasing colorectal can-

cer screening rates—especially in ethnic minority, underserved, and uninsured populations—are partly due to limitations of existing research methodology. (The full text of this section is available at <http://consensus.nih.gov/2010/colorectalstatement.htm>.)

### WHAT ARE THE CURRENT AND PROJECTED CAPACITIES TO DELIVER COLORECTAL CANCER SCREENING AND SURVEILLANCE AT THE POPULATION LEVEL?

In planning the implementation of population-based screening programs, the current and future capacity to provide the various recommended screening modalities must be considered. Capacity involves not only laboratory and endoscopic facilities and providers but also support for informed decision making, as well as the primary care resources needed to coordinate screening services, to communicate results effectively, and to track and follow positive results.

#### What Is Known

Only a few studies, primarily done in the early 2000s, have addressed the capacity to deliver colorectal cancer screening, and these focus on endoscopic capacity only. These data are limited by the uncertain validity of current endoscopic volume and available capacity estimates, lack of standard definitions, and lack of distinction between screening and surveillance colonoscopy. Of note, the results of these studies vary widely, probably reflecting differences in assumptions about uptake, the size of the eligible population, and the available workforce and facilities. In addition, they do not account for the resources needed to reach the many persons who are unscreened.

Different resources are needed to fully implement different screening approaches. Although sampling for FOBT is self-administered, laboratory facilities are needed to analyze and interpret the results. Endoscopy requires dedicated facilities with highly trained providers and staff and expensive equipment. Colonoscopy is required to follow positive results from FOBT, flexible sigmoidoscopy, flexible sigmoidoscopy plus FOBT, and computed tomographic colonography. If FOBT was the primary screening strategy, estimates suggest that colonoscopy capacity is sufficient to follow positive FOBT results. If flexible sigmoidoscopy or flexible sigmoidoscopy plus FOBT was the primary screening strategy, current flexible sigmoidoscopy capacity is unlikely to be sufficient; however, current colonoscopy capacity may be sufficient to follow positive flexible sigmoidoscopy results. If colonoscopy was the primary screening strategy, there is substantial uncertainty that current colonoscopy capacity would be sufficient. Some modeling estimates suggest that colonoscopy capacity may be sufficient if screening targets are achieved over 5 to 10 years.

#### What Needs to Be Learned

Additional data are needed to generate more precise estimates of the current and projected endoscopic capacity,

the projected demand, and the effect of overuse and misuse on capacity estimates. At the community level, identifying strategies to match capacity with need is critical. (The full text of this section is available at <http://consensus.nih.gov/2010/colorectalstatement.htm>.)

### WHAT ARE THE EFFECTIVE APPROACHES FOR MONITORING THE USE AND QUALITY OF COLORECTAL CANCER SCREENING?

No comprehensive system in the United States effectively monitors the use or quality of colorectal cancer screening across a range of populations and for all approved modalities. Effective monitoring of screening is complicated by the various types and intervals of screening methods (for example, 10 years for colonoscopy vs. annually for FOBT). Ultimately, a robust system should be usable for setting and monitoring population-based goals and should contribute to improved understanding of the relative benefits of different screening strategies as well as factors associated with optimum use of each approach. The system should be large enough to provide accurate estimates of underuse, overuse, misuse, and quality and should be timely, flexible, and affordable.

#### What Is Currently Done

Population-based surveys, such as the National Health Interview Survey and the Behavioral Risk Factor Surveillance System, include questions about colorectal cancer screening modality and timing and are the major source of information about trends in rates of colorectal cancer screening. Such surveys may not accurately distinguish colonoscopy from sigmoidoscopy and may overestimate the rate of screening. The surveys are insufficient to address overuse, misuse, or outcomes of screening.

The Health Plan Employer Data and Information Set measures for colorectal cancer screening are based on the experience of persons enrolled in selected managed care plans and are reported in aggregate by plan. Current reporting does not permit assessment of screening rates by age, race, or sex. The measures do not specify which screening modality was used, and they include no information about quality, complication rates, or follow-up.

Administrative data sets, such as Medicare or other health plan data, can be used to measure rates of screening and follow-up medical care. The data are most accurate for ascertaining colonoscopy or flexible sigmoidoscopy and least accurate for ascertaining FOBT. The long period of coverage needed (10 years) to determine that someone is nonadherent to screening recommendations is a limiting factor. Administrative data are a good source of information on the rate and nature of complications related to colorectal cancer screening (for example, colon perforation) that require specific treatment (for example, hospitalization or surgery).

Electronic medical records provide detail that is not available in administrative databases. However, few of

these systems are designed for population monitoring, and their use for such purposes generally relies on text fields and complex algorithms that draw information from clinical notes and laboratory reports. Electronic medical records have the potential for assessing the indication for a test, results, time to follow-up, and complications.

Thus, current sources of population-based data for monitoring colorectal cancer screening in the United States are inadequate for estimating rates and are essentially nonexistent for assessing appropriate use. Assessment of quality is limited to a few measures, such as frequency of major complications, polyp detection rate, and missed cases of cancer after colonoscopy. Other measures, such as the percentage of patients having colonoscopy with adequate bowel preparation, colonoscopic withdrawal times, and the percentage of FOBT cards with an adequate sample, are not widely available. In addition, most available data address either use or quality of screening, but not both.

### What Could Be Done

Given the reported link between increased rates of colorectal cancer screening and both decreased incidence of colorectal cancer and earlier stage at diagnosis, cancer registries could be used to monitor the incidence and stage of colorectal cancer in population subgroups to identify regions with relatively low rates of colorectal cancer screening. The value of cancer registries could be extended if they collected information on whether a tumor was detected as a result of screening or by evaluation of symptoms.

A colorectal cancer screening registry analogous to the Breast Cancer Surveillance Consortium should be established to monitor rates of colorectal cancer screening, overuse, quality, and complications. In addition, expansion and analysis of existing data sources relating to colorectal cancer screening and quality should be supported. These sources include the Clinical Outcomes Research Initiative endoscopy database, the Cancer Research Network, and the Computed Tomography Colonography Registry.

An ideal monitoring system should be able to estimate rates of screening regardless of a patient's insurance status and demographic characteristics and to assess use, appropriateness, and outcomes. A variety of strategies will probably need to be combined to obtain a relatively complete picture of colorectal cancer screening and quality.

## WHAT RESEARCH IS NEEDED TO MAKE THE MOST PROGRESS AND HAVE THE GREATEST PUBLIC HEALTH EFFECT IN PROMOTING THE APPROPRIATE USE OF COLORECTAL CANCER SCREENING?

### Tracking Trends in Colorectal Cancer Screening

The panel recommends development of an infrastructure for capturing information on colorectal cancer screening, follow-up, and cancer outcomes. The system should include existing screening modalities and allow for adding new screening techniques. In addition, the proposed mon-

itoring system could include expansion, extension, and greater use of the Behavioral Risk Factor Surveillance System, the Medicare Current Beneficiary Survey, the Medical Expenditure Panel Survey, the National Health Interview Survey, and administrative data that will allow tracking of population screening by subgroups as well as by screening method.

### Factors Influencing Use of Colorectal Cancer Screening

The panel recommends research to 1) study patient preferences and other factors influencing informed and shared decision making on the choice of a colorectal cancer screening modality, 2) better understand and reduce the barriers (for example, insurance coverage, out-of-pocket costs) to timely and appropriate colorectal cancer screening, 3) study physician recommendations to the patient on the choice of screening modalities and adherence to guideline recommendations, 4) understand how integrated systems achieve high levels of performance (for example, electronic medical record decision support, performance incentives), and 5) study how practices outside of integrated systems can create an infrastructure that promotes high performance.

### Effective Strategies for Increasing Appropriate Use

The panel recommends research to 1) evaluate interventions aimed at patients, providers, systems of health care, and communities to increase rates of screening and appropriate follow-up; 2) eliminate racial and ethnic, socioeconomic, and geographic disparities in colorectal cancer screening; 3) assess sustainability of successful interventions that increase the rate of colorectal cancer screenings and disseminate evidence-based interventions; and 4) improve the acceptability and performance of screening techniques.

### Current and Projected Colorectal Cancer Screening Capacity

The panel recommends research to 1) assess the demand and capacity for colorectal cancer screening across geographic areas; 2) assess the options for expanding the supply of providers doing lower endoscopy, including specialists and appropriately trained primary care physicians or nonphysician providers; and 3) learn what constitutes adequate provider training.

### Effective Monitoring of Use and Quality of Colorectal Cancer Screening

In addition to the comprehensive monitoring infrastructure recommended previously, the panel recommends research that 1) examines strategies for community and regional monitoring of colorectal cancer screening outcomes and the performance of methods used to screen and 2) evaluates the performance of new colorectal cancer screening tests as they emerge.

## CONCLUSION

The panel finds that despite substantial progress toward higher colorectal cancer screening rates nationally,



screening rates fall short of desirable levels. Targeted initiatives to improve screening rates and reduce disparities in underscreened communities and population subgroups could further reduce colorectal cancer morbidity and mortality. This could be achieved by using the full range of screening options and evidence-based interventions for increasing screening rates. With additional investments in quality monitoring, U.S. citizens could be assured that all screening achieves high rates of cancer prevention and early detection. To close the gap in screening, this report identifies the following priority areas for implementation and research to enhance the use and quality of colorectal cancer screening:

Eliminate financial barriers to colorectal cancer screening and appropriate follow-up.

Widely implement interventions that have proven effective at increasing colorectal cancer screening, including patient reminder systems and one-on-one interactions with providers, educators, or navigators.

Implement systems to ensure appropriate follow-up of positive results of colorectal cancer screening.

Develop systems to ensure high quality of colorectal cancer screening programs.

Conduct research to assess the effectiveness of tailoring programs to match the characteristics and preferences of

target population groups to increase colorectal cancer screening.

Conduct studies to determine the comparative effectiveness of the various colorectal cancer screening methods in usual practice settings.

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