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**Improving Community-Based Prevention by Transforming Managed Care
Organizations into Health Improvement Organizations**

by

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ABSTRACT

Improving Community-Based Prevention by Transforming Managed Care Organizations into Health Improvement Organizations

Large non-governmental health systems are taking over much of the direct delivery of healthcare to populations previously served by health departments. This paper explores ways in which governmental and academic public health systems can help maximize the positive aspects of this situation on community health. The experience of Group Health Cooperative of Puget Sound is reviewed, with particular attention to its prevention structure and work to address tobacco use. An ideal preventive health improvement system model is presented, and future directions and key lessons are explored, including encouraging the survival of non-profit health systems, appropriate measurement of key prevention performance indicators, and fostering prevention delivery infrastructure development within managed care organizations.

Keywords

Managed care

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Health promotion

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Biographies

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Improving Community-Based Prevention by Transforming Managed Care Organizations into Health Improvement Organizations

Introduction

Any discussion of community-based prevention would be incomplete without addressing some of the potential effects that may result from two trends in healthcare delivery. First, during the past decade a growing cadre of physicians and other healthcare professionals trained in public health theory and practice have been developing prevention infrastructures within non-governmental health systems caring for a defined population (such as health maintenance or managed care organizations). These individuals attempt within these systems to apply public health principles to the improvement of preventive care for the population¹. Second, in the past several years there has also been a shift at the local and state level towards public health departments partially or completely divesting themselves of the business of providing direct patient care. The provision of care to populations such as the poor, historically treated by governmentally sponsored and administered agencies, is giving way to care provided by a range of “managed care” organizations (MCOs) reimbursed via capitation agreements with local or state agencies.² Because of these two trends, rapid membership turnover, and increasing recognition of the influence of environmental, political and social forces on disease outcomes, these systems also have an increased interest in efforts to improve the health of the entire community.

In this article we provide an overview of capacities for prevention improvement within non-governmental health systems, particularly relating our experience at Group Health Cooperative of

Puget Sound (GHC), a consumer-governed health improvement organization with over 650,000 members, 6,000 employees, 900 physicians and a 20-year track record of consciously attempting to improve the quality of preventive services for its members³. We also address ways in which governmental and academic public health can facilitate prevention improvement in these non-governmental health systems.

What's in a Name?

Unlike the old days of fee-for-service medicine, most people in the U.S. now have their healthcare services provided by an entity that combines some of the functions of an insurer and a deliverer of care for a defined population of people. Although in this article we usually use the phrase “Managed Care Organization (MCO)”, there is not a consensus on the best name for these entities. Several decades ago, it was “health maintenance organization”, which was associated initially with closed staff-model systems where physicians were salaried employees of the health plan or an affiliated physician group. But as these systems expanded and new systems were created that included independent providers who accepted patients on a capitated basis, the term “managed care organization” was introduced. Although this term is currently the most popular, it has a top-down, screw-tightening sound to it that many organizations feel does not accurately describe their work or structure. The descriptive name that our organization uses is “health improvement organization” (HIO), to indicate that we are not only about the business of maintaining health or managing healthcare, but are actually committed to *improving* the health of our members and the community through a collaborative process. In our case this includes having a Board of Directors elected by health plan members who hire the CEO and work with medical

staff and administration to help ensure our improvement goals reflect the desires of those we serve. At the individual level, this means using a shared decision-making model to approach complex issues such as hormone replacement therapy, PSA testing, and priority-setting in chronic illness care⁴. GHC also defines itself partially in terms of what it is not - it is not in the business of micro-managing the day-to-day practice of medicine. However, the term Health Improvement Organization has not spread widely. Other names used include “integrated health systems”, which may allow multiple insurance products, and simply “health plans”, indicating any entity that takes responsibility for coordinating and improving the delivery of care.

Non-Governmental Can Still Be Public - Health Oriented.

Many MCOs are creating centers of responsibility for population-based and preventive care improvement. In some organizations these exist as separate departments, and in others are embedded within the mission of quality improvement or other departments. This trend is most consistent within the not-for-profit organizations, but can also be found in for-profit organizations. Many of the individuals working in these capacities received formal public health academic training and some have worked in governmental health agencies previously. They tend to think of themselves as public health workers who happen to work on public health improvement within managed care organizations.

The past decade has seen the rise of some trends within large healthcare systems that are in alignment with the values of public health. For instance, there has been a major organizational

commitment to the values of quality improvement and population-based medicine. Some of the same forces involved in the “industrialization” of medicine have helped foster these trends, but it also has been an independent force. As companies have desperately looked at ways to decrease premiums while simultaneously trying to improve the quality of care or service, one approach has been to attempt to continuously examine and measure the processes of care, and empower the teams that participate in the processes to systematically examine and improve these processes. This has resulted in drastic decreases in average length-of-stays in hospitals, and guidelines to attempt to better align the practice of medicine with evidence for effectiveness. Unfortunately, rapid across-the-board downsizing to drastically decrease costs has sometimes hampered efforts to improve quality and service, although studies of small area variation within and between plans suggest that approximately 30% of costs may be avoided by decreasing variation without threatening quality⁵.

Increasingly, large healthcare organizations are also beginning to develop infrastructures to monitor and analyze the causes of morbidity and mortality in their populations. Although they are not yet as sophisticated in this realm as most health departments, the need to know what is causing illness and disease, and hence expense, in their populations has led to the development of more sophisticated tracking and monitoring systems.

Economic and Structural Factors Impacting Prevention Efforts

Increasingly, health systems are driven by the bottom line: profit or margin. Ten years ago the majority of health systems were locally based and non-profit, but this has shifted dramatically towards national companies evolving ever-more-complex relationships, including publicly traded for-profits accountable to their shareholders to extract the highest profit margin possible from the “business” of health. Even within the world of non-profit health systems such as Group Health, Kaiser-Permanente, Healthpartners, Harvard-Pilgrim Community Health Plan etc., there is increasing attention being paid to driving down costs and business-oriented strategies in order to survive in what is now clearly a highly competitive volatile marketplace. The phrase “cost per-member-per-month” (pmpm) has become a steady drumbeat. Non-profits are also linking together to create larger regional and national organizations capable of competing with the national for-profits. Group Health, for instance, is affiliating with Kaiser. However, it is important for leaders in governmental public health to recognize that there are important differences between the for-profit and non-profit sectors of MCOs.

The bottom line difference is the bottom line: publicly traded for-profits deliver healthcare services in order to make money for their shareholders. Non-profits make money in order to deliver healthcare services⁶. Many, but not all, of the horror stories about MCO’s manipulating physicians have emanated from the for-profit publicly traded sector, such as gag rules on physicians around non-covered services, financial incentives for providing less care⁷, and even frank fraud⁸. There is a rich literature describing improvements in important health care outcomes in staff-model HMO settings in areas such as breast cancer survival⁹, prostate cancer

survival¹⁰, immunization rates¹¹, and overall performance¹². However, these studies were done when non-profit HMOs predominated. The generalizability of these improvements to publicly traded for-profits has not yet been rigorously studied.

Whether for-profit or non-profit, MCOs are increasingly driven by the bottom line of “what will result in fast cost-savings or rapid increases in membership?” when deciding what areas of possible improvement to focus on. Although prevention has often claimed to deliver actual cost savings, the arenas where we can truly deliver on this promise are few and far between. Most preventive services cost money to deliver years of life saved. Even ones where there is clear pay-off in terms of decreased utilization of services, this decrease more often comes years after the intervention, such as smoking cessation programs which pay for themselves in four or five years by decreasing hospital utilization¹³. Unfortunately, with both the rapid cycle time for membership in MCOs (many plans roll over 20% of membership/year) and the focus by MCO planners on short-term cost decreases that can be measured in months not years, prevention is not objectively a major part of the equation.

Prevention improvement efforts that are generated by cost-containers tend to run more toward what we shouldn't do than what we should. For example, in the heart disease prevention arena the emphasis will be on controlling access to the cholesterol-lowering statin drugs, rather than increasing exercise or improving diet.

To overcome this tendency, we believe it is critical that there be a recognizable organizational division for prevention within MCOs, and that this division work tirelessly to maintain pressure to consider improving preventive services as seriously as improving therapeutic services. Some of the approaches that have worked in our institution have included:

- emphasizing the important marketing and public relations role that high-quality preventive services can play. Our own surveys and national surveys indicate that customers value prevention, that it is one of the top six indicators they examine when choosing a health plan and that it can decrease disenrollment by 9%¹⁴.
- emphasizing that our primary business is saving and improving the quality of lives, not simply doing less, and that this applies to prevention as well as treatment. We do require higher standards of proof both for effectiveness of proposed prevention screenings and interventions, and for evidence that harms have been quantified, since unlike therapeutic interventions where a person in pain is seeking us out, we are usually asking asymptomatic people to undergo preventive services. The maxim *Primum non Nocere* is especially important for preventive services¹⁵. However, no one would require that a surgeon prove that operating on a case of appendicitis is cheaper than watchful waiting, only that it improves the probability of the patient surviving. We may work to control the costs associated with treatment of appendicitis, by decreasing hospital length of stay and decreasing unnecessary operations for abdominal pain, etc., but we don't require that the basic intervention end up costing our system less than doing nothing. Our patients are paying us as an insurer and deliverer of care to provide preventive services. Most MCO planners initially want to apply the "it must end up saving us money" standard to prevention improvements. We have tried to move them towards the "there must be

evidence for cost-effectiveness” standard, where we are willing to spend reasonable amounts of money to add years of quality life, based on an understanding that our patients are paying us to help prolong their life in a proactive fashion where indicated, not just fix them when they break down.

Our experience

At Group Health, we have been involved in many areas that illustrate the rich potential for large non-governmental health systems to improve the public’s health. We here present a brief review of how we have structured this work, and some of our experiences in one specific area for illustrative purposes: decreasing tobacco use. Specific detailed information about our overall approach³, immunization programs¹⁶, breast cancer screening¹⁷, bicycle safety¹⁸, quality improvement infrastructure¹⁹, and prostate cancer screening²⁰ have been published previously.

Prevention Structure

Twenty years ago a Department of Preventive Care (DPC) was formed within our medical staff to provide an organizational focus for physician-led preventive initiatives. This department brings an epidemiologic, population orientation to priority-setting and uses an evidence-based approach for the analysis of issues. It also works to bring in external funding to help answer critical research questions that affect the delivery of preventive care. It co-sponsors with our Center for Health Promotion a multi-disciplinary Committee on Prevention with physicians, nurses, pharmacists, administrators, health educators, epidemiologists and researchers that

sponsors, prioritizes and implements prevention improvement efforts, including critically reviewing prevention guidelines and screening schedules. The Center for Health Promotion is also charged with doing much of the implementation work that makes prevention guidelines and programs “come alive” in a systematic fashion. It also has a community services function which works closely with community organizations and governmental agencies to help improve the health of the entire community, and a health-at-work division that commercializes services such as our smoking cessation program in order to make them available to other health plans and employers.

The Center for Health Studies at GHC is a semi-autonomous research unit supported by external grant dollars (approximately \$9 million in 1995) involved in epidemiological and health services research, with particular interest in improvements of chronic disease management and population and clinic-based risk factor reduction.

The Division of Clinical Planning and Improvement, begun four years ago, oversees organized activity to improve and maintain the quality of clinical services at Group Health. It employs a “gaps” measurement quality improvement approach,²¹ which systematically examines processes and outcomes of clinical care in order to focus improvement efforts on areas where there is a measurable, modifiable gap between what is currently happening in practice and what we are capable of achieving. Health status, satisfaction, and cost-effectiveness are the main outcomes of interest. Increasingly, its mission has overlapped with the other prevention players, particularly as its guideline development group has grown more systematic in the creation of processes for

formal literature review and methods to integrate guidelines into clinical care. Recently, the DPC and this group have developed a coherent common approach to guideline development and implementation.

We have found that to be most effective prevention improvement efforts need to start with an open mind as to what is the best venue to accomplish the desired outcome. We do not assume that every problem is best solved by a clinical intervention delivered in a doctors office. Indeed our most successful programs such as our breast cancer screening, immunizations, and tobacco cessation all use the entire “playing field” from the individual encounter in the primary care office through changing the office infrastructure and other organizational change, and including the external community^{3, 11}. In these latter areas, we become more similar to a public health agency.

Decreasing tobacco use - a case study

In 1991, a group of population-oriented planners began meeting regularly to develop a comprehensive strategy to decrease the prevalence of tobacco use at Group Health. Several years later, GHC formally adopted this goal as its number one prevention priority. A number of dramatic changes in how we approach tobacco use have resulted. The distinguishing characteristic of this effort was that it began from a population perspective: the planners did not ask how we could get more of the smokers who took part in our cessation program to quit, they asked how can we decrease the prevalence of tobacco use in our entire population. Improvement efforts focused on how we could get dramatically more smokers to participate in the program, how we

could systematically get our doctors and nurses and pharmacists to provide brief, repetitive messages to smokers to quit, and change in public policy at the regulatory/legislative level.

Our major accomplishments include a profound re-tooling of our smoking cessation program²² which has included making it available through telephone counseling in our Center for Health Promotion. We removed most financial barriers to program participation, including coverage of nicotine replacement therapy for appropriate GHC program participants. As a result of these efforts, participation increased 10-fold, from 180 a year in 1991 to 1500-2000 a year since 1993. In 1997, we removed all remaining copay barriers and participation is approximately 3,000 a year. Our one-year cessation rate, which had been 22%, increased and has held steady at 30% (defined as no smoking, not even a puff, for at least a month prior to the call)^{23, 24}. This program is also made available on a commercial basis to employers and other health plans.

We have also introduced a clinical guideline into our primary care system that is similar to the NCI²⁵ and AHCPR²⁶ guideline, requiring clinical teams to routinely inquire and record smoking status, give brief advice and offer assistance to all smokers. We have systematically measured multiple process outcomes over the past three years using chart audits and standardized telephone interviews of randomly selected patients. We have fed results back to the teams, and have seen major progress, including an increase from less than 30% identification of smoking status to over 85% in the medical records at all 29 of our primary care clinics (see Figure 1). Documentation of advice to quit in identified smokers has doubled in the past year (see Figure 2), and 71% of our patients who smoke report in post-visit surveys that their doctor talked to them

about smoking during their visit. This compares with national surveys reporting that half of smokers say smoking has never been discussed with them by any doctor^{27,28}. In 1994, 45% of parents of children who are exposed to environmental tobacco smoke recalled being advised of its dangers. By 1996 this had increased to 68% ($p<0.05$). Over the past decade, our smoking prevalence has declined from 25% to 15%, as measured by large surveys, while the State of Washington's prevalence has only declined from 25% to 23% (see Figure 3).

Group Health has also worked closely with the larger community, since clearly tobacco use is a community problem, not just a clinical problem. Our legislative lobbyist was instrumental in the passage of a state law that banned vending machines and established a merchant licensing fee to fund tobacco education programs at the local health department level and enforcement of the law prohibiting sales to minors. Because interventions in the schools and media have been shown to be effective²⁹ we have co-sponsored a tobacco poster art contest in the schools that has been highly successful three years in a row. Other examples are outlined in the "governmental roles" section.

Preventive Health Improvement System

Our sense is that the way of the future for the delivery of preventive services in MCOs lies not in the development of more isolated stand-alone programs for specific screening programs or specific risk factor reduction, but in building an integrated system that addresses all preventive issues from primary risk reduction to secondary screening to prevention of disability from

existing chronic diseases within a cohesive, seamless framework. This ideal preventive care system will incorporate what is known about screening requirements³⁰ and changing individual behavior³¹ with the incredible capacity of developing information systems to track and remind and directly intervene or refer individuals regarding all recommended prevention services. We envision a proactive interactive system that communicates regularly through multiple entry points with every healthplan member, with real-time information about a members' prevention status available to clinical providers at both the individual level during all patient encounters, as well as aggregate for population monitoring and local-level interventions. The system will blend centralized coordinated reminder systems and behavior change support utilizing personalized mail, on-line access and telephonic capacity with local clinic-level efforts augmented by just-in-time information to providers and patient education support.

To our knowledge, no such comprehensive preventive health improvement system exists anywhere in the world, but many organizations and individuals are working on the development of different components of such a system^{32, 33}. We believe it is critical that both the governmental and academic public health systems and the non-profit private health systems work to help create this system. Many pharmaceutical companies are actively developing "disease-state management" subsidiaries that are increasingly getting into the business of managing and even delivering healthcare and preventive services for high-cost carve-out areas. If we don't influence or provide alternatives, the complex integrated health improvement system we envision will be created by the pharmaceutical industry and other for-profit health system players, whose motives and driving forces may include using it for the purpose of increasing

sales of high-profit products, or otherwise increasing profitability rather than focusing on increasing health status.

Governmental Roles in Improving MCOs Prevention Performance

As health departments continue to divest themselves of direct patient care responsibilities, they will continue to play several critical roles in regards the delivery of direct patient care by MCOs:

1) Regulatory capacity. Especially in an era increasingly dominated by for-profit healthcare systems, it is appropriate and necessary that governmental health agencies be engaged in an oversight capacity. Although there has been a plethora of legislation that is primarily aimed at simply bashing MCOs³⁴, there have also been thoughtful attempts both to limit excesses such as gag rules that do not allow physicians to discuss non-covered services, and to encourage more proactive delivery of preventive services. In the latter arena however, health departments may be hampered by their direct link to local/state legislative bodies that are more subject to lobbying by special interest groups. Examples of problems that can arise as a result have included attempts by special-interest groups to legislate requirements for coverage and even mandating specific care delivery patterns for questionable or controversial prevention screening procedures such as PSA testing and mammography under age 50.

Another potential regulatory role for health departments would be to require that all MCOs devote a demonstrable fixed percent (i.e. 3-5%) of revenues to the development, implementation

and improvement of population-based prevention services for the members served. This would help counterbalance the difficult reality that the time-period for beneficial program effects (either cost-savings or avoiding negative health outcomes) is likely to be at least 3 to 5 years, not the standard six to twelve month result requirement under which MCOs currently operate.

2) A customer. Health departments are becoming a major purchaser of capitated health system services through their divestment of direct delivery of Medicaid services, developing Medicare managed care contracts, as well as other health service contracts. As a customer of these systems, they can exert powerful competitive pressure on health service deliverers to provide high-quality low-cost medical care, including preventive care. By requiring measurement and embedding into the bidding requirements key prevention services, they can help move health plans toward systematically providing and improving such services as childhood immunizations, paps, mammography and smoking cessation services to their populations. The Pacific Business Group and others have identified prevention targets such as immunization rates, with plans that do not meet the targets being at risk for decreased overall revenue³⁵. Some of the keys to successfully using this leverage point are to:

- choose key prevention interventions consistently recommended by evidence-based gold standard groups such as the US Preventive Services Task Force. Examples of services not to require include eye exams in young adults, PSA tests, or frequent general periodic health exams.
- try to be consistent with other large purchasers wherever possible, such as the HEDIS prevention measures of the NCQA. As requiring measurement of processes and outcomes becomes increasingly popular among purchasers, MCOs are faced with growing non-

complementary requirements for measurement that can eat up scarce measurement and improvement resources.

-do require wherever possible population measures of effectiveness, rather than measures of care quality for those who have sought out care. For example, even if a plan is doing a good job of immunizing Medicaid children who come in for a visit, they may have a poor rate of immunization for that population if they have no program for outreach to proactively encourage parents to bring their kids in.

-practice what you preach. An example of where this has not happened in our state is in the area of smoking cessation programs. Although our state and local health departments have been strong advocates for legislation to decrease tobacco use, our state has not yet included coverage of smoking cessation programs as part of the benefit package for either our Medicaid population or our "basic health plan", a state-sponsored insurance program funded by a tobacco tax, for those too poor to purchase insurance but not poor enough to be eligible for Medicaid. For several years, these were the only groups in our plan who had no coverage for smoking cessation programs, even though they have twice the smoking rate. At the same time that GHC's smoking cessation program participation rate was soaring 10-fold, we had virtually no participation from this critical population. Our GHC solution eventually was to bypass the governmental public health arena, and bite the bullet by providing the service even though it is not required as part of the benefit package. Since doing this, Medicaid and basic health plan participation have increased 10-fold. In this way we are fulfilling a part of our community service mission.

3) Technical assistance and consultation: particularly in the arena of disease surveillance, managed care organizations can benefit from the expertise in health departments, as well as

university-based public health academics. Examples of how we have undertaken this role have included purchasing the expertise of the state department of health surveyors who do the CDC-designed behavioral risk factor survey to survey our own membership, asking the same questions as well as some specific to our own institution.

Another arena where health departments may have specific and valuable expertise important to MCOs is in the realm of outreach and behavior change for low-income populations.

4) Underwriter of health services research: MCOs have the capacity to deliver preventive care in new ways. Determining how best to do this, and how much more effective these ways are, requires further research. Ensuring that the most relevant and important questions are asked and answered with the most appropriate methodologies and sufficient funding will require continued dialog and cooperation between MCOs, public health agencies such as the CDC, and academic research centers. The CDC is working actively to build such a partnership³⁶.

MCOs with their defined populations often have utilization data including costs and diagnosis for members seen at all levels of care including primary care, emergency, specialty and hospital. They can thus serve as mini population laboratories for disease surveillance³⁷, for testing interventions directed to populations^{16, 38} and for measuring the effects of community-based programs. We have been involved in numerous collaborative research projects with university-based public health researchers to help answer fundamental public health questions, such as:

- is chlamydia screening in younger women beneficial³⁹?

- do community campaigns reduce head injuries³⁵?

-what interventions work to decrease falls in seniors⁴⁰?

5) A partner for policy: We have worked with our state and local health departments to help champion anti-tobacco legislation. In fact, we have had the Washington State Department of Health Deputy Secretary/Health Officer sit on our tobacco steering committee, and the medical director sit on our Committee on Prevention. We have also worked in numerous partnerships both with health departments and other voluntary organizations such as the American Cancer Society, Heart Association and Lung Association. At the national level, the CDC played a leadership role working with The HMO Group to call together a large group of MCOs to develop a strategy for tobacco policy work that led to a coalition of MCOs purchasing ad space to support FDA regulation of tobacco. At the local level, we have collaborated with our health departments and university researchers to develop a community-based campaign to increase bicycle helmet usage⁴¹.

6) A leader and coordinator in community medicine: Many MCOs will depend on leaders in public health to help identify the key issues that need to be addressed to improve the health of the entire community, to identify the strategies that can lead to solutions, and to recommend the specific roles that MCOs can play. Examples include the work our state health department has done to develop an immunization registry so that the immunization status of all children in the state is in a common data-base, a necessity given the rapid cycling of children from plan to plan. This example was a two-way street in that GHC investigators played a sizable technical role in developing the community registries since we had already developed one for our members³³

The development of an evidence-based guide to community prevention services will be of considerable help in this arena.⁴²

Key Future Opportunities

Our most fundamental learning after working within a non-profit non-governmental health improvement organization for 20 years is that this is a pioneer venue for public health activity.

-health departments should consider placement of public health workers in MCOs or at least having liaisons to help foster a public health approach to the populations served, and to learn more about the capacity of MCOs to deliver preventive care.

-Public health schools should develop training opportunities during public health and preventive medicine training programs within MCOs, as well as fostering research relationships.

-MCOs should invest a small but consistent portion of their resources in efforts that improve the health of the entire community, including supporting legislative and regulatory activity as well as community coalitions.

-MCOs should invest a portion of their resources into further development of their prevention delivery infrastructure. This tendency, which runs counter to the powerful force of treatment-oriented medicine, can be aided by external forces such as purchaser pressure requiring measurement of prevention processes and outcomes. If necessary, this should be legislatively mandated.

-consult with and include MCO leaders in planning efforts, particularly around identification of measurement goals for populations historically served by public health departments

-Any attempts by governmental public health agencies to influence how MCOs provide preventive care for the patients they are responsible for should only include measurement and accountability for key prevention interventions that have strong, established evidence both for importance and for capacity to intervene in a cost-effective manner.

-When public health officials can influence which MCO plans will be made available to the poor or elderly, non-profit status should be taken into account along with cost and performance measures, since these plans spend in excess of 90 cents on the dollar on health-care as opposed to the 70 cents by many publicly traded for-profit plans⁶. This might be done by, for instance, limiting the percent of income that can go to profits or administration as opposed to patient care (including preventive care). Effects of different financial structures on quality of care is an important area for future research.

Summary

There is a major change occurring in the structure of healthcare delivery away from local fee-for-service toward large complex national health plans that provide both insurance and healthcare. This change will impact the delivery of preventive services profoundly. It is up to those of us who have training and commitment to improving the public health, whether we work in an academic setting, a governmental agency, or within a MCO, to work together to maximize the potential for benefit from this change, and minimize the potential harms.

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Table 1

Governmental roles in improving MCOs prevention performance
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- | |
|---|
| <ol style="list-style-type: none">1. Rational regulator.2. Customer (i.e. Medicaid)3. Provider of technical assistance and consultation.4. Underwriter of health services research.5. Partner for policy change.6. Leader and coordinator in community medicine. |
|---|

Table 2

Key future opportunities	
1.	Place public health workers within MCOs.
2.	Develop training opportunities with MCOs.
3.	MCOs invest resources into community health initiatives.
4.	MCOs/Governmental health agencies invest in developing prevention infrastructure.
5.	Involve MCOs in public health planning efforts.
6.	Emphasize areas where evidence is strong.
7.	Consider financial structure of MCO as well as cost and short-term performance.

Figure 1

**Group Health Cooperative of Puget Sound
chart documentation of tobacco status**

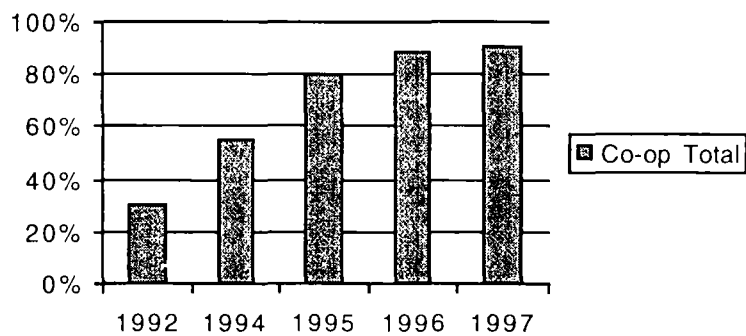


Figure 2

**Group Health Cooperative of Puget Sound
chart documentation of provider tobacco cessation intervention**

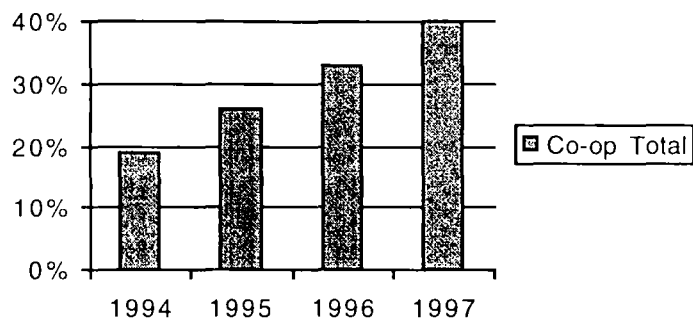
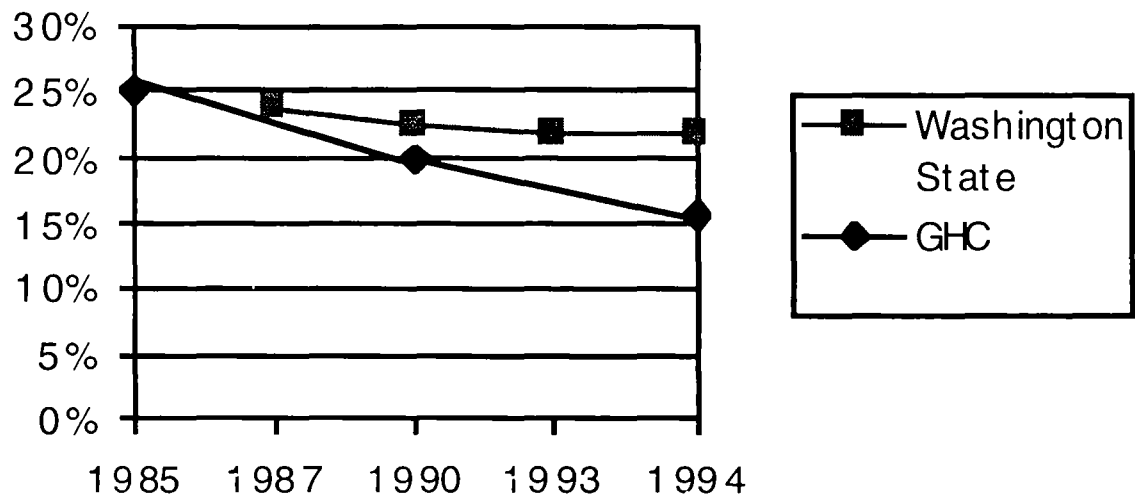


Figure 3

Smoking prevalence

Percent of Adults
Currently Smoke



Quitting Smoking in the United States in 1986

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In an analysis of recent behavior with regard to quitting smoking, detailed histories were obtained on a representative sample of 5,623 Americans who had smoked in the year preceding the 1986 Adult Use of Tobacco Survey. An estimated 55.8 million Americans smoked regularly for some period during the year prior to the survey. Approximately one third (34.8%) quit for at least a day during the year prior to the survey, 28.3% quit for at least 7 days during the year prior to the survey, and 16.2% were still not smoking at the time of the survey. Of those who quit for a day, 54% had relapsed by the time of the survey. Demographic characteristics, such as age, sex, race, marital status, and education, were evaluated as predictors of making a major attempt to quit for 7 days or more. Among those who had made a major attempt, a similar analysis was done predicting success in maintaining cessation for 3 months or more. Ordinal logistic regression analyses showed that younger age and higher education predicted a major attempt to quit. There was only one group who differed markedly from all others: those who were younger and were more highly educated. Older age and being white predicted those who abstained for 3 months or longer. [J Natl Cancer Inst 82:1402-1406, 1990]

Smoking prevalence in the United States has been decreasing since the early 1960s (1); since 1974, this decline has occurred at a constant rate of about 0.5 percentage points per year (2). If this constant rate continues, the number of adult smokers in the United States in the year 2000 will be approximately 42 million (3), a number not substantially lower than the 48 million smokers noted in 1985.

In 1985, there were an estimated 390,000 smoking-attributable deaths and many more cases of smoking-related morbidity in the United States (1). Even if the current success in reducing smoking prevalence continues, there will be only a small reduction in the

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number of smoking-related health events by the year 2000. Further, the pattern of these health events will change; they will occur increasingly more often among women, blacks, and the less educated (2,4).

Despite the substantial progress of the last 25 years in the reduction of smoking, the United States is still far from a smoke-free society. To reduce smoking prevalence further will require either a reduction in the rate of smoking initiation or an increase in the rate of smoking cessation.

Usually, smoking cessation is measured in surveys by a current smoking status question, which divides the population into current, former, and never smokers. Cessation is indicated by the number of former smokers or the ratio of former smokers to ever smokers (quit ratio) (5). These measures of smoking cessation are both point prevalences. However, smoking cessation is not a single-step, all-or-none process; rather, it is a dynamic process. In a pattern similar to that observed among heroin addicts and alcoholics, smokers who quit often relapse to become smokers again (6). Like cessation of other drugs of addiction, cessation of cigarette smoking is associated with withdrawal symptoms whose occurrence and strength are related to the likelihood of relapse. Public health efforts to assist smokers to quit often concentrate on increasing the smokers' motivation or on increasing their skills in maintaining cessation and avoiding relapse. The appropriate distribution of resources among those different approaches requires answers to the following questions: Who is trying to quit, and who is successfully maintaining cessation?

Using a large, nationally representative survey conducted in 1986, this article describes the sociodemographic differences among the population of smokers who made a major attempt to quit smoking in the year prior to the survey as well as among those who were able to abstain from smoking for at least 3 months and were still abstinent at the time of the survey. The objective of our analysis was to describe the dimensions of the quitting process in the United States. By identifying those groups of smokers at various stages of the quitting process, we hope to stimulate studies and interventions to improve the likelihood of successful smoking cessation.

Subjects and Methods

In 1986, Westat, Inc. (Rockville, Md), conducted a detailed survey (i.e., the Adult Use of Tobacco Survey) for the Office on Smoking and Health on 13,031 members of the adult (≥ 17 yr old), noninstitutionalized population of the United States. The complex sampling process has been described in detail elsewhere (7). The process involved a screening survey of 36,405 households obtained by random-digit dialing to clusters of between 10 and 15 households from a random sample of telephone exchanges in the United States. A stratified random sampling procedure was used to select participants from this screening survey to provide an approximately equal proportion of respondents in each smoking category (current, former, or never). The response rate was 85.5% to the screening survey and 86.9% from the selected individuals, the product of which gives an overall response rate of 74.3% ($n = 13,031$). The survey was weighted to control for sample design and to ensure representativeness according to geographic region, education, race, sex, and age.

Smoking status (current, former, or never) was obtained from responses to the following two standard questions used to define smoking status in the United States: 1) Have you smoked at least 100 cigarettes in your life? 2) Do you smoke cigarettes now?

Smoking cessation is not defined by former smoking status but rather by history of quitting smoking over the past year. In accord with the National Working Conference on Smoking Relapse (8), smoking cessation is defined as abstinence for at least 1 day. However, a more interesting variable in terms of describing the quitting process is a "major quit attempt," defined as at least 7 days of abstinence. The clinical programs studied by Hunt et al. (6) suggest that a high proportion of those who relapse will do so in this 1st week. We chose to model those people who made it through the crucial 1st week. The same data also suggest that the majority of relapses will occur within 3 months after smoking cessation.

Quitting history of former smokers was obtained by asking them the following question: Approximately how long ago did you stop smoking cigarettes? Quitting history of current smokers was obtained by asking them the following three questions: 1) Have you ever made a serious attempt to stop smoking cigarettes entirely? 2) Just thinking of the last time, how long did you stay off cigarettes? 3) How long ago did that (LENGTH OF TIME) period begin?

Of the 13,031 persons included in the survey, 5,623 (4,700 current smokers and 923 former smokers who had abstained for < 1 yr) reported smoking regularly at some point within the 12 months preceding the survey and are the focus of this article. The quitting history during the 12 months prior to the survey of these persons was categorized into the following five subgroups: 1) long-term quitters (abstinence for 3–12 mo), 2) short-term quitters (abstinence for < 3 mo), 3) current smokers (quit attempt lasted ≥ 7 days before relapse), 4) current smokers (quit attempt lasted from 1 to 6 days), and 5) current smokers (no attempt reported in last 12 mo).

Analysis

First, a weighted sample was used to report the population estimates for each subgroup of quitting history. Then the unweighted sample was used to perform multivariate analyses to identify sociodemographic predictors of a major quit attempt (defined as an attempt resulting in abstinence for ≥ 7 days) within the past year and of maintenance (defined as abstinence for at least 3 mo). This latter multivariate analysis did not consider former smokers who have maintained their quit attempt for less than 3 months, as their success was considered uncertain.

Multivariate logistic regression analyses were performed for these two outcome variables using BMDP statistical software (9). The sociodemographic variables included in the models were sex, race (white or black), education (≤ 11 yr, 12 yr, 13–15 yr, and 16+ yr), marital status (married or cohabitating, widowed, divorced or separated, and never married), and age. Age was first used as a continuous variable, and its relationship to the quitting history was investigated for a linear term as well as higher order terms. This analysis suggested that categorization of age would not introduce a bias; therefore, for purposes of interpretation, age was also analyzed in four categories (17–24, 25–44, 45–64, and

55+ yr). Because of sample size considerations within the analysis of 3-month maintenance, the marital status categories of divorced or separated and widowed were combined.

A stepwise approach to modeling the data was used (10). First, models were fitted that contained only the main effects of the independent variables. The likelihood ratio test was used to assess the effect of removal of every variable from the model. Variables with a *P* value larger than .10 were dropped from the model. All two-way interactions of the remaining factors were added, and the same step-down procedure was used. We assessed the goodness of fit of this parsimonious model by comparing it with the model with all main effects and all two-way interactions, using the likelihood ratio test and the goodness-of-fit test of Hosmer and Lemeshow (11). Results are reported using odds ratios and their 95% confidence intervals (CIs). Statistically significant (*P* < .05) effects occur when these CIs do not span 1.0.

Results

History of Quitting Smoking in the United States

Weighted data from the survey were used to provide population estimates for the United States on recent quitting history (table 1). An estimated 55.8 million Americans 17 years and older smoked regularly at some time during the past year; however, 9.0 million of these (16.2%) were not smoking at the time of the survey (categories 1 and 2). During the 1-year period, 19.4 million (34.8%) quit smoking for at least 1 day (categories 1-4). However, 54% of those who quit for at least a day had relapsed by the time of the survey (categories 3 + 4/categories 1 + 2 + 3 + 4); 6.8 million (12.2% of all smokers in the last yr) remained abstinent for 7 or more days before relapsing. Another 3.6 million (6.4% of all smokers) had been abstinent for at least 3 months at the time of the survey. Overall, 15.8 million (28.3% of all those who smoked in the last yr) quit for 7 or more days. Of those who had made this major quit attempt and were still abstinent at the time of the survey, 22.5% of those eligible had maintained cessation for at least 3 months.

Table 1. History of quitting smoking in the United States*

Category	% of smokers in last yr	Estimate of US population (millions)
1) Long-term quitters (abstinence for 3-12 mo)	6.4	3.56
2) Short-term quitters (abstinence for <3 mo)	9.8	5.46
3) Current smokers (quit attempt lasted ≥7 days before relapse)	12.2	6.79
4) Current smokers (quit attempt lasted from 1 to 6 days)	6.4	3.59
5) Current smokers (no attempt reported in last 12 mo)	65.2	36.42
6) Proportion with major quit attempt (categories 1 + 2 + 3/ categories 1 + 2 + 3 + 4 + 5)	28.3	15.81
7) Proportion who succeeded for at least 3 mo (category 1/categories 1 + 2 + 3)	22.5	1.56
Total	100	55.83

*Data from Adult Use of Tobacco Survey, 1986.

Table 2. Sociodemographic predictors of a major quit attempt* in the last 12 mo: main effects model†

Sociodemographic predictor	P	Odds ratio	95% CI
Sex	.39		
Male		1.00	Referent
Female		0.97	0.92-1.03
Age (yr)	5×10^{-3}		
17-24		1.00	Referent
25-44		0.83	0.75-0.92
45-64		0.80	0.72-0.90
65+		1.05	0.89-1.24
Education (yr)	5×10^{-5}		
≤11		1.00	Referent
12		0.87	0.80-0.96
13-15		1.00	0.90-1.11
16+		1.34	1.19-1.52
Race	.31		
White		1.00	Referent
Black		1.05	0.95-1.17
Marital status	.36		
Married or cohabitating		1.00	Referent
Widowed		1.01	0.83-1.24
Divorced or separated		0.90	0.78-1.03
Never married		1.05	0.91-1.21

*Abstinence of at least 7 days.

†Data from Adult Use of Tobacco Survey, 1986.

Sociodemographic Predictors of a Major Quit Attempt

Results of the main effects model are presented in table 2. Of the five sociodemographic variables considered in this analysis, sex, race, and marital status were not significant predictors of who made a major quit attempt within the last year.

Age was a strong predictor of a major quit attempt; however, only those in the youngest and oldest categories were more likely to try to quit. Those aged between 25 and 44 and between 45 and 64 were approximately 20% less likely to make a major quit attempt than persons in either the younger or older categories.

Education was also a predictor of a major quit attempt; those with 16 or more years of education were 34% more likely to quit than those with either 11 or fewer years or 13-15 years of education. Those with 12 years of education were 13% less likely to make a major quit attempt than those with 11 or fewer years of education or those with 13-15 years of education. High school graduates were 47% less likely to make a major quit attempt than persons with 16 or more years of education.

Results from the parsimonious model (containing age, education, and age by education) are presented in table 3. This model was not statistically different from the model containing all main effects and all two-way interactions (likelihood ratio = 37.35; *df* = 42; *P* = .67). One age-by-education category stands out as very different from all the others in these data: persons 17-24 years old who have already had 16 or more years of education. While there were only 32 of the 5,446 target group in this category of 17-24 year olds, two thirds of these made a major quit attempt in the last year—over five times higher than the reference category (age 17-24 yr with ≤11 yr of education) or almost any other category. This group was much more likely to try to quit than the more highly educated who were a little older (aged 25-44 yr).

Only one category (ages 25-44 yr with ≤11 yr of education)

Table 3. Major quit attempt* by age and education: proportion of smokers who tried to quit in past 12 mo†

Age (yr)	Education (yr)	No.	% tried	Odds ratio	95% CI
17-24	≤11	156	28.8	1.00	Referent
	12	330	40.9	1.71	1.13-2.57
	13-15	159	36.5	1.42	0.88-2.27
	16+	32	68.7	5.43	2.38-12.36
25-44	≤11	341	20.2	0.63	0.40-0.97
	12	1,125	25.4	0.84	0.58-1.22
	13-15	749	29.8	1.05	0.71-1.53
	16+	522	34.9	1.32	0.89-1.95
45-64	≤11	357	29.4	1.03	0.68-1.56
	12	603	23.5	0.76	0.51-1.13
	13-15	320	25.9	0.86	0.56-1.32
	16+	203	30.0	1.06	0.67-1.68
65+	≤11	254	33.9	1.26	0.82-1.95
	12	160	25.6	0.85	0.52-1.40
	13-15	80	30.0	1.06	0.59-1.91
	16+	55	36.4	1.41	0.74-2.70

* Abstinence of at least 7 days.

† Data from Adult Use of Tobacco Survey, 1986.

was significantly less likely (37%) than the reference category to make a major quit attempt during the year.

To examine whether the observed effect in the younger, more highly educated individuals was not related to the small sample, we conducted the analysis with age as a continuous variable. The marked effect due to age in the highest education category persisted.

Predictions of Who Was Still Abstinent After at Least 3 Months

The main effects model for predicting who was still abstinent after at least 3 months showed that neither sex ($P = .84$), marital status ($P = .46$), nor education ($P = .22$) contributed significantly to the model. The parsimonious model included only age ($P = .0001$ in main effects model) and race ($P = .06$ in main effects model) without any interaction, and this model was not significantly different from the one containing all main effects and all two-way interactions (likelihood ratio = 18.38; $df = 18$; $P = .43$). However, with only 109 blacks in this analysis, some of the cells for interaction terms were very small. Specifically, only three blacks were over the age of 64 in this analysis. Accordingly, this model was confirmed by similar analyses limiting age to 17-64 years to verify the race effect, and only whites were considered to verify that age was the only other predictor.

Table 4 suggests that there is a dose-response effect for age, where success in quitting improves with increasing age. Over half of those in the oldest age category were able to maintain their quit attempt, which was substantially higher than in any other group. After adjustment for race, people over the age of 65 years who quit were three times more likely to be abstinent for at least 3 months than those between the ages of 17 and 24 years. Further, persons 65 and older were 2.7 times more likely to be successful in their attempt than those 25-44 years old ($P = .002$) and twice as likely to be successful as those 45-64 years old ($P = .008$).

Only 26% of the blacks who made a major quit attempt were able to maintain it for at least 3 months (table 4). After adjustment

for age, blacks were 36% less likely to maintain their quit attempt than whites.

Discussion

Our results suggest that while there is considerable motivation to quit in the community, either the motivation level is not high enough to overcome the addictive nature of cigarette smoking (12), or many in the community do not have the requisite skills or support to maintain this major behavior change (13). It is crucial that the decline in smoking prevalence continue and, ideally, accelerate. Therefore, there is a need to identify any specific characteristics of those who are more likely to try to quit, as well as those who are more likely to be successful in their quit attempt.

In general, the level of education is positively correlated with making a quit attempt of 7 or more days. The effect of age is more complex: quitting attempts are more frequent among the youngest (17-24 yr) and the oldest (65+yr) age groups.

Smokers who were 17-24 years of age and had completed 16 or more years of education stand out as the group most likely to quit, with 22 of 32 subjects having reported a quitting attempt. The odds of attempting to quit for this group are thus 4.1 times as high as those of the group with the highest education in the next age category (95% CI = 1.9-8.9). However, the possible cohort effect suggested by this observation does not carry over to the other three age groups.

In summary, one may speculate that the quitting attempts are most frequent among the young, who are still experimenting with cigarettes, and the more aged people, who are confronted with the necessity to quit because of health problems. Smokers in the middle age categories (25-64 yr) have established a smoking history and are not yet forced by health problems to reexamine their smoking behavior. Clearly, education is a determining factor in smoking behavior. One feels tempted to argue that this is more so among the youngest, more susceptible age group. The current data are too sparse to support this argument, but further investigation is needed on the responsiveness of college students to antismoking campaigns. Again, one may speculate that the social pressure against smoking may be significant in colleges in the United States. If so, then this high social pressure needs to be better characterized so that interventions can be aimed at generalizing these pressures beyond the college setting.

Table 4. Successful quit attempt* among those who made a major quit attempt†

Sociodemographic predictor	% succeeded	No.	Odds ratio	95% CI
Age (yr)				
	17-24	29	1.00	Referent
	25-44	32	1.18	0.83-1.67
	45-64	37	1.48	0.99-2.22
	65+	56	3.15	1.77-5.37
Race				
	White	36	1.00	Referent
	Black	26	0.64	0.41-1.00

* Abstinence of ≥3 mo.

† Major quit attempt is abstinence of at least 7 days. Data from Adult Use of Tobacco Survey, 1986.

It should be noted that the American College Health Association has adopted a strong no-smoking policy and "encourages colleges and universities to be diligent in their effort to achieve a campus-wide tobacco/smoke-free environment" (14).

Maintenance of the cessation attempt for at least 3 months was predicted only by age and race. The marked increased success in maintaining cessation in those over 65 years may be a function of a higher mortality rate among smokers (15), which would bias this comparison toward finding a difference. However, it could also be associated with the increased incidence of smoking-related morbidity in this age category, leading to increased motivational levels to quit. Studies suggest that the presence of smoking-related morbid conditions may be associated with increased abstinence rates (16).

Further, although blacks were just as likely to quit as whites, they were less likely to be able to maintain abstinence. Even after controlling for education and other sociodemographic factors, Novotny et al. (17) also documented that blacks were less likely to have quit than whites. The observed difference between quit attempts and maintenance of abstinence for blacks may be partially attributed to psychosocial factors (e.g., motivational level or social influence) or possible biological differences in nicotine metabolism (18).

Educational level did not seem to be related to the ability to maintain abstinence for at least 3 months, although it was related to the likelihood that an individual would try to quit. It is possible that the reported effect of education (4) is associated only with the ability to maintain smoking cessation beyond 1 year, or it may be that there have been recent changes in the exposure to antismoking campaigns among the less educated, which diluted the education effect in recent years. There was a lack of difference in quitting between genders; this finding has previously been reported also for the quit ratio (2) and is a further indication that the difference in prevalence seen between the genders (3) is mainly an effect of differential uptake rates.

This analysis also indicates that, to properly evaluate the impact of smoking intervention in different communities, trends in recent quit attempts and in the ability to maintain success should be assessed for the various sociodemographic subgroups.

In conclusion, this article has characterized the recent quitting history of smokers in the United States. While we have previously reported that the pool of former smokers is increasing at a constant rate (≈ 1.3 million/yr) (3), there are many more smokers trying to quit. There is considerable consistency across sociodemographic groups in those who are making a quit attempt lasting 7 or more days, with the exception that persons who were 17-24 years old and had 16 or more years of education were more likely to make such an attempt than any other group. Using

smoking cessation for at least 3 months as evidence of at least short-term success, we identified age and race as predictors of such success. In particular, those over the age of 65 years were much more successful than any other group.

It is now important to identify what it is about these groups that makes them more likely to make a major quit attempt and then to maintain the abstinence. Such targeted research is necessary if interventions to increase smoking cessation in the community are to become more effective.

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Cigarette Smoking Among Adults — United States, 1995

One of the national health objectives for 2000 is to reduce the prevalence of cigarette smoking among adults to no more than 15% (objective 3.4) (7). To assess progress toward meeting this objective, CDC analyzed self-reported information about cigarette smoking among U.S. adults from the Year 2000 Objectives Supplement of the 1995 National Health Interview Survey (NHIS). This report summarizes the findings of this analysis, which indicate that, in 1995, 24.7% (47.0 million) of adults were current smokers.

The 1995 NHIS was administered to a nationally representative sample ($n=47,213$) of the U.S. noninstitutionalized civilian population aged ≥ 18 years; the overall response rate for the supplement was 80.9%. Participants were asked, "Have you smoked at least 100 cigarettes in your entire life?" and "Do you now smoke cigarettes every day, some days, or not at all?" Current smokers were persons who reported having smoked ≥ 100 cigarettes during their lifetimes and who smoked every day or some days at the time of interview. Former smokers were those who had smoked ≥ 100 cigarettes during their lifetimes but who did not smoke currently. Interest in quitting was determined by asking current smokers, "Would you like to completely quit smoking cigarettes?" Attempts to quit were determined by asking current every-day smokers, "During the past 12 months, have you stopped smoking for one day or longer?" Data were adjusted for nonresponse and weighted to provide national estimates. Confidence intervals (CIs) were calculated using SUDAAN.

In 1995, an estimated 47.0 million adults (24.7% [95% CI ± 0.8 percentage points]), including 24.5 million men (27.0% of adult men [95% CI ± 1.2]), were current smokers (Table 1). Overall, 20.1% (95% CI ± 0.8) were every-day smokers, and 4.6% (95% CI ± 0.4) were some-day smokers (every-day smokers constituted 81.2% [95% CI ± 1.5] of all smokers). Prevalences of current smoking were higher among American Indians/Alaskan Natives (36.2% [95% CI ± 10.6]), non-Hispanic blacks (25.8% [95% CI ± 2.6]), and non-Hispanic whites (25.6% [95% CI ± 1.0]) than among Hispanics (18.3% [95% CI ± 1.8]) and Asians/Pacific Islanders (16.6% [95% CI ± 4.6]). Current smoking prevalence was highest among persons with nine to 11 years of education (37.5% [95% CI ± 2.9]) and lowest among persons with ≥ 16 years of education (14.0% [95%

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*Cigarette Smoking — Continued***TABLE 1. Percentage of persons aged ≥ 18 years who were current cigarette smokers*, by selected characteristics — United States, Year 2000 Objectives Supplement of the National Health Interview Survey, 1995**

Characteristic	Men (n=7,423)		Women (n=8,790)		Total (n=17,213)	
	%	(95% CI) [†]	%	(95% CI)	%	(95% CI)
Race/Ethnicity[‡]						
White, non-Hispanic	27.1	(± 1.5)	24.1	(± 1.3)	25.6	(± 1.0)
Black, non-Hispanic	28.8	(± 3.7)	23.5	(± 3.1)	25.8	(± 2.8)
Hispanic	21.7	(± 2.9)	14.9	(± 2.1)	18.3	(± 1.8)
American Indian/ Alaskan Native [§]	37.3	(± 17.2)	35.4	(± 13.9)	36.2	(± 10.6)
Asian/Pacific Islander	28.4	(± 8.6)	4.3	(± 3.1)	16.6	(± 4.8)
Education (yrs)^{**}						
≤ 8	28.4	(± 4.2)	17.8	(± 2.8)	22.6	(± 2.5)
9–11	41.9	(± 4.4)	33.7	(± 3.5)	37.5	(± 2.9)
12	33.7	(± 2.3)	26.2	(± 1.8)	29.6	(± 1.4)
13–15	25.0	(± 2.6)	22.5	(± 2.2)	23.6	(± 1.8)
≥ 16	14.3	(± 1.8)	13.7	(± 1.8)	14.0	(± 1.4)
Age group (yrs)						
18–24	27.8	(± 3.9)	21.8	(± 3.0)	24.8	(± 2.4)
25–44	30.5	(± 1.8)	26.8	(± 1.6)	28.8	(± 1.2)
45–64	27.1	(± 2.1)	24.0	(± 2.0)	25.5	(± 1.5)
≥ 65	14.3	(± 2.1)	11.5	(± 1.5)	13.0	(± 1.3)
Poverty status^{**}						
At or Above	25.9	(± 1.3)	21.8	(± 1.1)	23.8	(± 0.9)
Below	36.9	(± 4.3)	29.3	(± 2.9)	32.9	(± 2.5)
Unknown	26.9	(± 5.7)	21.0	(± 3.5)	23.8	(± 3.2)
Total	27.0	(± 1.2)	22.6	(± 1.1)	24.7	(± 0.8)

* Persons who reported having smoked ≥ 100 cigarettes and who reported now smoking every day or some days. Excludes 104 respondents for whom smoking status was unknown.

[†] Confidence interval.

[‡] Excludes 182 respondents in unknown, multiple, and other racial/ethnic categories.

[§] Wide variances on estimates reflect the small sample sizes.

^{**} Persons aged ≥ 25 years. Excludes 60 persons with unknown years of education.

^{††} Poverty statistics are based on definitions developed by the Social Security Administration in 1964 (which were subsequently modified by federal interagency committees in 1989 and 1990) and prescribed by the Office of Management and Budget as the standard to be used by federal agencies for statistical purposes.

CI ± 1.4) and was higher among persons living below the poverty level* (32.5% [95% CI ± 2.5]) than among those living at or above the poverty level (23.8% [95% CI ± 0.9]).

In 1995, an estimated 44.3 million adults (23.3% [95% CI ± 0.8]) were former smokers, including 25 million men and 19.3 million women. Former smokers constituted 48.6% (95% CI ± 1.4) of persons who had ever smoked at least 100 cigarettes. Among current smokers in 1995, an estimated 32 million (68.2% [95% CI ± 1.8]) wanted to quit smoking completely, and 17.3 million (45.8% [95% CI ± 2.0]) current every-day smokers had stopped smoking for at least 1 day during the preceding 12 months.

* Poverty statistics are based on definitions developed by the Social Security Administration in 1964 (which were subsequently modified by federal interagency committees in 1989 and 1990) and prescribed by the Office of Management and Budget as the standard to be used by federal agencies for statistical purposes.

Cigarette Smoking — Continued

Reported by: Epidemiology Br. Office on Smoking and Health, National Center for Chronic Disease Prevention and Health Promotion, CDC.

Editorial Note: The prevalence of smoking in 1995 (24.7% [95% CI ± 0.8]) was similar to that in 1994 (25.5% [95% CI ± 0.7]) (2). The findings in this report and previous trends (3) suggest that the goal of reducing the prevalence of cigarette smoking among adults to $\leq 15\%$ by 2000 will not be attained. Smoking prevalence can be reduced by decreasing the rate of smoking initiation and by increasing the rate of smoking cessation. Methods for decreasing the rate of smoking initiation among adolescents include increases in prices of tobacco products, education, counter advertising campaigns, and efforts to restrict access to and limit the appeal of tobacco products (4).

Effective efforts to assist smokers to quit permanently produce substantial and immediate health and economic benefits (5). Despite the desire of most smokers to stop smoking completely and the existence of proven interventions (6), most smokers may not have easy access to such interventions. One of the national health objectives for 2000 is to increase to 100% the proportion of health plans that offer treatment for nicotine addiction (objective 3.24) (1). Based on a survey of 105 large health-maintenance organizations in 1996, a substantial proportion (two thirds) reported offering some level of smoking-cessation program or product as a covered member service (7). However, coverage of cessation services and products was subject to restrictions: for example, only 23% of plans covered nicotine replacement therapy (NRT) as a standard drug benefit (7). Indemnity plans are less likely than managed-care plans to cover preventive services such as smoking cessation (8). In addition, more than half of corporations self-insure for their employees' health insurance benefits, and few corporations include coverage for smoking-cessation services in their benefit designs (8). As of March 1997, only five state Medicaid programs provided reimbursement for smoking-cessation counseling or group programs (L. Dixon, Health Policy Tracking Service, National Conference of State Legislatures, personal communication, 1997). Although Medicare pays for medically necessary services furnished by a physician or other Medicare provider, it does not pay for either special smoking-cessation programs or for over-the-counter drugs, including NRT (J. Steber, Office of Legislation, Health Care Financing Administration, US Department of Health and Human Services, personal communication, 1997).

Advice from health-care providers to smokers to quit smoking increases cessation rates by 30% (6), and guidelines published by the Agency for Health Care Policy and Research state that all smokers should be advised by their health-care provider to quit (6). In addition, one of the national health objectives for 2000 is to increase to at least 75% the proportion of primary-care and oral health-care providers who routinely advise cessation and provide assistance and follow-up for tobacco-using patients (objective 3.16) (1). In 1996, for the first time, the Health Plan Employer Data Information Set (HEDIS), a managed-care "report card," included a measure of smokers' receipt of medical advice to quit.¹ In 1996, the plan average for smokers reporting receipt of advice from health-care providers to quit was 61%; however, advice rates were as low as 30% for some plans (9).

¹The source for data contained in this article is Quality Compass[™] and is used with the permission of the National Committee for Quality Assurance (NCQA). Any analysis, interpretation, or conclusion based on these data is solely that of CDC, and NCQA specifically disclaims responsibility for any such analysis, interpretation, or conclusion.

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Cigarette Smoking — Continued

Racial/ethnic variations in smoking prevalence are influenced by differences in educational level and cultural factors (e.g., the ceremonial use of tobacco among American Indians). Proven smoking-cessation treatments need to be culturally and language-appropriate (6).

Effective smoking-cessation interventions are less costly than other preventive medical interventions (e.g., treatment of hypercholesterolemia) (10). Although all proven types of cessation are cost-effective, those involving more intense counseling and the nicotine patch are most cost-effective (10). The prevalence of current smoking can be decreased by intensifying efforts to establish proven smoking cessation treatments (both pharmacotherapy and counseling) as a covered medical benefit and to reimburse clinicians for providing effective cessation interventions (6). Other priorities include the needs to train health-care providers and health-system administrators about the current cessation guideline recommendations, evaluate cessation interventions for children and adolescents, and better inform smokers about the availability and variety of proven smoking-cessation interventions.

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Short-term Economic and Health Benefits of Smoking Cessation

Myocardial Infarction and Stroke

James M. Lightwood, PhD; Stanton A. Glantz, PhD

Background Most analyses of the economic benefits of smoking cessation consider long-term effects, which are often not of interest to public and private policy makers. These analyses fail to account for the time course of the short-run cost savings from the rapid decline in risk of acute myocardial infarction (AMI) and stroke.

Methods and Results We estimate the time course of the fall in risk of AMI and stroke after smoking cessation and simulate the impact of a 1% absolute reduction in smoking prevalence on the number of and short-term direct medical costs associated with the prevented AMIs and strokes. In the first year, there would be 924 ± 679 (mean $\pm$ SD) fewer hospitalizations for AMI and 538 ± 508 for stroke, resulting in an immediate savings of \$44 $\pm$ 26 million. A 7-year program that reduced smoking prevalence by 1% per year would result in a total of

$63\,840 \pm 15\,521$ fewer hospitalizations for AMI and $34\,261 \pm 9\,133$ fewer for stroke, resulting in a total savings of \$3.20 $\pm$ 0.59 billion in costs, and would prevent $\sim 13\,100$ deaths resulting from AMI that occur before people reach the hospital. Creating a new nonsmoker reduces anticipated medical costs associated with AMI and stroke by \$47 in the first year and by \$853 during the next 7 years (discounting 2.5% per year).

Conclusions Although primary prevention of smoking among teenagers is important, reducing adult smoking pays more immediate dividends, both in terms of health improvements and cost savings. (*Circulation*. 1997;96:1089-1096.)

Key Words • smoking • prevention • cost-benefit analysis

Smoking is the leading preventable cause of death, killing $\sim 420\,000$ smokers¹ and 53 000 nonsmokers^{2,3} annually. The total cost of medical services for smokers amounts to \$50 billion annually, with another \$50 billion in lost wages due to morbidity and mortality associated with smoking.⁴ Given these huge costs to society, the question arises as to why more resources are not expended in programs to reduce smoking and promote cessation. Tobacco control advocates are often confronted by the fact that policy makers take a short-run approach to decision making in which it is difficult to justify current expenditures to save money in the long run. Most studies provide little guidance for the short run; they focus on the long run.⁴⁻⁷ Actual public and private decisions generally depend on specifically defined costs and benefits over a relatively short time horizon. Examples are a cost-benefit analysis for an HMO or medical care provider with a large annual turnover rate or government funding allocations among competing projects made under severe budget constraints. Investments in reducing smoking prevalence often are not viewed as productive because of the length of time it takes to reduce treatment costs by preventing cancers and chronic lung disease.⁸ In contrast to cancer and emphysema, the impacts of smoking cessation ac-

cure rapidly when heart disease and stroke are considered.⁹ The excess risk of a myocardial infarction or stroke falls by $\sim 50\%$ within the first 2 years after stopping smoking. Treatment for these heart attacks and strokes is expensive, and their prevention provides immediate short-term financial returns for both private and public health insurers.

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In the present study, we estimate the short-run absolute reduction in the number of hospitalizations due to AMI and stroke avoided by smoking cessation and the resulting savings in direct medical expenditures and short-run rehabilitation. We do not include the indirect costs of treatment or lost wages; we only consider the direct medical costs. We estimate the immediate savings (within 1 year) associated with the reduction in the number of heart attacks and strokes in 35- to 64-year-old adults due to a 1% absolute reduction in smoking prevalence (which corresponds to 3% to 4% of smokers quitting) and the cumulative effect of a 7-year annual 1% absolute reduction in prevalence, similar to that produced by California's large Proposition 99 anti-tobacco education program⁹⁻¹¹ (Fig 1).

Methods

Separate Monte Carlo simulations were conducted for AMI and stroke.

Step 1: Estimation of Fall in RR for Ex-smokers Over Time

Selection of Studies

Studies used to estimate RR(t) after smoking cessation had to meet four criteria. First, they must have reported results as

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Selected Abbreviations and Acronyms

AMI = acute myocardial infarction
HMO = health maintenance organization
ICD-9 = International Classification of Diseases, 9th revision
RR = relative risk
RR(t) = relative risk over time

specific clinical events corresponding to ICD-9 diagnosis codes for hospitalization statistics. Studies on heart attacks had to report the RR for AMI rather than all forms of sudden cardiac death or broad categories of nonfatal ischemic heart disease. This requirement excluded several studies¹²⁻¹⁴ that included angina and related ischemic heart diseases as end points. Second, the study must have reported age-adjusted RRs. Third, the study must have been either a case-control study that reported RRs adjusted for a reasonable number of cofactors and effect modifiers or a population-based study that could reasonably be applied to the United States. Fourth, the study must either have screened out or adjusted for preexisting cardiovascular and cerebrovascular diseases to reduce the influence of the "quitting sick effect" on the RR estimates and to reduce the possibility of confounding.

Five studies were used for the estimation of RR for AMI: Willett et al¹⁵ (1981), Rosenberg et al¹⁶ (1985), Rosenberg et al¹⁷ (1990), Dobson et al¹⁸ (1991), and Kawachi et al¹⁹ (1994). Each of these studies reports statistics adjusted for age and other risk factors for heart disease, except Dobson et al, which is a population-based study that reports statistics adjusted for age and history of cardiovascular disease.

The RR values for the final open-ended lengths of cessation (eg, ≥ 15 years) were excluded from the estimation because they might have large effects on the estimates. One outlying observation from Dobson et al¹⁸ (RR > 9 after 9 months' cessation for females) was also excluded because it was based on a very small sample. The omission of this outlier did not noticeably affect the estimates.

Two studies of the fall in risk of stroke after smoking cessation met all the selection criteria outlined above.^{20,21} Other studies met the criteria but either focused on only one type of stroke or did not provide enough information to estimate an RR over time since cessation. Both the studies we used were prospective cohort designs and also adjusted the estimated RRs for confounders and modifiers. Wannamethee et al²⁰ (1995) considered all strokes (ICD-9 codes 430 through

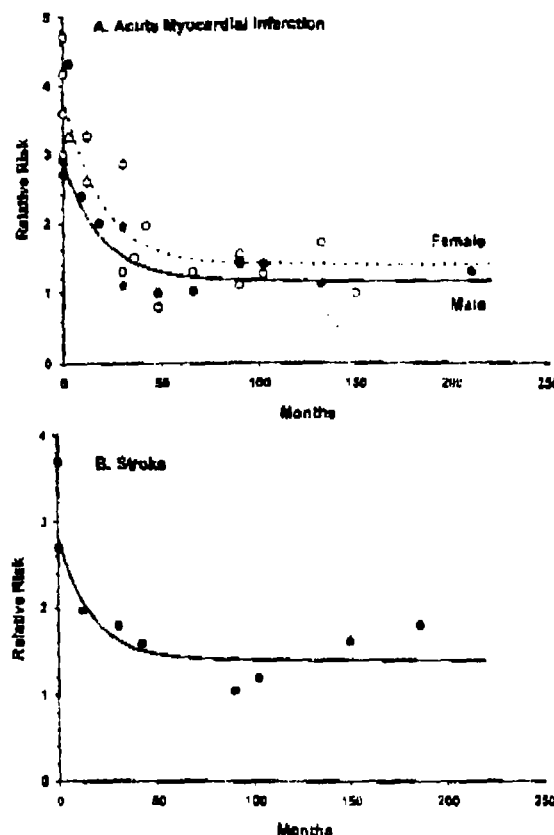


Fig 2. Estimated decline in RR for AMI (A: ●, male; ○, female) and stroke (B) over time after smoking cessation.

438) for British males. Kawachi et al²¹ (1993) considered codes 430 through 434 and code 436 for females in the United States and Canada. Kawachi et al omitted some ICD-9 codes, such as transient ischemic events, and ill-defined events. However, they included the principal types of events: subarachnoid hemorrhage, intracerebral hemorrhage, and ischemic stroke.

Estimation of Fall in RR(t) After Cessation

The five studies of AMI each used different time intervals of smoking cessation. The RRs were assigned to the midpoint of the reported observation intervals. Meta-analytic pooling methods were not feasible for the estimation of a continuous decline curve because there were seldom two statistics from different studies that estimated RR across the same time interval. We combined all of the reported RRs and estimated a function for the decline in RR from the combined data as a function of time (Fig 2A). Several functional forms were fit to the data; all showed a significant reduction in RR(t). We found that an exponential decay in the $\ln$ RR produced the most parsimonious description of the data:

$$(1) \quad \ln RR(t) = \ln \{ [(RR_0 + RR_{off}F) - (RR_{on} + RR_{off}F)] e^{-t/\tau} + (RR_{on} + RR_{off}F) \} + \epsilon$$

where $RR(t)$ is the RR of AMI t months after cessation, RR_0 and RR_{on} are the estimated RRs for AMI at time 0 (just before smoking cessation) and at steady state, and τ is the time constant for the fall in risk after cessation. F is an indicator variable set to 0 for males and 1 for females, and RR_{off} and RR_{on} quantify the difference between the parameters for male and female subjects. The difference in τ between sexes was very small, so it was not modeled.

Adult Smoking Prevalence

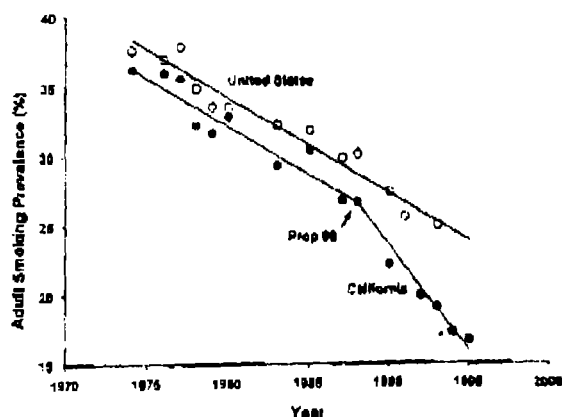


Fig 1. Proposition 99 accelerated the historical decline in smoking prevalence in California by $\sim 1\%$ per year. Data source: California Department of Health Services.

TABLE 1. Fall in Risk of AMI and Stroke Over Time After Smoking Cessation

Parameter	Estimate	Standard Error	t
Acute Myocardial Infarction*			
RR ₀	2.88	0.32	9.144
RR _c	1.17	0.13	8.734
RR _{ex}	0.97	0.34	2.880
RR _{ex} *	0.23	0.17	1.363
τ , months	19.1	7.49	2.550
Stroke**			
RR ₀	2.80	0.21	13.310
RR _c	1.42	0.16	7.882
τ , months	16.2	11.30	1.432

*n=33, r=.87; **n=9, r=.87.

The regression errors were assumed to be independent within each study, which resulted in a diagonal covariance matrix for the regression errors (ϵ). The data were fit to Equation 1 by use of nonlinear weighted least-squares regression with each point weighted by the inverse of its variance. Estimates were calculated by use of the nonlinear regression facility in Statistica release 4.5B²² with the quasi-Newton algorithm, using 0.0001 as the convergence criterion.

Fig 2A and Table 1 show the estimated decline curve for AMI after smoking cessation, together with the uncertainty in the parameter estimates. The t value associated with RR_{ex} is only 1.36 (less than usually considered statistically significant), but this term was retained because it produced residuals that more closely approximated the normal distribution.

Data for the fall in risk of stroke after smoking cessation for both sexes were pooled because there did not appear to be significant differences between male and female RRs, given the data available. The data are shown in Fig 2B. As with AMI, an exponential decay in the ln RR produced the best description of the data, dropping the terms that coded for sex differences (F), ie,

$$(2) \ln RR(t) = \ln \{ (RR_0) - (RR_c) / e^{-t/\tau} + RR_{ex} \} + \epsilon$$

Fig 2B and Table 1 show the estimated results for stroke. The estimate for τ for stroke is not statistically significant by conventional standards; however, retaining this parameter is required to predict RR(t). The reduction in stroke risk in ex-smokers is well established,²³ so the actual τ is certainly not zero.

Simulation of Uncertainty in RR(t)

The regression estimates are used to estimate the fall in RR over time, including a random component reflected in the uncertainty in the parameter estimates in Table 1. A standard linear approximation was used to estimate the probability distribution of ln RR(t) over time:

$$(3) \ln RR(t) - \ln RR(t) + \tau_v \left(\left[\frac{d \ln RR}{dp} \right]^T \text{cov}(p) \text{cov}(p) \left[\frac{d \ln RR}{dp} \right] \right)$$

where RR(t) is the point estimate of the RR t months after cessation, τ_v is Student's t with ν degrees of freedom, $d(\ln RR)/dp$ is the derivative of ln RR(t) with respect to the vector of parameters in Equations 1 or 2 evaluated at t using the point estimates of the parameters, and cov(p) is the covariance matrix of the parameter estimates. We assume that the hospitalization rate is uniformly distributed across time within each year, so t is set to the midpoint of each year. Estimates for the distribution of ln RR(t) for men and women with AMI and stroke were computed separately.

Step 2: Calculation of the Average Hospitalization Rates for Never-Smokers

AMI hospitalization rates by smoking status are needed to turn the estimated RRs into absolute incidences among current and ex-smokers. We estimated the never-smoker hospitalization rate using published data on smoking prevalence, RRs, and observed AMI hospitalizations for the entire population (including both smokers and nonsmokers). We calculated the never-smoker hospitalization rate for males and females (r_0) separately using

$$(4) r_0 = \frac{RR_0 p_1 + RR_{ex} p_2}{1 - p_1 - p_2}$$

where r_0 is the observed incidence rate for AMI hospitalizations for the population, RR_0 is the sex-specific RR of AMI for current smokers, RR_{ex} is the sex-specific average RR for all ex-smokers, p_1 is the sex-specific proportion of the population 35 to 64 years old who are current smokers, and p_2 is the sex-specific proportion of the population 35 to 64 years old who are ex-smokers. The values for p_1 and p_2 are derived by adjusting the age-specific smoking rates reported by the Centers for Disease Control and Prevention²⁴ to the age distribution of the 1994 US resident population found in the *Statistical Abstract of the United States*,²⁵ Table 14. The statistics p_1 , p_2 , and r_0 are all assumed to be normally distributed. The AMI hospital discharge rate was used as a proxy for incidence (r_0) of admissions. We used the CDC Wonder computer system to retrieve these data from the 1988 to 1990 National Hospital Discharge Survey. The specification was ICD-9 codes 410.0 through 410.91, all initial hospitalizations for first diagnosis for every discharge status for people aged 35 to 64 years. The regression estimate for the lower limit of the RR for an ex-smoker (RR_{ex}) was used for the average RR for all ex-smokers. The regression estimate of $RR(0) = RR_0$ is used to estimate the RR for a current smoker. Both estimates are very close to the pooled average RR for current smokers from the studies.

The parameters of stroke were calculated in the same way. The estimates for proportions of current smokers and ex-smokers were calculated by combining data for both sexes. The hospital discharge rate for stroke was obtained using this value from the National Discharge Survey data for 1988 to 1990 in CDC Wonder for ICD-9 codes 430 through 437.9, all stroke hospitalizations for every discharge status for people aged 35 to 64 years. This rate includes all ICD-9 codes for stroke except 438, late effects of cerebrovascular disease, which is only significant for those more than 65 years of age. The average RRs for all current smokers and ex-smokers were calculated from the regression estimates of $RR(0)$ and RR_{ex} , respectively.

Table 2 lists the parameter values used in the Monte Carlo simulations.

Step 3: Calculation of the Absolute Event Rate and Costs

The sex-specific incidence rate for AMI hospitalizations for an ex-smoker who quit t years ago ($r(t)$) is

$$(5) r(t) = RR(t) r_0$$

The absolute number of AMI hospitalizations avoided [$h_A(s)$] in year s for a cohort of individuals who have quit smoking t years ago is simply

$$(6) h_A(s) = q [N_{cs} r(0) - N_{cs} r(t)]$$

where q is the proportion of quitters in the cohort, N_{cs} is the number of individuals in the cohort of current smokers remaining in year s, N_{cs} is the number of individuals in the cohort of quitters remaining in year s, and $r(t)$ is the rate of hospitalization given by Equation 5.

TABLE 2. Parameters Used in Simulations for Events Prevented After Smoking Cessation

Event	Myocardial Infarction		Stroke	Variable
Sex	Male	Female	Both	
Proportion of smokers, P_s	0.301 (0.00889)	0.250 (0.00813)	0.275 (0.00460)	Random
Proportion of ex-smokers, p_e	0.288 (0.00357)	0.205 (0.00356)	0.245 (0.00350)	Random
Observed incidence in the population, r_c	0.00502 (0.00062)	0.00159 (0.00026)	0.00219 (0.00027)	Random
35-64-year-old cohort size, n	46 408 800	48 410 200	94 820 000	Constant
No. of smokers equivalent to 1% drop in prevalence	464 086	484 102	948 200	Constant
Annual survival probability	0.99163	0.99497	0.99334	Constant
Annual survival probability after event				
First year	0.812	0.765	0.883	Constant
Second and following years	0.944	0.933	0.961	Constant
Average cost of event, 1995 US dollars				
First year	30 924	30 819	29 043	Constant
Second year	1922	1817	8887	Constant
Third year	1268	1163	1618	Constant
Fourth year	...	...	1481	Constant
Fifth year	...	...	1190	Constant
Sixth year	...	...	583	Constant

Note: For random numbers, first number is mean, number in parentheses is SD.

Smokers and ex-smokers who have never had an event are assumed to have the annual survival probability of the average current smoker aged 35 to 64 years. We used sex-specific probabilities reported by Hodgson.²⁶ There are no estimates of short-run changes in total mortality for ex-smokers; therefore, it was not clear how to adjust the current smoker mortality to reflect the experience of ex-smokers immediately after cessation.

Those people who suffer a hospitalization in year t are assumed to have the average annual survival probability for the first year after a hospitalization. Those who have had a hospitalization before year t are assumed to have the average survival probability for the second and subsequent years after a hospitalization. The rates for AMI were taken from McGovern et al.²⁷ Survival rates after stroke were calculated from age-specific rates reported by Taylor et al.²⁸ for all stroke patients younger than 65 years old. The values for male and female cohort sizes are the midyear 1995 resident populations from the US Census Bureau monthly postcensus estimates (obtained on the Internet at <http://www.census.gov/population> under "additional detail files").

Total direct medical costs represent the number of events multiplied by the mean cost of an AMI in 1995 dollars for the first through third years after an event (Table 2). There are three parts to these amounts. The first part is the average costs associated with initial treatment for an AMI (from Kuntz et al.²⁹). The second part is the expected cost of major surgical procedures such as angioplasty and coronary artery bypass surgery. Hlatky et al.³⁰ reported the average costs of these procedures, and Nelson et al.³¹ reported their frequencies in the first year after an AMI. The third part consists of follow-up and rehabilitation costs after the initial hospitalization, which are discussed below.

About half the expected cost of an admission for AMI arises from revascularization procedures. According to Nelson et al.,³¹ 58% of the admissions for AMI include a revascularization procedure. Langa and Sussman³² report that between 34% and 45% of HMO and fee-for-service admissions for all ischemic heart disease included a revascularization procedure in California in the late 1980s. The rate of revascularization was increasing during the 1980s, so these data probably underestimate the current revascularization rate. The rate of revascularization reported by Langa and Sussman³² also may be low compared with the rest of the US because of the market share of HMOs in California. The revascularization rate Nelson et al.³¹ report seems comparable given the greater severity of AMI versus all ischemic disease and the national market share of HMOs compared with that in California, and it is used for

calculation of average cost. The cost of thrombolytic therapy was omitted because of insufficient data.

The third part of the cost consists of annual direct medical follow-up, and rehabilitation costs are included for 3 years after an AMI. The follow-up costs are calculated with the use of data from Hemenway et al.³³ on the ratio of annual follow-up resource usage to initial hospitalization admission usage for angina. This formula has been used for cost-effectiveness analysis of cardiac procedures, such as post-AMI angioplasty.²⁹ Documented rehabilitation costs and usage are quite small.^{34,35}

There are three components to the cost of stroke: the direct medical short-term care cost of treatment, rehabilitation costs, and cost of care in nursing facilities.²⁸ Taylor et al.²⁸ provide cost data by stroke subtype (subarachnoid hemorrhage, ICD-9 code 430; intracerebral hemorrhage, ICD-9 codes 431 and 432; and ischemic stroke, ICD-9 codes 434 and 436), age group, and race for direct medical and rehabilitation costs for the first 2 years; we used these data to calculate costs for these types of strokes for people aged 35 to 64 years. The estimates were adjusted for the inclusion of transient ischemic events and unclassified strokes with the use of the relative charge data for ICD-9 codes 430 through 436 reported by Holloway et al.³⁶ and the relative frequencies of the relevant ICD-9 codes from the National Hospital Discharge Surveys for 1984, 1985, 1987, 1988, and 1990 through 1993.³⁷⁻⁴⁴ We assumed that the unclassified strokes included in ICD-9 code 437 had the same average cost as the classified strokes and that the cost-to-charge ratio was the same across all stroke subtypes.

The expected costs of rehabilitation in the third and subsequent years after a stroke or AMI were calculated from the results in Taylor et al.²⁸ and Adelman⁴⁵ and by allocating the present discounted value of these costs reported by Taylor et al.²⁸ to each year after the annual service usage pattern reported by Adelman.⁴⁵ The cost of care in skilled nursing facilities after hospitalization is omitted because only ~5% of stroke patients younger than 65 years of age are discharged to this type of institution.⁴⁶

The medical costs used in the present study included the average hospital room and service charges, physician and other health professionals' fees, and ancillary charges. These cost estimates were based on very large numbers of patients, so the uncertainty of estimated mean costs was very low, and we therefore treated them as constants. The cost estimates were derived in a variety of ways by the various studies that we used. They typically included charge data adjusted for Medicare Cost Report cost-to-charge ratios, Medicare allowable charge ratios, and actual average patient and third-party reimbursements for services. These cost data are best interpreted as approxima-

TABLE 3. Effects of Reductions in Smoking Prevalence*

	Year						
	1	2	3	4	5	6	7
One-time 1% reduction in smoking prevalence							
Cases avoided annually**							
AMI	924 (879)	2098 (891)	2704 (674)	3011 (845)	3180 (840)	3226 (840)	3234 (623)
Stroke	538 (508)	1146 (599)	1457 (510)	1583 (439)	1655 (413)	1671 (415)	1668 (408)
Savings, millions of US dollars							
Annual	44 (26)	102 (28)	136 (27)	153 (25)	163 (25)	167 (25)	158 (25)
Cumulative	44 (26)	146 (48)	282 (69)	435 (90)	598 (111)	765 (133)	933 (155)
Annual 1% reduction in smoking prevalence							
Cases avoided annually**							
AMI	924 (879)	3022 (1228)	5725 (1785)	8736 (2303)	11 896 (2862)	15 122 (3427)	18 356 (3988)
Stroke	538 (508)	1684 (805)	3141 (1211)	4734 (1497)	6388 (1792)	8060 (2067)	9729 (2403)
Savings, millions of US dollars							
Annual	44 (26)	146 (48)	282 (69)	435 (90)	598 (111)	765 (133)	933 (155)
Cumulative	44 (26)	191 (67)	474 (128)	908 (209)	1506 (313)	2272 (439)	3205 (567)

*Numbers in parentheses are SDs.

**Cases avoided does not include deaths before reaching the hospital.

tions of what is actually paid for the services, as opposed to the charges generated, or variable resource usage costs as defined by various cost-accounting methods.

Step 4: Simulation of the Number of AMIs and Strokes Avoided

The simulations are designed to estimate the distribution of the reduction of AMI events in the cohort of 35- to 64-year-old quitters as opposed to an identical cohort that continued to smoke. Five thousand trials were generated for each of male AMI, female AMI, and stroke. The results were within 2% across multiple simulations. The simulations were run on Minitab software, release 10.2.⁴⁷

We simulated two patterns of cessation: (1) A one-time, 1% reduction in smoking prevalence (equivalent to 3% to 4% of smokers quitting). Prevalence is reduced by 1% at the beginning of year zero and then remains at the new lower level. (2) A continuing annual reduction in smoking prevalence of 1% per year for 7 years. Absolute smoking prevalence is reduced by 1% at the beginning of year zero, and then is reduced an additional 1% per year. This second case is based on the observed effect of a program like the California Proposition 99 antismoking campaign,⁹ which increased the rate of decline in absolute smoking prevalence by 1% per year over the historical trend (Fig 1).

Results

The results for a one-time, 1% reduction in the absolute smoking prevalence rate appear in Table 3. In the first year, we estimate 924 fewer hospitalizations for AMIs and 538 fewer strokes. (See Table 3 for the associated SDs.) Because ~17% of people suffering AMIs die before reaching the hospital,⁴⁸ we estimate that an additional 190 deaths would be prevented. After 7 years, the annual reduction in the incidence of AMIs and strokes approaches a steady state of ~3200 hospitalizations for AMI and 1700 for stroke each year. (Approximately 660 deaths from AMI that occur before reaching the hospital would also be prevented.) The medical costs avoided are \$44 million in the first year (in 1995 dollars), increasing to ~\$168 million per year at steady state. The cumulative (undiscounted) savings in medical costs avoided amount to \$933 million over 7 years.

The effect of a program designed to reduce prevalence by 1% per year are much larger because the benefits grow rapidly as the number of people who have quit for at least 2 years increases. The annual reduction in AMI and strokes reaches 3022 and 1684 cases during the second year and increases to 18 356 AMIs and 9729 strokes avoided in the seventh year (Table 3). Over the course of 7 years, such a program would prevent a total of 63 840 hospitalizations for AMI and 34 261 for strokes. Approximately 13 100 myocardial infarction fatalities that occur before the patient reaches the hospital would also be prevented. The cumulative (undiscounted) savings reach \$191 million in the second year and \$3.2 billion by the seventh year.

We also estimated the discounted present value of short-term medical costs associated with AMI and stroke avoided across various time horizons to estimate the value to an organization such as an HMO of creating a new nonsmoker. The average ex-smoker will reduce these medical costs by \$47 in the first year. The discounted present value of this new nonsmoker grows the longer the time horizon that is used (Table 4); over a 7-year period, the expected reduction in direct medical costs for each ex-smoker is \$990 (undiscounted) or \$853 and \$738 (using 2.5% and 5% discount rates, respectively).

Discussion

This analysis shows that there are substantial short-term benefits to assisting adult smokers in stopping smoking and that these benefits accrue rapidly as one extends the time horizon used to assess the benefits of creating a new nonsmoker. In particular, a national program that would reduce smoking prevalence by 1% per year, similar to California's Proposition 99, would prevent 98 100 hospitalizations for AMIs and strokes (and 1300 deaths of acute myocardial infarction outside the hospital) and eliminate the need to spend ~\$3.2 billion (undiscounted) on the treatment of myocardial infarctions and strokes over a 7-year period.

For California, the program used as the model for these calculations, this effect corresponds to prevention

TABLE 4. Cumulative Expected Savings per Quitter at Time of Cessation in US Dollars

	Year						
	1	2	3	4	5	6	7
Undiscounted							
Male AMI	43 (36)	143 (86)	274 (35)	423 (124)	581 (153)	741 (182)	903 (210)
Female AMI	18 (9)	59 (18)	114 (28)	176 (38)	241 (50)	308 (62)	376 (74)
Stroke	16 (16)	54 (30)	105 (41)	162 (53)	223 (64)	286 (72)	350 (88)
Total	47 (27)	155 (51)	289 (73)	462 (98)	634 (119)	811 (141)	990 (164)
Discounted at 2.5% per year							
Male AMI	43 (36)	139 (85)	261 (81)	393 (115)	526 (138)	655 (161)	778 (181)
Female AMI	18 (9)	58 (17)	108 (26)	163 (36)	218 (45)	273 (55)	324 (64)
Stroke	16 (16)	53 (29)	100 (39)	150 (49)	202 (58)	253 (67)	302 (76)
Total	47 (27)	151 (50)	284 (70)	439 (89)	575 (107)	717 (125)	853 (142)

of ~12 000 myocardial infarctions and strokes with an associated cost savings of ~\$390 million in direct medical costs. For comparison, during the first 7 years of the Proposition 99 program, \$411 million (in 1995 dollars) was spent on antismoking media and community-based programs.⁴⁹ (This amount excludes expenditures on school-based programs, which would not affect adult smoking.) Thus, the avoided short-term medical costs for AMI and stroke alone would almost pay for the entire program.

The data in Table 3 can be used to calculate the savings if all smokers aged 35 to 64 years quit at once. There would be 25 000 AMI and 15 000 stroke hospitalizations prevented in the first year; these effects would grow to 88 000 AMIs and 46 000 strokes prevented per year by year 7. The total annual savings would be much greater: \$1.2, \$4.4, and \$4.6 billion in the first, fifth, and seventh years, respectively. The cumulative undiscounted savings over a 7-year period would be \$25.4 billion.

The value of a quitter in terms of AMI and stroke costs avoided varies by sex (Table 4). Women have a much lower risk of AMI than men until after menopause, so the savings from avoided AMIs are much less for women aged 35 to 64 years. At the time of cessation, a female quitter can expect to avoid \$376 in undiscounted AMI costs and \$350 in undiscounted stroke costs, for a total of \$726 over a 7-year period. The cumulative 7-year undiscounted savings for a male are \$903 for AMI and \$350 for stroke, for a total of \$1253.

Our computations do not include the value of the lives saved or the suffering avoided or the many other medical costs associated with smoking. Our estimates were designed to be low because we omitted the indirect costs from lost work and productivity, which may roughly equal the medical costs.⁴ We omitted many other outcomes that are also rapidly affected by smoking cessation, such as the impact of smoking during pregnancy on the risk of having a low-birth-weight infant⁵⁰ and exposure of children to secondhand smoke, which accounts for thousands of hospitalizations and physician office visits annually.⁵¹⁻⁵³

The results emphasize the importance of encouraging smoking reduction across a broad range of ages. Although primary prevention is important,^{34,35} much of the cost of smoking in terms of cardiovascular disease is not incurred until early middle age. This study shows that there are quick and substantial benefits to implementing programs that reduce the number of adult smokers. In

addition, it is through interventions that reduce adult smoking that one can demonstrate the kind of short-term changes in cigarette consumption that appear necessary to convince policy makers to make the necessary investments in tobacco use prevention.

Our estimate that there is some residual risk for AMI long after cessation contradicts the hypothesis that excess risk for AMI disappears entirely 2 or 3 years after cessation.¹⁸ The existence of both a relatively rapid decline in RR and a small long-term excess risk >1.0 (Fig 2A) is consistent with the view that smoking damages the cardiovascular system in at least two ways. One is a short-term effect produced by agents that have an immediate effect on the circulatory system, probably related to the thrombotic effects of smoking and vasoconstriction caused by nicotine.³⁴ This effect is a function of current consumption and would disappear soon after exposure to the relevant toxins ends. The other is a long-term effect mostly determined by cumulative consumption, probably involving an increased rate of atherosclerosis induced by smoking that may be irreversible.^{13,14,54}

This simulation counts both first and subsequent events. The inclusion of subsequent events is important. The RR for subsequent versus first AMI is between 3 and 10 depending on age group,²⁹ and ~15% of admissions for AMI are for subsequent events.⁵⁷ The RR for a subsequent versus a first stroke is between 10 and 20, and 10% to 20% of admissions are for subsequent events for people younger than 65 years old.⁵⁸ It would be preferable to model first and subsequent events separately; however, we could not find data that were detailed enough to do so. Therefore, we assumed that the RR of events for smokers versus nonsmokers was the same for first and subsequent events. This assumption will lead to an underestimate of the actual number of events.

Bradley et al⁵⁹ showed that continuing smokers have a higher incidence of subsequent events than nonsmokers or quitters after an AMI and that they incur more costs. The statistics reported by Bradley et al⁵⁹ do not contain enough detail to calculate the time course of excess direct medical costs associated with smoking. However, they report the figures for cumulative events and costs for 10 years after an initial AMI. These estimates are consistent with the assumption that the cost difference between smokers and ex-smokers after the first AMI is approximately the same as before the first event. We have not found similar data for stroke. If the RRs for

excess costs for stroke survivors who continue to smoke are similar to those for AMI, then our assumption results in an underestimate. Our assumption provides a reasonable approximation until more detailed data are available.

Study Limitations

The main limitation of the present study is its treatment of first and subsequent AMI and strokes. We assume that the RR between smokers and ex-smokers does not change after a first event. The omission of stroke almost certainly results in an underestimate of savings, but this effect is small compared with the overall uncertainty associated with the other parameters.

There are some potential limitations in the studies we used to estimate the time course of the reduction in AMI after smoking cessation. Three were retrospective case-control studies, which have tended to report a greater decline in events than other study designs.^{13,19} However, the results of the five selected for use in the present study are much more consistent with each other than in the literature for broader categories of disease and mortality. The study populations for both Willett et al.¹⁹ (1965 through 1976) and Kawachi et al.¹⁹ (1976 through 1988) are from the same longitudinal study of US and Canadian nurses. However, the sample periods for the two do not overlap significantly, so they may be considered independent samples from the same population for distinct periods. One of the studies¹⁹ reported combined RRs for nonfatal AMI and sudden cardiac death attributable to AMI. Kawachi et al.¹⁹ reported these rates separately, and the RR for sudden cardiac death was similar to that for hospitalization. The number of deaths was also a small fraction of the hospitalizations.

We do not account for the people who grow older than 64 after the first year of the program. This failure is not a serious problem. It is known that the RR for AMI and stroke decreases with age, and it is thought that the decline in RR after smoking cessation becomes slower for people aged ≥ 65 years. We know of no studies that estimate the time course of RR after smoking cessation for the elderly, but there is evidence that the shape of the decline curve shifts slowly with age. LaCroix et al.⁶⁰ Paganini-Hill and Hsu,⁶¹ and Seeman et al.⁶² present some evidence of the decline in RR for older smokers but do not present enough data to estimate a short-run curve. Their evidence indicates a gradual reduction in RR for current smokers and a shift to a more gradual decline curve. However, the shift may not occur until very old age; LaCroix et al.⁶⁰ report results from a prospective study of people aged ≥ 65 years that indicate a return to never-smoker rates for cardiovascular mortality within 5 years after quitting.

Conclusions

This analysis reveals that a one-time, 1% reduction in absolute prevalence of smoking produces substantial short-run savings, both in terms of events avoided and dollars saved. In the first year, we estimate 924 ± 679 (mean $\pm$ SD) heart attacks and 538 ± 508 strokes are avoided, resulting in an immediate savings of $\$44 \pm 26$ million (in 1995 dollars). A 7-year program that reduced smoking prevalence by 1% per year would result in a total of $63\,840 \pm 15\,521$ fewer hospitalizations for heart attacks and $34\,366 \pm 9261$ fewer hospitalizations for

strokes, resulting in a total savings of $\$3.20 \pm 0.59$ billion in short-term medical costs. In addition, this program would prevent $\sim 13\,100$ deaths from AMI that occur before people reach the hospital. (Data are not available to estimate the number of prehospital stroke deaths.) At an individual level, creating a new nonsmoker will reduce anticipated medical costs associated with myocardial infarction and stroke by $\$47$ in the first year, with a discounted present value of $\$853$ during a 7-year period (using a 2.5% discount rate). These figures justify significant investment in programs designed to reduce adult smoking.

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Awakening the Sleeping Giant: *Mainstreaming Efforts to Decrease Tobacco Use in an HMO*

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Group Health Cooperative (GHC) of Puget Sound is developing, within a framework of quality improvement, a comprehensive population-based approach to decreasing the prevalence of tobacco use. Broad organizational support has been obtained, centralized support is being integrated with clinic-level activity, local ownership of outcomes is encouraged with empowerment of health care teams, and support for community and policy-based activities is being provided. GHC's smoking prevalence has decreased from 25% to 15.5% over the past decade, while the state of Washington's prevalence declined from 23.7% to 21.8%. (Key words: Tobacco, quality improvement, smoking cessation, nicotine dependence, Health Maintenance Organization)

There is increasing evidence that interventions by providers and organizations can increase behavior change success in key areas such as diet, exercise and smoking.¹ Tobacco use, the leading cause of preventable disease and death in this country today,² is the most well-documented example of a health behavior that HMOs could influence. There is a comprehensive literature describing effective interventions that increase cessation and decrease initiation of tobacco use.³ These interventions range from the level of the individual clinical patient encounter⁴ to changes in clinic organization,⁵ to legislative and other community-level initiatives.⁶

Unfortunately, minimal attention has been devoted to examining the mechanisms by which large managed care organizations can mobilize their resources and systematically apply the tools available to decrease tobacco use in their populations. However, as HMOs increasingly adopt the outlook and tools of quality improvement/

management, a new opportunity arises to awaken the sleeping giant and fundamentally alter the prevalence of tobacco use in our populations.

Group Health Cooperative (GHC) of Puget Sound has embarked on a major organizational effort called the "Clinical Roadmap" to

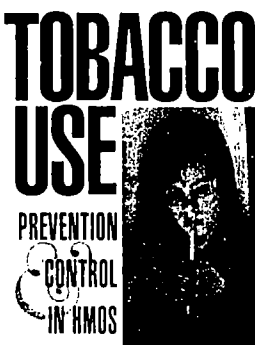
improve performance as a health care delivery system within a framework of quality improvement. The Roadmap is a population-based, evidence-based, systematic effort to identify and improve key clinical processes for GHC enrollees by aligning the systems and structures of the organization toward identified outcomes.⁷ The Roadmap is currently focusing on six clinical areas, one of which is tobacco. This paper describes the efforts of GHC to develop and implement a Tobacco Roadmap with the outcome of decreasing the prevalence of tobacco use. We outline key activities which are awakening the sleeping giant at GHC, some preliminary results, and future directions.

IMPLEMENTING A TOBACCO ROADMAP

Group Health Cooperative is a membership-governed HMO with about 400,000 enrollees. Approximately 900 physicians are employed in the GHC staff model HMO, over 40% as primary care physicians, with IPAs and other delivery models currently being added.

In 1982, GHC was one of the first businesses in the Puget Sound area to ban smoking from all facilities. Throughout the 1980s population-based smoking cessation interventions were a research priority in our Center for Health Studies, and there were numerous individual provider-level efforts within the Cooperative addressing tobacco use. However, GHC did not have an explicit, formally sponsored tobacco agenda.

In 1991, a group sponsored by the Committee on Prevention (COP), a standing GHC



committee whose mission includes evaluation and implementation of new preventive services.⁸ This group produced a report "Decreasing Tobacco Use at GHC During the 1990s" (available upon request). Since then the tobacco agenda has moved from an idea to a high-priority clinical roadmap which has Cooperative-wide senior leadership endorsement and growing clinical ownership. The following six lessons were critical to our success:

Use A Population Perspective And Data

"Decreasing Tobacco Use at GHC During the 1990s" took a population-based, evidence-driven perspective, making recommendations

supporting the implementation of interventions at different levels depending on potential for effectiveness (see Appendix A).

This document was endorsed by the COP, and has since supported a paradigm shift toward treating tobacco use status as a key health indicator in its own right. This has enabled us to focus on "saving lives" as a selling point, for which the evidence is overwhelming and incontrovertible.⁹⁻¹¹ The process of creating and obtaining support for this document helped foster a sense of organizational ownership for decreasing tobacco prevalence among enrollees, positioned tobacco to take advantage of opportunities as they arose, and set the agenda for GHC's improvement efforts in this area.

SECTION EDITOR'S COMMENTS

Managing and Improving Quality



Donald M. Berwick, MD, MPP
SECTION EDITOR

In its work to decrease tobacco use, Group Health Cooperative of Puget Sound has put it all together from the viewpoint of improvement. As you read their challenging report, notice four key characteristics of their efforts, characteristics that tend to be associated with sound, systemic improvement anywhere:

- ▶ **Highly focused, strategically valued aims.** There is no doubt at all, judging from both rhetoric and investment behaviors, that GHC as a system intends to make progress against tobacco use.
- ▶ **Measurements strongly linked to aims, and used actively in the pursuit of improvement.** No hiding here behind silly debates about "report cards!" GHC is measuring its progress in several dimensions, and with appropriate attention to stratification of analyses. Measurement is their servant, not their master.
- ▶ **Specific systemic changes made.** GHC is not content to exhort its current work system to try harder. They know that only thorough redesigns for old processes and innovative designs for new ones can produce the substantial gains they want. Moreover, they are showing the capacity for multiple, parallel tracks of effort. They seek no single magic bullet, but rather are building a whole arsenal of efforts integrated by purpose.
- ▶ **Rapid cycles of testing change.** A little less in evidence, but still coming well along is a culture of "testing" changes—of learning as they go along. Improvement works best in cycles of action and reflection, with each stage building upon lessons from prior stages. This is actually the least developed of these four characteristics of GHC's program to improve its anti-smoking efforts; but, no wonder, since "PDCA" ("Plan-Do-Check-Act") cycles—which lie at the heart of improvement as a system—are easy to teach but very, very hard to carry out in real work settings.

Bravo! GHC shows us an important topic, well-linked to a maturing competence in improvement.

Dr. Berwick, a practicing pediatrician, is Associate Professor of Pediatrics at Harvard Medical School and President and CEO of the Institute for Healthcare Improvement.

Obtain Broad Organizational Support

In an organization with 28 primary care clinics, two hospitals, three specialty centers, and numerous QI and leadership groups, this was no easy task. We attempted to apply the same lessons learned from individual behavior change theory¹² to institutional change: determine how ready the person or organizational unit is to change, then provide brief, repetitive, consistent reminders from multiple respected sources reinforcing the importance of change, with assistance and follow-up to make the agreed-upon changes. Communication avenues included presentations at numerous meetings, inclusion in letters from the medical director and CEO to employees, and communication pieces sent directly to front-line staff. Over the past 4 years, these repetitive messages have assisted in moving tobacco use to the forefront in the administrative arena and towards the inclusion of tobacco use as a key vital sign on the front line.

As a result, in 1992, decreasing tobacco use was identified as GHC's number one prevention priority and was identified as one of four key "clinical roadmap" quality improvement areas of focus. Decreasing tobacco use to no greater than 12.5% by the "Year 2000" became an organizational goal.

Group Health Cooperative regions have endorsed the following Year 2000 clinical targets in support of this prevalence goal:

- ▶ Tobacco use status will be identified in 95% of all charts.
- ▶ 80% of all patients who use tobacco or have recently quit will receive advice to quit from their provider during their most recent outpatient visit.
- ▶ 10% or less of patients who use tobacco will rate the individual support and counseling offered by their provider as fair or poor.

Integrate Centralized Support And Clinic-Level Activity

Centralized Support for the Tobacco Roadmap has included:

- Improving access to tobacco cessation services while minimizing impact on the delivery system.
- Development of global measurement systems.
- Provision of a clinical guideline, implementation tools.
- Population-based education.
- Staffing support.

► **Access to Cessation Support:** One of the first priorities on the tobacco agenda was to obtain coverage for tobacco cessation services. Although GHC had a smoking cessation program, "Free & Clear," which was validated in a randomized controlled trial in 1985,¹³ participation in the program was not a covered benefit for enrollees. This was seen as a barrier both to enrollee participation, and to provider referrals. In addition, lack of easily accessible follow-up for motivated smokers had been identified as a barrier by providers to routinely addressing tobacco during patient encounters.

In 1992, GHC provided coverage for Free & Clear (with a copayment) and nicotine replacement therapy for participants in Free & Clear. The design of this program is described elsewhere.¹⁴ (See related article, page 144.)

► **Measurement:** Measurement systems are critical to monitoring implementation of activities and outcomes. Tobacco use is a universally difficult area to measure since it is not part of most claim systems and most organizations are in the initial stages of developing clinical information systems. Although the measurement issues are far from resolved at GHC, the organization has supported several avenues for attaining Cooperative-wide and clinic-level measures for tobacco outcome and process measures. Tobacco questions have been incorporated into GHC's annual System Satisfaction Survey and biannual Outpatient Satisfaction Survey.

The results from these surveys provide Cooperative-wide measures of tobacco use prevalence, incidence of cessation, patient recall of being asked about tobacco use status and of being advised to quit if they use tobacco, and patient satisfaction with tobacco cessation services. In addition, GHC's Division of Clinical Planning and Improvement is providing annual random

FIG 1
Smoking Prevalence

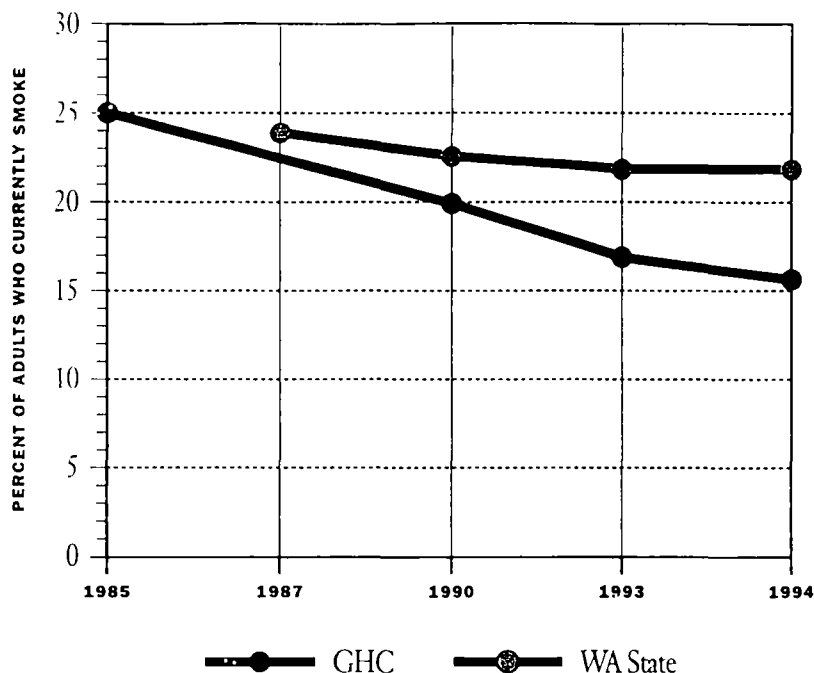


chart audits to measure the following process measures: documentation of tobacco use status, the provision of advice to quit for patients who smoke and assistance in relapse prevention for patients who have quit in the past year. Clinics are being advised to sponsor quarterly chart audits to monitor these process measures at more frequent intervals. In 1995, GHC chose tobacco use as one of its report card indicators for NCQA review, which has served as an added incentive both to improve measurement and to improve the processes measured.

► **Provision of a clinical guideline and implementation tools.** Building on the National Cancer Institute's "Ask, Advise, Assist, and Arrange follow-up" model (the 4 As),¹⁵ a clinical guideline was developed. The guideline has been distributed to all primary care health care teams as part of a larger guideline manual, and can also be accessed by providers on their computer. Implementation tools include training and on-going consultation (see Staffing Support), patient questionnaires and education materials, stickers/vital sign stamps, flow sheets, scripting, chart audit materials, and evidence review (included in an implementation manual).

► **Population-based education:** Our member publication, *Northwest Health* (formerly *View*) magazine, is distributed bimonthly to all households. Since tobacco was cho-

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sen as our prevention priority, there has been a significant tobacco-related story in every issue. These have included a Garrison Keillor story describing his experiences quitting smoking, several pictorial essays of counter-advertisements, several analyses of tobacco industries' attempts to ensnare children, and profiles of successful Group Health "quitters." They have also run large advertisements for the Free and Clear program. As a result, the magazine was cited as the second-most-common reason for enrollment in the Free and Clear program.

- **Staffing Support:** GHC's Center for Health Promotion and Department of Preventive Care have provided ongoing staff support for implementation planning and coordination, tool development, communication, and training. Support includes part-time assistance from physicians, health educators, and an implementation coordinator who works with clinics, staging their readiness to engage in guideline implementation and providing appropriate education and follow-up. Local process owners have teamed with central support staff to offer brief trainings, usually two 1-hour luncheon meetings several months apart. Clinic contacts received follow-up calls to determine implementation status and to offer support and encouragement. In addition, researchers from the Center for Health Studies and Department of Preventive Care have provided ongoing consultative support and assistance with evaluation activities, and funds have been obtained to support additional staff time for pilot work.

Establish Local Ownership

Dedicated staff time has been critical to moving the planning stages of the tobacco agenda forward, but cannot substitute for local ownership and initiative. GHC is currently refining a general implementation infrastructure for improvement initiatives which more clearly defines local ownership and support. Regional vice-presidents and chiefs of staff have identified regional groups to sponsor and lead implementation at the clinic level. These regional groups have identified process owners at each medical center, usually a physician and a nurse, as co-leaders. Each process owner receives brief training and on-going academic detailing based on the tobacco use guideline. Target measures are broadly communicated along with information on current status and progress.

Results, based on random chart audits, indicate that in 1994 when measurement was begun, 40% of all outpatient charts promi-

nently displayed smoking status. In January 1995, 68% of charts displayed smoking status, and by May 1995 this had increased to 80%.

Empower And Support Health Care Teams

Efforts to disseminate and implement identified process improvements at the front line level have included efforts to empower and support the team by:

- Involving MDs, RNs, MAs, and pharmacists in planning;
- Teaching effective, brief behavior change skills;
- Focusing on key processes and outcomes rather than pre-packaged solutions;
- Providing a broad set of implementation tools;
- Providing feedback and ongoing consultation;
- Keeping system improvements simple.

Provide Organizational Support for Community and Policy-Based Activities

Our clinical guideline for tobacco is unusual in that it explicitly calls for clinicians to engage in activities such as letter-writing and testifying for policy changes about tobacco issues. In addition, GHC has applied its organizational weight to numerous community and legislative tobacco-related initiatives in Washington State. Support for this activity grew out of our outcomes-based approach: for example, although research in adolescent cessation has been discouraging,¹⁶ there is considerable evidence that changes in public policy and community norms can result in dramatic decreases in youth initiation and can support adult cessation.¹⁷

We did encounter significant barriers to HMO participation in activities that could lead to public policy change such as:

- The perception that this is not an appropriate arena for HMO activity.
- Skepticism regarding policy change effectiveness for decreasing tobacco use.
- Resource competition from more bottom-line issues such as health care reform.
- A kaleidoscopic array of organizations working on tobacco control with different organizational styles, from state bureaucracies to ad-hoc advocacy groups.

Despite these initial barriers, we were able to mobilize GHC support by emphasizing that the evidence pointed toward this type of activity as an effective way to achieve our desired outcomes, and that there were potential positive public relations benefits.

Group Health Cooperative has supported

and is currently active in several community coalitions which support regulatory change and legislation directed at decreasing youth access to tobacco products; increasing counter advertising and tobacco education; obtaining a dedicated tobacco excise tax to support prevention activities; and strengthening indoor air regulations. As examples, we have co-sponsored a children's art counter-advertisement poster contest, provided free office space and grant support to Washington "DOC" ("Docs Oughta Care"—a tobacco control organization), provided seed grants to the American Heart Association for tobacco control organizational development, provided repeated testimony in support of an office smoking ban, and encouraged staff participation in the Tobacco-Free Washington coalition.

Due in part to the efforts of GHC's chief executive officer, physicians, staff and lobbyists a "smoker's rights" bill has been repeatedly defeated, and a youth access bill that eliminated vending machines and required licensing fees and penalties for merchants selling tobacco to minors was passed (with the money raised being devoted to enforcement and tobacco youth prevention programs). The state of Washington has banned smoking in all office buildings, and a recent attempt by the tobacco industry to roll back this legislation was defeated. As of July 1, 1995, our state has one of the highest tobacco taxes in the nation. In addition, GHC staff members were instrumental in establishing a large coalition of community groups that helped convince the *Seattle Times* newspaper in 1993 to stop accepting tobacco advertisements.

PREVALENCE RESULTS

In 1994, the prevalence of tobacco use at GHC had dropped to 15.5% from 20% in 1990 and 25% in 1985 (Fig 1). The GHC population is similar to the general Washington State population,¹⁸ and has actually increased its low-income enrollees (who are likely to smoke more) in the past 5 years. During the same period, data obtained by similar methods (random phone surveys of several thousand adults) showed a much slower rate of decline in the state of Washington (23.7% in 1987, 22.4% in 1990, 21.8% in 1993 and 1994).

FUTURE DIRECTIONS

In order to accomplish our objectives, we are working on several additional improvement activities:

- Development of high-quality automated information systems for clinical care. We are working to ensure that tobacco use status is fully supported by this system,

APPENDIX A

Summary of 1991 GHC Report on Decreasing the Prevalence of Tobacco Use

TOBACCO USE AT GROUP HEALTH:

- is prevalent
 - 20% to 25% of adult GHC members = 52,000 to 63,000
- causes significant morbidity and mortality
 - about 500 deaths/year in GHC members
- results in tremendous unnecessary health care costs
 - \$18 million/year at GHC
- is easily identified
 - “Do you use tobacco?”

SMOKING CESSATION:

- dramatically decreases morbidity and mortality
- interventions by health providers at the system and individual level
 - can decrease the prevalence of tobacco use
 - are more cost-effective than treating hypertension and cholesterol

SUMMARY RECOMMENDATIONS:

Goal: Decrease the prevalence of tobacco use by 50% from the 1985 level of 25% to 12.5% by the year 2000

Objective: A comprehensive, coordinated set of interventions will be available covering all the stages of tobacco use, including encouraging adolescents to never use tobacco; motivating tobacco users to quit; assisting users in cessation efforts; and working to help quitters avoid relapse.

Strategies:

1. Identify, track and treat tobacco use with the same vigor as other diseases with significant morbidity and mortality.
2. Advocate for coverage of tobacco services where clinical effectiveness has been convincingly established.
3. Encourage adolescents to never become tobacco users, both during clinic contacts and through school and community outreach.
4. Encourage and support population-based projects to decrease tobacco use.
5. Make tobacco a top lobbying priority of the GHC legislative affairs office in the 1990s.
6. a) Develop educational programs about tobacco use and services for staff at all levels, including nursing, physician, clerical, medical assistant and pharmacy.
b) Encourage and support ongoing programs to decrease the prevalence of tobacco use among GHC employees.
7. Maintain a standing tobacco services subcommittee reporting to the Committee on Prevention.
8. Funding should be sought to help support implementation of a comprehensive tobacco prevalence-lowering effort. Implementation should not depend on acquisition of external funds.

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including data entry and display, as well as embedding reminders and easy access to relevant guideline support information.

- Expansion of guideline diffusion efforts into the specialty arena. This has been most effective when coupled with other quality initiatives such as heart care, diabetes and pregnancy improvement which now have specific tobacco-related targets. A hospital guideline with automatic cessation support services is being developed.
- Evaluation of the impact of four different coverage approaches for our smoking cessation program and nicotine replacement therapy (NRT). Population participation and quit rates are being measured. This information will be used to construct a benefit structure which addresses both cost/benefit and utilization.

Future efforts to decrease initiation of tobacco use include a pilot program in our pediatric population for identification of parental smoking status with delivery of messages about environmental tobacco smoke, inclusion of tobacco education in direct mailings to children, and concerted efforts to ensure at least a dime/pack of tobacco tax revenue is devoted to tobacco prevention programs.

CONCLUSION

Prevention has been an explicit core value at GHC since its founding. GHC's 1995-1996 goals include a commitment to achieving measurable improvements in key clinical processes and outcomes for the population of tobacco users. However, values and intentions alone will not automatically improve the health of an identified population. Broad organizational commitment is required for the development and implementation of evidence-based processes and structures directed at achieving targeted outcomes. It is this work which has contributed to the decrease in the prevalence of tobacco use among GHC enrollees to 15.5% in 1994, and will move GHC to a prevalence of 12.5% or less by the year 2000. The sleeping giant is starting to stretch its arms...

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