

TOWARD A SYSTEM OF CANCER SCREENING IN THE UNITED STATES: Trends and Opportunities*

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■ **Abstract** The hard work of public health officials, physicians, and disease advocacy groups to educate Americans about the importance of early detection has resulted in uptake of screening tests at levels equivalent to or higher than in countries with organized cancer screening programs. However, the societal costs of high screening rates are larger in the United States than in other countries, including higher prices for screening, more unnecessary testing, and inefficiencies in delivery, especially in small practices. Further, screening rates are not evenly distributed across population groups, and the national expenditure on clinical and community research to promote cancer screening among individuals has not been matched by research efforts that focus on policy or clinical systems to increase screening widely throughout the population. We identify opportunities for organizational change that improve access to use, improve quality, and promote cost effectiveness in cancer screening delivery.

OVERVIEW

In the United States, cancer screening rates are equivalent to or higher than those of other industrialized countries. Widespread enthusiasm in the United States for screening is the result of the hard work of public health officials, physicians, and disease advocacy groups to educate Americans about the importance of early detection. These efforts have likely accelerated the uptake of tests for which screening confers a range of benefits, including the gold standard of a mortality benefit. However, these high rates of screening have been achieved at considerable societal cost. The efforts to promote screening may also have encouraged overuse of screening among some groups (97). Furthermore, screening rates are not evenly distributed across the population.

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Research and dissemination efforts in the United States have focused on promoting cancer screening to individual patients, individual physicians, and, to a lesser extent, health care organizations. The national emphasis on promoting cancer screening to these specific groups has not been matched by equivalent efforts to address the broad structural and policy factors that affect the distribution and delivery of this approach to preventive care. Focusing on these broad factors is challenging, particularly when the organization and financing of health care is fragmented, as it is in the United States. However, changes to systems and policies present valuable opportunities for improving the distribution and delivery of cancer screening modalities once individual interventions have been shown effective.

In this review, we examine trends in cancer screening and the many factors that influence use of tests, including promotional interventions. The purpose of our investigation is to identify opportunities for improving the ways in which cancer screening is organized and delivered in the United States. These ways include increasing access to use, generally improving quality, and promoting cost effectiveness of services delivered. We also suggest additional directions for policy and structural interventions that could improve screening delivery. In so doing, we hope to stimulate creative thinking about cancer screening policy and improve how clinics are structured and health care is delivered. This is a critical but neglected area of research.

PERSPECTIVES ON THE BENEFITS OF CANCER SCREENING

The decision to screen for cancer should be based on well-established criteria (117). First, the disease should be an important health problem. Second, there should be a detectable preclinical phase. Third, treatment of screen-detected disease should offer advantages over and above those achieved by waiting to treat until the disease is symptomatic. Fourth, the screening test should be affordable and cost-effective. Fifth, the test must be acceptable to the target population and to health care professionals. Finally, the test must achieve an acceptable level of accuracy in the population undergoing screening. The ultimate measure of success of a cancer screening program is that it reduces disease-specific mortality in the at-risk population. For screening to be effective by this measure, it needs to be an early step in a larger care process that is conducted systematically and in a timely manner (125).

The groundbreaking 2001 Institute of Medicine (IOM) report, *Crossing the Quality Chasm*, draws on an underlying care delivery framework described by Berwick (6). This framework, which provides a useful lens through which to examine the overall health care distribution and delivery process, consists of four levels: the experience of patients; the functioning of small units (or teams) of care delivery; the functioning of the organizations that house or otherwise support care delivery; and the environment of policy, payment, regulation, accreditation,

litigation, and other factors that shape the behavior, interests, and opportunities of the organizations.

The current literature already has identified important barriers to cancer screening, which individual efforts are powerless to change. These include lack of access to health care, lack of insurance coverage for preventive services, and economic pressures on physicians that result in ever-shorter office visits. The literature also shows, however, that because they establish the structural context for service delivery to patients, the three broader levels of the health care framework (care units, organizations, and environment) can do much to help reduce these barriers for patients. For example, compelling evidence suggests that systematic diffusion of guidelines, computerized reminder systems, and a system of auditing physician adherence to guidelines, along with providing routine feedback to physicians, improve the rates of recommended preventive care delivery in practices that have a clear policy supporting screening guidelines (52, 100, 116).

To fully understand trends and opportunities, as well as the specifics of distribution and delivery and the factors that may favorably affect its appropriate and equitable use, screening should be considered from a population health, or societal, perspective (70). Because it is designed to take into account everyone affected by screening programs, the societal perspective examines all significant health outcomes and costs that flow from it, regardless of who experiences the outcomes or costs (33). This perspective recognizes that resources are limited and that even health—at least to some degree—should be subject to the resource limits that constrain society. Thus, not every screening test would be reimbursed regardless of benefit. But neither would anyone be categorically excluded from getting services with a proven benefit. In short, the societal perspective is a comprehensive viewpoint that, if successful, gives appropriate weight to all significant aspects of an issue. It is from this perspective that we examine trends and opportunities for cancer screening in the United States.

TRENDS IN CANCER SCREENING

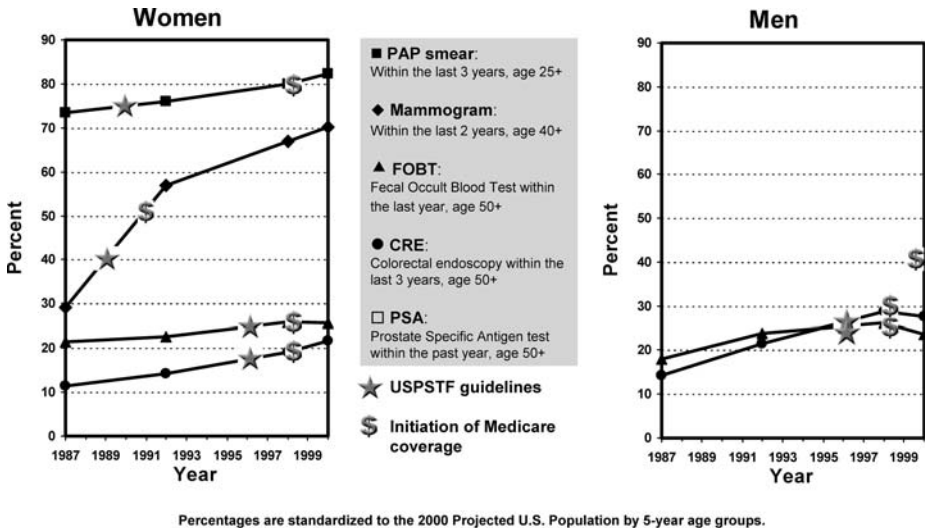
For screening to provide a maximum benefit, the population at risk needs to participate at a high level. Monitoring screening patterns and trends is critical to achieving population benefits because it enables us to identify who is getting screened and which factors may impede or facilitate the behavior. Population-based monitoring can therefore help researchers target and direct interventions so as to maximize screening rates in a population. Population-based monitoring also can be used to assess the degree to which community-based screening interventions achieve the same participation rates and beneficial outcomes as those achieved in randomized trials (106).

Trends in use of different screening modalities are influenced by a variety of factors. For example, evidence of test efficacy [as reflected by publication of U.S. Preventive Services Task Force (USPSTF) clinical guidelines] and inclusion of the procedure as a health insurance benefit (such as by Medicare) can have a

significant influence on the uptake of cancer screening. Trends in use also reflect the length of time since tests were first marketed and the resources, capacity, and infrastructure available for test delivery. The availability of the equipment and staff trained to perform and evaluate the procedures are key elements that ensure adequate delivery. Trends also reflect patient and provider access to the test as influenced by financial, administrative, and geographic realities; ease of administration (for example, is specialty referral required?); and acceptability (for example, invasiveness) of the screening test.

Figure 1 shows trends in prevalence of four cancer screening tests. The Figure shows that Pap testing is the most widely used type of cancer screening. It was first introduced in the 1940s, and its widespread adoption occurred before the National Health Interview Survey (NHIS) began monitoring cancer screening, before the USPSTF guidelines, and before Medicare coverage began. After its initial diffusion, use of Pap testing increased slowly but steadily.

Figure 1 also shows that of these four tests, mammography has been the most heavily influenced by the publication of guidelines and inclusion as a covered benefit. National monitoring of mammography use began before publication of the USPSTF guidelines, and Medicare benefits followed shortly thereafter. These factors, combined with the passage of state legislation mandating private insurance



¹ National Health Interview Survey

² <http://healthservices.cancer.gov/seermedicare/considerations/testing.html>

³ For mammography and pap test recommendations, see U.S. Preventive Services Task Force. 1989. *Guide to Clinical Preventive Services: An Assessment of the Effectiveness of 169 Interventions*. Baltimore: Williams & Wilkins (110a). For FOBT and CRE, see U.S. Preventive Services Task Force. 1996. *Guide to Clinical Preventive Services*. Washington, DC: Off. Dis. Prev. Health Promot., US Gov. Print. Off. (110b).

Figure 1 Screening trends by gender with years of guidelines and Medicare initiation. Recent use of cancer screening tests,¹ initiation of Medicare coverage,² and USPSTF guidelines³: 1987, 1992, 1998, 2000.

coverage for mammography screening, discussed below, probably account for the documented rapid rise in reported mammography use.

Colorectal cancer screening uptake has been slower than either Pap tests or mammograms, in part because evidence of a benefit for colorectal cancer screening appeared more recently than for breast and cervical cancer screening tests (86). Another reason for the slower uptake of colorectal cancer screening may be the variety of competing tests available for this purpose. For example, one U.K. study found that uptake was slower when physicians recommended more than one screening test for a particular cancer to their patients (111). This issue may also affect the implementation of public health messages. The decline shown in Figure 1 in use of colorectal endoscopy reported by men after 1998 may be due to changes in the 2000 NHIS, when question wording was modified to reflect changes in science, technology, and physician practices. Use of prostate specific antigen (PSA) testing was already widely used in the United States when it was first measured in the 2000 NHIS, even though the efficacy of the test is fraught with uncertainty (89). Although the scientific evidence is not sufficient for USPSTF guidelines to recommend the test, it is nevertheless covered by Medicare. Randomized clinical trials to test whether PSA confers a mortality benefit are ongoing in the United States and Europe (23, 32). A recently published study questioned whether PSA could detect prostate cancer (108).

FACTORS AFFECTING THE USE OF CANCER SCREENING TESTS

For widespread screening to occur in a population, physicians and patients must know about the tests, consider them valuable, and be able to adopt them. Broad social, political, and economic systems that shape behaviors and access to resources also are critical to the widespread adoption of screening (46). As a result, factors affecting the use of cancer screening tests are frequently grouped and analyzed in terms of patients, physicians, and systems. Reviews have been conducted of the large literatures on surveillance (10, 42, 102) and behavioral intervention research on patients and providers (8, 58, 66, 74, 99, 101, 112, 113, 115, 121). Researchers also have conducted several reviews of interventions to increase recommendations for cancer screening by physicians, and they found that introducing information systems and organizational changes in staffing and procedures has consistently increased cancer screening rates (65, 99, 101).

In contrast to the large literature on factors affecting patients and providers, studies of how systemic factors affect cancer screening practices are almost nonexistent, except for a recent analysis of health plan policies and practices by Klabunde et al. (50). Little research has focused on cancer screening policy (74) except for two recent papers by Adams (1, 2) and an older paper by Holland (44), even though it is increasingly recognized that individual behavior should be considered in the

context of the broader economic environment that shapes, facilitates, and limits health care delivery. In the following sections, we briefly summarize the patient and provider literature and discuss several key systemic issues that influence screening behavior.

Patient Factors

A number of factors influence the degree to which individuals receive cancer screening tests. Numerous studies have shown that patients with a usual source of care are far more likely to get screened for cancer than are other patients (10, 20, 26, 38, 64, 102, 110). Similarly, screening increases with the number of physicians seen (55), the number of appointments kept (110), the number of years of clinic attendance (63), and the receipt of regular medical check-ups (59). Cancer screening also is strongly related to use of other preventive services and behaviors (21, 59, 69, 88).

Not surprisingly, therefore, the major reason patients report not having a recent cancer screening test is lack of a physician recommendation (27, 28, 30, 35, 81, 114). Patients also report being less likely to initiate screening if they believe they cannot afford treatment if cancer is found (84). NHIS data, shown in Table 1, provides further evidence about common barriers to screening. Lack of a usual source of health care, inadequate health insurance coverage, and having recently immigrated to the United States are important patient barriers to obtaining cancer screening services (10, 47). Related barriers associated with patients not getting cancer screening services include low income, low educational attainment, rural or inner-city residence, older age, nonwhite race, and Hispanic and Asian ethnicity (102).

Cultural orientation toward preventive services shapes use among immigrants (53, 107, 109), although lack of access to health care may be a more immediate reason why immigrants in low-income populations are not screened (47, 57, 123). Clearly, solutions to these barriers, as well as to the high cost of services, are beyond an individual patient's ability to solve. Improving access to health care and providing culturally competent health services to individuals requires policy and structural interventions. For example, one recent study found that improving

TABLE 1 Cancer screening in the United States: Where are the disparities? 2000 National Health Interview Survey. From Reference 102

Barriers to screening	Pap test	Mammogram	Colorectal (women)	Colorectal (men)
Total	82%	70%	38%	41%
No health insurance	62%	38%	18%	20%
No usual source of care	58%	35%	13%	14%
Recent immigration	61%	39%	16%	20%

access to health care attenuated differences between foreign-born Latinos more than foreign-born Asians, as compared with U.S.-born whites (31).

Physician Factors

The behavioral literature on cancer screening has shown that physicians who have better general prevention knowledge and lower patient volume tend to have higher referral rates (29, 37, 55, 60, 94). Higher screening referral rates also are associated with such physician characteristics as being younger in age, being an internist (versus a family practitioner) or obstetrician gynecologist, and being female (55, 60).

Although individual physician behavior and characteristics are important, systemic modifications also can improve physician recommendations. A study by Ward et al. (116) found that system-wide internal policies and structures to promote cancer screening were more powerful predictors of the extent to which Department of Veterans Affairs (VA) physicians complied with guidelines than were an individual physician's knowledge of and proclivity toward screening. Supportive systems are needed if practices are to recommend and perform cancer screening according to guidelines. Audits of compliance with feedback (5, 62), facility policy to which care providers subscribe (116), and reminder systems have improved compliance with guidelines. In a review published in 1998, Rimer (93) recommended that reminder systems should constitute a minimum practice for all health systems because the evidence for them was overwhelming (they doubled or tripled the odds of women getting breast or cervical cancer screening).

In addition to policies and structures to support physician recommendations for cancer screening, policies and structures also must be in place to support follow-up to cancer screening. In a review of the literature on follow-up care after cancer screening, Yabroff et al. (122) found that fewer than 75% of patients screened for cancer get timely follow-up, and a recent study (48) found that 9% of women with a newly discovered breast abnormality had received no follow-up care 12 months later. O'Malley et al. (84) found that doctors would be less likely to recommend screening if they know or suspect their patient is uninsured or unable to afford or locate free follow-up care. Delays or lack of follow-up after screening undermine the purpose of screening—to prevent or detect cancer early. Interventions to address barriers to follow-up care are needed at the patient, provider, and system levels (122).

Systemic Factors

The unusual way health services are structured and financed in the United States significantly influences the delivery and distribution of health care services, including screening.

FINANCING HEALTH CARE DELIVERY In the United States, health care is distributed through markets. Unlike other industries, most health care is paid for by insurance companies rather than by consumers, and the services covered depend on the

individual patient's insurance policy. Providers do not decide which services will be covered or their level of reimbursement. The level of services offered depends on the patient's insurance coverage and profit rates in the insurance industry. Thus, most decisions about health care screening are driven, at least to some extent, by reimbursement factors rather than by science-based policy. Key exceptions are legislation mandating private insurance coverage for mammography and programs covering breast and cervical cancer screening and treatment for poor, uninsured women.

For most Americans, health insurance is an employment benefit, although about 29% of the workforce works in small companies (defined as fewer than 25 employees). About 30% (12.6 million) work in companies where health insurance is not provided and so remain uninsured. Further analysis reveals an important dynamic that economists call "market power." Large corporations use their market power to reduce premiums paid to insurance companies and prices paid to physicians, including for cancer screening for their employees. Small businesses do not have equivalent market power to do this, and, therefore, many small businesses do not pay insurance premiums for their employees. As a result, employees of small companies lack insurance as well as face higher prices for screening services. Limited insurance coverage and higher prices for services worsen health care access. In contrast, employees of large corporations, who have better health benefits, are more likely to obtain cancer screening. Even for large corporations, however, this benefit is a Pyrrhic victory. Overall, as Reinhardt points out, the highly fragmented organization of health care financing in the United States serves to allocate relatively greater market power to the supply side of the health system, resulting in higher prices for health services. Because of fragmentation among the multiple purchasers of care, U.S. prices rise above those in industrialized countries with either a single-payer system or collective bargaining among multiple payers (91). The greater market power held by the supply side of the health system also can increase demand for services beyond what is needed.

Overall costs of cancer screening are higher in the United States than anywhere else in the industrialized world. For example, in 1997, the median charge for colonoscopy in Canada was US\$606, and in the United States it was US\$1736 (4). For a screening mammogram, the median charge was US\$77 and US\$130, respectively. Inefficiencies in the delivery of screening in the United States contribute to the high cost of screening in the United States (9). Another reason is that efforts to collect monitoring and evaluation data and to conduct promotional campaigns that encourage screening are not routinely incorporated into the delivery of clinical screening services. This means that these efforts must be funded separately, adding to the overall cost of screening. The cost of malpractice insurance, which is high relative to the revenues physicians earn from practicing medicine, is a third reason. Mammography is the procedure associated with the most malpractice suits (12, 14). Prostate cancer screening may also be vulnerable to lawsuits. Although evidence is lacking that PSA testing conveys a mortality benefit, a recent *JAMA* editorial documents a malpractice suit brought by a patient who, under presumed

conditions of shared decision making, did not have a PSA and then sued when he was subsequently diagnosed with prostate cancer (75).

STRUCTURING HEALTH CARE DELIVERY Overcoming barriers related to the structure and financing of screening services requires intervention at the policy or system level. An examination of the two most prevalent models of health care service delivery in the United States—equal access providers and small entrepreneur providers—can illuminate the types of policy- or system-level interventions that could be instituted to ensure equitable access to appropriate cancer screening services.

A growing minority of Americans obtain health care through health insurance plans that have been called “equal access” providers (98) or “organized plans.” These providers include group- and staff-model HMOs, the VA, and many “safety net” providers. Organized plans determine coverage as well as provide clinical services to patients. For a fixed annual fee, they offer preventive services on the basis of whether patients are eligible according to USPSTF or other clinical practice guidelines. As a result, socioeconomic disparities all along the continuum of cancer care, from screening services through follow-up and treatment, are less likely to occur in organized practice settings. For this reason, we characterize them as equal access providers. It is important to note, however, that equal access providers offer equal access only to those able to leap the cost barrier of a monthly insurance fee. Therefore these providers may systematically exclude whole groups of people, such as the unemployed, from their care.

Most patients are served by providers who work in individual or group practices as small entrepreneurs. These patients are insured by policies independent of the health care provider, and the provider has no control over what procedures are covered. Entrepreneurial plans can be grouped into several types, including Fee-For-Service (FFS) or indemnity, Network, Individual Practice Association (IPA), and Preferred Provider Organization (PPO)/Point of Service (POS). Except for FFS, all are managed care plans. What they have in common is that they provide health care only when a patient has coverage for the service.

THE FINANCING AND STRUCTURE OF CANCER SCREENING CAN LEAD TO OVERUSE AND UNDERUSE The way that health care is structured and financed in the United States is generally thought to encourage distortions in the appropriate use of cancer screening procedures (24, 90, 120).

Overuse Leaving decisions about screening to individual doctors and consumers adds to the demand for services, especially when patients have insurance coverage, and creates an environment where profit, rather than public health, motivates how health care is delivered. The U.S. health care service market allows screening services to be offered regardless of their scientific merit. As a result, screening services may be used too frequently or by patients for whom cancer screening is not recommended. For example, patients who can afford widely advertised

full-body scans or other unproven screening tests can readily purchase them, even though they confer no medical benefit. From a population health, or societal, perspective, these expenditures appear to be a waste of resources. If reaching an entire population, including the poor, in a timely fashion is a concern, then it seems unethical to spend resources on unproven methods or to overuse procedures when the resources could be used to provide proven screening services throughout the population.

Overuse of cancer screening also leads to higher follow-up rates for American consumers compared with consumers in other countries. Higher follow-up is due to the higher relative value placed on sensitivity compared with specificity of test results (which yields a higher rate of false positive tests) in the United States (25). Though the literature on this is scant, adverse screening results leading to unnecessary follow-up procedures may reduce quality of life (11, 36).

Underuse Investigators generally agree that the first test for prevalence of cancer is more important than subsequent screens (18). However, although cancer screening may be frequently used by those who can afford it, some high-risk populations are never screened. One of the largest groups never screened is those without health insurance. An estimated 15.2% of the population, or 43.6 million people, were without health insurance coverage during the entire year in 2002, up from 14.6% in 2001. This represents an increase of 2.4 million people (79). Lack of insurance or other resources to cover costs of screening and follow-up can preclude realizing the benefits of early detection.

Disparities in payment to physicians may further exacerbate underuse. For example, specialists are reimbursed at higher rates, both by Medicare and by private insurance plans, than are primary care physicians. Unequal reimbursement encourages physicians to specialize, locate in relatively wealthy areas, and establish their practice or business in areas with economic demand for services. In this way, disparities in payment to physicians result in shortages of doctors in inner city and rural areas and cause differentials in quality and coverage (118).

OPPORTUNITIES TO IMPROVE CANCER SCREENING IN THE UNITED STATES

Policy has great potential to affect a large number of people inasmuch as it shapes the organization, financing, and delivery of cancer screening. However, we have little data on the effect of policy on cancer screening because it is rarely evaluated in the United States. Notable exceptions include evaluations of policies to promote cervical cancer interventions implemented in the 1980s and 1990s (44, 76) and recent evaluations of various screening programs by Adams et al. (1, 2). A recent addition to these studies compared women enrolled in organized health plans with women in the surrounding community. This evaluation concluded that enrollment in an organized health plan is associated with increased likelihood of

mammography and reduced odds of late-stage breast cancer (105). The following section focuses on national policies and structural interventions at the clinical and health plan level that already facilitate cancer screening. We then propose additional interventions that could potentially reduce costs while improving the quality, coverage, and delivery of cancer screening services and then detail several key research opportunities.

Building on Current Interventions

Many programs already exist that have improved cancer screening in the United States. They operate nationally and in plans and clinics delivering health care around the country. If extended, these interventions could improve cancer screening even more.

NATIONAL INTERVENTIONS Legislation, regulation, monitoring, and funding have increased access to some types of screening. Similar policy interventions would likely yield similar results for other types of screening in the future. For example, starting in 1987, all 50 states began passing legislation mandating mammography by private health insurance plans (71). This trend in legislation was concurrent with a rapid increase in reported use of mammography (Figure 1).

The Medicare program, which provides nearly universal health insurance coverage to Americans aged 65 and older (80) and has lower administrative costs than other do health insurance programs in the United States (119), may be the most successful policy model for health insurance coverage and surveillance in the United States. As the largest purchaser of health care services in the country, Medicare is a prime example of the power of national interventions to influence screening. Medicare's coverage for Part B participants for routine cancer screening (which follows science-based guidelines, with the notable exception of the PSA test), additional screening and follow-up after suspicious screening results, and diagnosis and treatment has had a decided impact on use of these services. In addition, as the only agency to have published reimbursement rates, Medicare tends to set the standard for private insurance reimbursement in the United States.

Although the Center for Medicare and Medicaid Services (CMS) conducts no routine systematic evaluation of the use of Medicare services or patient outcomes and does not collect claims from patients in HMOs (92), several sources of Medicare data are available to researchers; these sources could provide valuable insight into the factors that foster, as well as hinder, optimal cancer screening. These include the Medicare Current Beneficiary Survey (MCBS) (3), the Consumer Assessment of Health Plans Study (CAHPS) (40), and Medicare claims data. The MCBS collects information on cancer screening, and these data can be linked to the Medicare claims data of survey participants. Analyses using these data have led to improvements in Medicare policy. For example, Medicare eliminated its deductible on mammograms after finding that healthy, poor enrollees were less likely to obtain mammography than were other women because of the annual

deductible (7). Other studies have documented disparities in delivery of Medicare services (15, 16), and these findings have led CMS to examine Medicare delivery to historically underserved populations, a critical step toward taking corrective action to eliminate disparities in care. Another service Medicare could provide is a population-based registry needed for efforts to develop an organized national system of screening.

The National Breast and Cervical Cancer Early Detection Program (BCCEDP) is another excellent example of the power of national interventions to influence screening behavior. BCCEDP provides access to breast and cervical cancer screening for uninsured, poor women. First offered to states in 1991, this federal-state partnership, administered and funded by the Centers for Disease Control and Prevention in conjunction with participating states, was rapidly adopted throughout the 50 states, territories, and Indian nations (41, 67, 68). A recent study showed that the number of years since a state adopted the program significantly predicts increased mammography and cervical cancer screening (1). Despite its popularity and success, current funding for the program covers only about 21% of eligible women aged 50–64 years, and coverage varies among states (F. Tangka, CDC, personal communication, 2004).

Considerable anecdotal evidence and studies published during the 1990s suggested that even though poor and uninsured women were getting screened through these low-cost programs, they had no means for obtaining follow-up tests when results were suspicious and no means for obtaining diagnosis and treatment in a timely manner (56). The Congress passed the Breast and Cervical Cancer Prevention and Treatment Act in 2000 to address this issue. The Act provides immediate (presumed) eligibility for Medicaid to cover follow-up care for low-income, uninsured women diagnosed with cancer. Coverage details, like other aspects of Medicaid, are left to individual states.

CLINICAL AND HEALTH PLAN INTERVENTIONS As Zapka (124) points out, insurance plans can play an important role in improving screening because they design benefits, develop and disseminate guidelines for use and reimbursement, and provide health education. The health services literature often distinguishes between HMO/managed care and FFS/indemnity plans. This distinction is important when considering cancer screening because patients with health maintenance plans are more likely than are those with indemnity plans to obtain screening (34, 45). Two reviews of the literature on performance indicators spanning 1980–2001 documented that patient satisfaction with prevention uniformly favored managed care over nonmanaged care (77, 78). In addition, managed care coverage of preventive services was more comprehensive, though findings were mixed for other types of services. A recent comparison of Medicare beneficiaries aged 65 and older in managed care and FFS settings found that managed care was better at delivering preventive services, whereas traditional Medicare was better in other aspects of care (54). These studies included all types of managed care, not just organized plans such as group- and staff-model HMOs.

In 2000, Phillips (85) surmised from Potosky's findings (87) that the inception of widespread managed care in the United States had reduced previous differences found in screening rates between group- and staff-model HMOs and indemnity plans. Yet, almost no outcome studies distinguish between group- and staff-model HMOs and other types of managed care organizations (19). A recently published survey of health plans and policies by Klabunde et al. (51) is one of the few studies that does distinguish between staff and group model HMOs and other types of managed care. This analysis found that group- and staff-model health plans were far more likely than were other types of managed care plans to have any system at all for screening delivery or monitoring (92% versus 36%). They also were significantly more likely than were other plan types to cover more than one screening modality, to have issued screening guidelines to providers, and to have issued guidelines covering more than one screening modality.

These findings suggest that policy and structural interventions to increase cancer screenings may be more feasible or successful in organized plan and practice settings because these settings can intervene at multiple levels, and therefore the interventions can have synergistic effects (124). This is particularly true when all components of the cancer continuum are targeted (125) because, as noted at the outset, cancer screening is effective in reducing cancer mortality only when it is accompanied by timely follow-up and treatment. For example, a review of health disparities in cancer treatment found that group- and staff-model HMOs and the VA system yielded similar cancer outcomes between racial-ethnic minorities and whites diagnosed with the same stage cancer (98).

Major structural changes are often more easily implemented in an organized setting than an entrepreneurial one. For example, Taplin et al. (104) found that a "team approach" in a staff-model health plan, in which a team of providers and staff organized care for a specific group of patients, did better at providing screening than did adjacent practices, largely by implementing an information system under an agreed-on plan. A meta-analysis conducted by Stone et al. (101) found that organizational change consistently increased use of cancer screening services when compared with physician-directed and patient-directed interventions. The changes tested included establishing a separate clinic devoted to screening and prevention, incorporating prevention into planned care visits, assigning staff to identify patients in need of prevention services, and arranging appointments for those patients (101). Stone concludes that decisions to use a particular approach will depend on resources, expertise, feasibility, and cost-effectiveness.

Several factors may help explain why it is easier to execute changes in organized settings than in others: the presence of research departments that disseminate scientific findings to staff; structured opportunities for discussion and debate about practices and protocols; institutional policies to screen patients for cancer; centralized administrations that allow for economies of scale; and strategic integration of prompts and reminder systems (66), goal setting, benchmarking, audits, and feedback (62).

However, some structural changes are feasible in any setting. For example, screening test use increases when reminder systems are in place. These systems can be instituted in entrepreneurial practice settings as well as organized plans. Other structural changes can increase screening rates for tests that require a referral and additional appointment (such as mammography and colorectal endoscopy) (13, 39, 72). One innovative study at a community health center introduced academic detailing and also moved sigmoidoscopy on site. Both physician referrals for and use of sigmoidoscopy by patients increased as a result (96). This finding is important because integrating screening services by moving them to the same site is against the tide in the United States. Mammography and colorectal endoscopy services usually require an additional appointment at a separate facility.

The Health Plan Employer Data and Information Set (HEDIS), a public-private surveillance effort, is an important tool that can be used to monitor the outcomes of structural interventions at the clinic and health plan level. HEDIS is a core set of health plan performance measures covering quality, access, patient satisfaction, membership, utilization, and finance, which has begun to bridge the information gap in the privately insured population younger than age 65. Designed to provide information for employers seeking cost-effective health insurance plans for their employees, HEDIS has measured ambulatory care facility compliance with breast and cervical cancer screening guidelines since its inception (22).

HEDIS cancer screening measures are based on USPSTF recommendations, supplemented with American Cancer Society guidelines when greater precision on the timing of screening is needed than USPSTF provides (82). HEDIS data, collected from nearly 600 managed care plans covering approximately 51 million Americans, show breast and cervical cancer screening rates slightly higher for managed care facilities than for those reported by the general population (83, 102). Colorectal cancer screening will become a HEDIS measure in 2005 (<http://www.ncqa.org/communications/news/hedis2004pubcomm.htm>).

Promulgation of clinical practice guidelines also has been widely promoted as a strategy to improve quality of cancer screening care. However, a Cochrane Review found that passive dissemination of information is generally ineffective, and policies designed to encourage more active implementation of research-based recommendations are needed to ensure changes in practice patterns (5). Studies of the promulgation of screening guidelines to physicians need to evaluate how the characteristics of different types of plans affect screening diffusion (5, 17). A recent Swedish study (49) showed that training to bring clinical practice into conformity with guidelines is possible regardless of the practice venue, although time and financial limits may constrain physician entrepreneurs from engaging in this activity without voluntary society or government help.

LOOKING TO THE FUTURE

Many of the deficiencies in the distribution and delivery of cancer screening described in this review could be rectified if clinical services were organized into larger entities that could allow providers to take advantage of economies of scale,

incorporate and update new technology rapidly, and distribute services, as needed, to at-risk populations.

Although these solutions have been identified (33) and the national interventions noted in the previous section have taken advantage of them, the high price of screening and its effect on the distribution of cancer screening services still must be addressed by global policy informed by economic analysis from the societal perspective (95). Additional research could fruitfully inform these analyses. For example, research is needed to identify the types of structures and policies that maximize access, quality, and cost-effectiveness of cancer screening. Structures themselves are rarely the target of interventions, and they need to be considered. Structural aspects of health care delivery include type of delivery system, technological systems within clinical practice, organization of clinical practice, and practice patterns. When practice patterns are analyzed, the type of delivery system is rarely described clearly. A clear explanation of the type of delivery system should be routinely included in analyses of interventions because it is impossible to generalize about findings if the study context is not known.

Studies have shown that equal-access organized health plans better promote and facilitate access to high-quality, cost-effective cancer screening than do other types of health plans. Including all types of nonindemnity plans under the umbrella term "managed care" is no longer analytically useful because managed care is the primary type of health plan in the United States, and its meaning is unclear. However, managed care includes a wide variety of types of plans and structures, including staff models, Networks, IPA, and PPO/POS. To evaluate service delivery policy and structures, studies need to report the type of system within which the intervention or surveillance is conducted.

In the meantime, however, a number of existing policies could be extended to improve cancer screening in the United States:

- Legislation mandating private insurance coverage for mammography could be extended to other scientifically supported cancer screening modalities and to regular checkups, which are associated with higher cancer screening rates.
- Single payer coverage, such as Medicare, could be extended to the entire population to adequately reimburse cancer screening and clinical follow-up (43, 73).
- Extend the BCCEDP to colorectal cancer screening and extend Medicaid presumptive eligibility to colorectal cancer treatment.
- Employ standardized guidelines for cancer screening. The VA, large-group and staff-model HMOs, and HEDIS already use established guidelines, which discourage use of screening tests that have no evidence of a mortality benefit.
- Reimburse for health maintenance visits to encourage providers to discuss cancer screening and other preventive services with new enrollees.
- Extend HEDIS measures to screening follow-up, including delivery of all test results, and follow-up when results are suspicious or treatment is needed.

- Incorporate cancer screening reminder systems for patients and providers.
- Develop a national system of screening registries linked to cancer registries to monitor periodicity of use of screening services as well as use of follow-up services. The Breast Cancer Surveillance Consortium provides a model for a cancer screening registry (<http://breastscreening.cancer.gov/esp.pdf>).
- Standardize forms and procedures for processing private insurance claims to bring their administrative costs in line with those of Medicare.

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