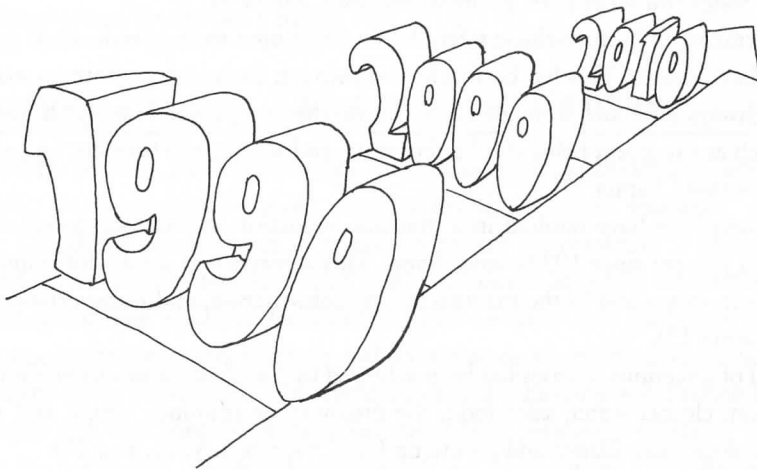


Public Health in the Twenty-First Century: Achievements and Challenges



The Future of Public Health

The United States in the 20th century saw great progress in public health. As a field of practice, public health has advanced in knowledge and methodology. Biomedical scientists have identified many of the organisms that cause infectious diseases and have developed methods to control them. Epidemiologists have recognized risk factors that lead to many chronic diseases, information that can be used to reduce people's risk of illness. Efforts to clean up the environment have resulted in air and water that are much safer than they were a half-century ago. Intensive health education efforts have even persuaded Americans to improve some health-related behaviors, leading to reductions in tobacco use and drunk driving. The ability to assess the state of the public's health and to evaluate the impact of medical and public health interventions has also advanced dramatically because of vast stores of health-related data and

computer software capable of analyzing them. These achievements have greatly improved the health of Americans. The average lifespan has increased by thirty years since 1900 (when it was 47), and 25 of those years are attributed to improvements in public health.¹

In 1999, the Centers for Disease Control and Prevention (CDC) published a “top ten” list of great public health achievements of the 20th century.¹ These accomplishments were chosen for the positive impact they have had and will continue to have in reducing deaths, illnesses, and disabilities in the United States. Following is the CDC’s list (not in order of importance).

- Routine use of vaccination has resulted in a dramatic reduction in infectious diseases, including the eradication of smallpox; the elimination of polio in the Americas; and control of measles, rubella, tetanus, diphtheria, and a number of other infectious diseases in the United States and other parts of the world (see Chapter 9).
- Improvements in motor vehicle safety have contributed to large reductions in motor vehicle-related deaths. This has been achieved through engineering efforts to make vehicles and highways safer and through success in persuading people to adopt healthier behaviors, such as using seat belts, child safety seats, and motorcycle helmets, and to not drink and drive (see Chapter 17).
- Safer workplaces have resulted in a dramatic reduction in fatal occupational injuries—down 90 percent since 1933—and illness. This achievement results from improvements in safety in mines and in the manufacturing, construction, and transportation industries (see Chapter 17).
- Control of infectious diseases has been achieved by (in addition to vaccination) improved sanitation, cleaner water, safer food, the discovery of antibiotic drugs, and methods of epidemiologic surveillance and follow-up (see Chapters 4, 9, 21, and 23).
- A decline in deaths from heart disease and stroke has resulted from the identification of risk factors (see Chapters 4 and 11) and people’s significant success in changing their behavior to reduce cholesterol levels and to stop smoking (see Chapters 15 and 16). Secondary prevention methods, such as early detection and treatment of high blood pressure, also contribute to the lower number of deaths.
- Safer and healthier foods have almost eliminated major nutritional deficiency diseases such as rickets, goiter, and pellagra in the United States. Microbial contamination of food has been reduced, and nutritional supplementation and labeling have made possible a healthier diet (see Chapter 23).
- Healthier mothers and babies are the result of better hygiene and nutrition; availability of antibiotics; greater access to health care, including prenatal care; and technologic advances in medicine. Since 1900, there has been a 90 percent reduction in the infant mortality rate and a 99 percent reduction in the maternal mortality rate (see Chapter 18).

- Access to family planning and contraceptive services has contributed to healthier mothers and babies through smaller family size and longer intervals between the birth of children; increased opportunities for preconception counseling and screening; and improved control of sexually transmitted diseases (see Chapter 18).
- Fluoridation of drinking water has reduced tooth decay in children by 40 percent to 70 percent, and tooth loss in adults has been reduced by 40 percent to 50 percent (see Chapter 5).
- Recognition of tobacco use as a health hazard and subsequent public health antismoking campaigns have helped to prevent people from beginning to smoke, have promoted quitting, and have reduced exposure to environmental (second-hand) tobacco smoke. The resulting decrease in the prevalence of smoking among adults has prevented millions of smoking-related deaths (see Chapter 15).

Challenges for the Twenty-First Century

In the early 21st century, public health faces many challenges, both old and new. There are renewed threats from infectious diseases, such as AIDS, antibiotic resistance, and foodborne pathogens. The global economy has increased Americans' vulnerability to many of the health threats faced by residents of less developed nations, brought about by international travel and by imported agricultural products. Paradoxically, past successes have led to new threats, such as climate change caused by overpopulation and economic development, and rising costs of medical care for the aging population. The challenge of understanding and altering human behavior—the factor that now contributes most substantially to premature mortality—remains to be confronted by the public health practitioners of the 21st century. The decline in cigarette smoking has slowed; rates of alcohol and illicit drug use among adolescents are largely unchanged over the past decade; physical inactivity and unhealthy diets contribute to the increasing prevalence of obesity among Americans; and injury is still a major cause of death.²

Ironically, the successes of public health in the 20th century led to cutbacks in resources and support for preventive activities. During the second half of the century, the medical approach—curing health problems rather than preventing them—gained acceptance. Public health's many achievements, including those described above, were taken for granted while rapidly increasing resources were devoted to medical care. This problem was recognized in the Institute of Medicine's 1988 report, *The Future of Public Health*.³ This report prompted public health agencies, policy makers, and academic institutions to initiate a national discussion on the role of public health and the steps necessary to strengthen its capacity to fulfill its role. Attempts were made to coordinate public health efforts at various levels of government, to develop public-private partnerships in communities, and to undertake strategic planning aimed

at achieving defined goals and objectives. The Institute of Medicine undertook a new analysis in 2003 to follow up on the 1988 report and made recommendations for enhancing understanding of public health and developing a framework for assuring the public's health in the new century.⁴

The events of fall 2001, particularly the bioterrorist attacks using anthrax, brought new attention to the American public health system and revealed the weaknesses in the public health infrastructure—workforce, information systems, laboratories, and other organizational capacity—which was suffering from neglect. It became clear to policy makers and the public that the public health system is the front line of defense in protecting the population from bioterrorism and other threats. Concerns about preparedness led to a flow of federal funds into public health agencies and activities. These funds have helped state and local agencies to begin strengthening their capacity to respond to public health challenges; however, public health officials are concerned whether the efforts can be sustained. Budget deficits at the federal and state levels threaten to derail the upgrades just when their importance is being recognized. The Institute of Medicine's report, *The Future of the Public's Health in the 21st Century*, was published in 2003 and includes lessons learned from the 2001 attacks.⁴

The 2003 report stated that, "the public health system that was in disarray in 1988 remains in disarray today."^{4(p.100)} It noted that the United States was not meeting its potential in the area of population health, in part because of the nation's emphasis on (1) medical care rather than preventive services and (2) biomedical research rather than prevention research. It also noted the serious and persistent disparities in health status among various population groups, according to race and ethnicity, gender, and socioeconomic status. The report recommended that the public health workforce needs better education and training, that changes are needed in public health laws to bring them up-to-date and to ensure better coordination among states and territories, and that advances in information technology should be used more effectively to provide adequate surveillance and communication. Although the resources to rectify some of the deficiencies have been provided in the wake of 9/11, the Institute of Medicine report stressed the need for these efforts to be sustained for the long term.

Strategic Planning for Public Health

With so many different agencies at so many different political and organizational levels involved in implementing public health's mission, it became apparent some time ago that there was a need for planning and coordination. Beginning in 1979, the Public Health Service adopted "management by objectives," a process that was becoming increasingly widespread in the private sector. This technique requires that managers jointly define a set of measurable

goals, use these goals as a guide to their actions, and regularly measure progress toward achieving them. The management-by-objectives approach is especially useful in decentralized organizations, where many different actors must coordinate their efforts, and thus is well suited to the needs of the public health system.⁵

To develop goals for the year 1990, the Public Health Service enlisted a broad range of participants from both within and outside of government to specify a set of health status objectives. The national goals, published as *Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention*,⁶ set targets for reducing mortality rates in different age groups, with specific objectives designed to meet each target. For example, to achieve the goal of a 25 percent death rate reduction for ages 25 through 64, progress had to be made in reducing the prevalence of cigarette smoking, high blood cholesterol, and high blood pressure among adults. Any state, community, or research group that applied for federal funds for a public health program had to justify its request by showing how its project would contribute to achieving one or more of the *Healthy People* goals. When the results of the first planning cycle were tallied in 1990, the numerical mortality goals were met for three of the four age groups: infants, children, and adults aged 25 through 64. Only targets for adolescents and young adults were not met, because of continued high rates of fatal motor vehicle injuries, homicides, and suicides.⁵

The *Healthy People* planning process encourages states and local communities to use the national objectives as a basis for developing objectives of their own. One problem that became obvious during the first decade of the program was a lack of data systems that could track progress, especially at the local level.

In 1987 the Public Health Service began the process of setting objectives for the following decade. *Healthy People 2000*, a 692-page book sets three overall goals, with over 300 measurable objectives divided into 22 priority areas.⁷ As in the previous *Healthy People* publication, these objectives set targets for individual behavioral change, environmental and regulatory protections, and access to preventive health services. *Healthy People 2000* also addressed the problem of inadequate data, which had hindered evaluation of progress toward the 1990 objectives. Implementing, tracking, and reporting on the goals and objectives involved many agencies of the federal government, as well as hundreds of state agencies, national organizations, academic institutions, and business groups. Most states developed their own year 2000 objectives. The individual states' objectives either paralleled or modified the national objectives to suit the states' own needs and priorities.

In 2001, a final review was published that evaluated the nation's progress in meeting the *Healthy People* objectives.⁸ Progress was achieved on over 60 percent of the objectives. Targets were met in reducing deaths from coronary heart disease and cancer, reducing AIDS incidence, and reducing homicide, suicide, and firearm-related deaths. Tobacco-related mortality targets were met. Goals for infant mortality and the number of children with elevated blood lead levels

Box 30-1

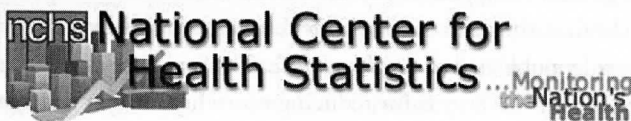
Healthy People 2010



CDC Home

Search

Health Topics A-Z



Healthy People 2010

Leading Health Indicators at a Glance

- **Physical Activity**
(Objectives: 22-2 & 22-7)
- **Overweight and Obesity**
(Objectives: 19-2 & 19-3c)
- **Tobacco Use**
(Objectives: 27-1a & 27-2b)
- **Substance Abuse**
(Objectives: 26-10a, 26-10c & 26-11c)
- **Responsible Sexual Behavior**
(Objectives: 13-6 & 25-11)
- **Mental Health**
(Objective: 18-9b)
- **Injury and Violence**
(Objectives: 15-15a & 15-32)
- **Environmental Quality**
(Objectives: 8-1a & 27-10)
- **Immunization**
(Objectives: 14-24, 14-29a & 14-29b)
- **Access to Health Care**
(Objectives: 1-1, 1-4a & 16-6a)

Source: U.S. Centers for Disease Control and Prevention

were nearly met. There was progress toward reducing health disparities. However, for 15 percent of the *Healthy People 2000* objectives, the nation moved away from the report's targets. Notably, these included the prevalence of overweight and obesity, especially among adolescents, an ominous sign for the future health of Americans.

Healthy People 2010, launched in January 2000, set public health goals and objectives even higher.² *Healthy People 2010* has two overall goals:

1. Increase quality and years of healthy life, and
2. Eliminate health disparities.

These are similar to the goals of *Healthy People 2000*, except that the first goal places a new focus on quality of life, and the second goal no longer sets different targets for racial and ethnic minorities, aiming to ensure that all groups in the United States will be equally healthy.

Healthy People 2010 is organized into 28 focus areas, many of which are the same as the priority areas in *Healthy People 2000*. In addition, a set of ten leading health indicators, shown in Box 30-1, were chosen as areas of special focus. These indicators were based on their ability to motivate action, the availability of data to measure their progress, and their relevance as broad public health issues.

Progress toward the *Healthy People 2010* goals was assessed in a midcourse review conducted in 2005. Data, mostly collected at the CDC, were analyzed to determine the status of 467 specific objectives in the 28 focus areas. Where data were available for various groups by gender, ethnicity, age, education level and income level, an attempt was made to determine for each objective and for each population group whether the goal was met, whether the objective moved toward or away from the target, and the extent of any disparity. This led to huge quantities of information. For example, if one wished to track progress on one of the leading health indicators, one could consult Chapter 22 of the analysis, which provides data on physical activity and fitness. One would learn that none of the objectives in this focus area met their targets, but five objectives for adults and two for adolescents moved toward their targets. Three objectives for adolescents moved away from their targets. The chapter contains a table of various population groups—race and ethnicity, gender, education, location, and disability—comparing each group's performance on each objective with the best-performing group. The whole midcourse review report, with discussion of each of the focus areas, has been posted online at www.healthypeople.gov/data/midcourse/html/default.htm. The monitoring data have been posted in an interactive database at the National Center for Health Statistics.⁹

The *Healthy People 2010 Midcourse Review* concluded that the first goal—quality and years of healthy life—continues to improve in years of life, but measures of quality yielded mixed results. There were slight improvements in “years in good or better health,” and “expected years free of activity limitations.” However, “expected years free of selected chronic diseases” declined

slightly. The second goal, eliminating disparities, did not show evidence of systematic improvement. Status on the objectives was improving for most populations, but the differences among the groups were generally not declining.⁹

As 2010 approached, the public health community mobilized to launch the process for *Healthy People 2020* (see Figure 30-1). An organizing framework, including vision, mission, and goals, together with draft objectives, was released in 2009, with public comment invited. Final 2020 goals, objectives, and action plans will be released during 2010.¹⁰

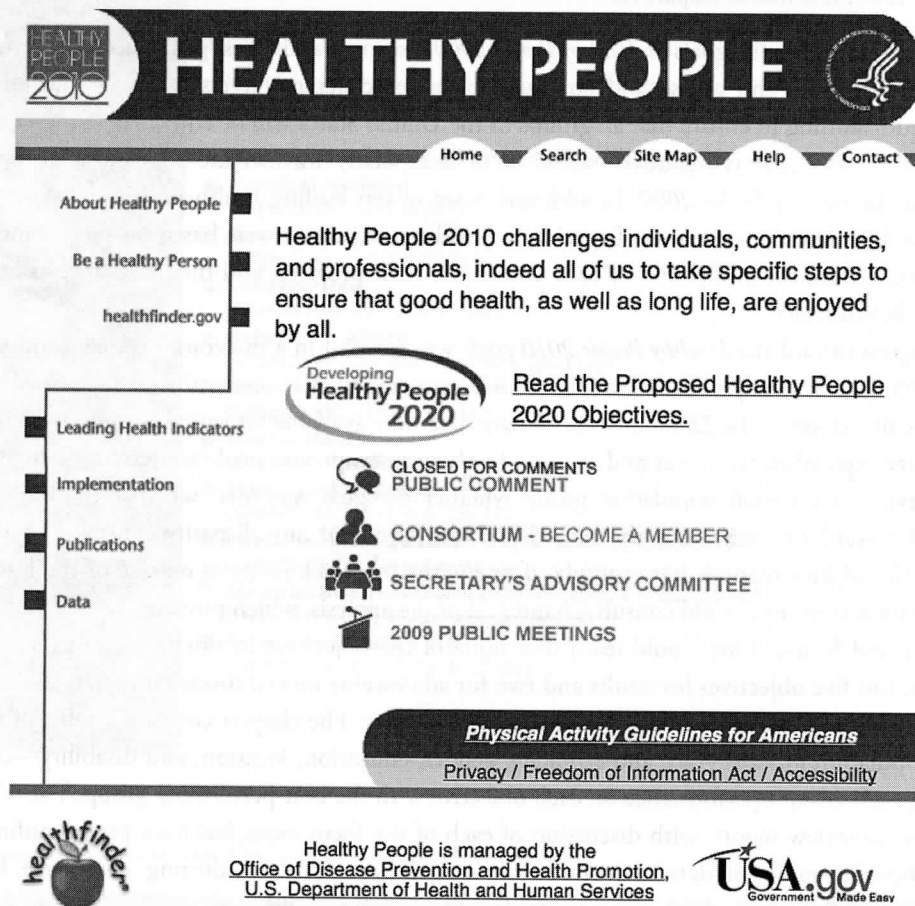


FIGURE 30-1 Healthy People 2010 Home Page. *Source:* Healthy People 2010. healthypeople.gov.

The overarching goals for 2020 are the following:

- Attain high-quality, longer lives free of preventable disease, disability, injury, and premature death.
- Achieve health equity, eliminate disparities, and improve the health of all groups.
- Create social and physical environments that promote good health for all.
- Promote quality of life, health development, and health behaviors across all life stages.

Inspired by the Institute of Medicine reports and the success of the Public Health Service's planning initiative, and recognizing that most public health activities take place at a local level, a group of public health associations began working on ways to help local public health agencies apply the management-by-objective approach. The participating organizations—the CDC, the Public Health Foundation, the American Public Health Association, the Association of State and Territorial Health Officials, the National Association of Local Boards of Health—developed guidelines for local public health agencies to conduct their own strategic planning process, involving all sectors of the community in both planning and implementation.¹¹ With funding from the Robert Wood Johnson Foundation, the participating organizations developed a program called “Turning Point: Collaborating for a New Century in Public Health.”¹² Turning Point created partnerships with 21 state and local public health and community-based organizations to serve as models for a more effective and responsive public health system. Although the project has now closed, it created materials and resources that can be used by communities and public health organizations to achieve public health goals. One of the outcomes has been the Turning Point Leadership Development National Excellence Collaborative, which developed a curriculum that is used by public health leadership institutes throughout the United States to train public health leaders to create learning organizations that work in collaborative environments.¹³

Dashed Hopes for the Integration of Public Health and Medical Practice

Because of the high and continuously rising cost of medical care, managed care became more prevalent in the 1990s, as discussed in Chapter 26. Managed care moves the incentives of medicine closer to the mission of public health—keeping people healthy. While traditional fee-for-service medicine focuses on people who seek care, offering financial rewards to doctors for providing services to patients, managed care organizations (MCOs) are responsible for all their members, yielding financial rewards when the need for expensive medical services is averted. This shift in medicine's perspective has a number of implications for public health.

The incentives for MCOs to keep their patients healthy encourage medical plans to use public health strategies to prevent disease and to promote healthy behaviors among members. The financial incentives also make medicine economically dependent on public health's effectiveness in preventing unnecessary disease in the community. Public health failures can be expensive. The 1993 cryptosporidiosis outbreak in Milwaukee described in the Prologue, for example, caused \$15.5 million in medical costs.¹⁴ Thus, the changes in how medical care is financed and delivered encourage the medical sector to support adequate funding for the public health sector.

With managed care, medicine is driven by the same kind of measurable goals and objectives that public health has been developing. As discussed in Chapter 27, MCOs are required to collect data on the effectiveness of their services and the health status of their members. They are evaluated on their success in achieving the same kinds of goals and objectives detailed in the Healthy People process. These common goals provide medicine and public health with strong incentives to work together.

Unfortunately from the standpoint of public health, managed care has lost its popularity since the late 1990s. As discussed in Chapter 26, there was a backlash against many of its cost-control measures, and the benefits that come from incentives to keep MCO members healthy were not obvious to the public. State Medicaid programs continue to rely heavily on managed care, however.

For the majority of Americans, whose health insurance is provided by their employers or through Medicare, the future is uncertain. The cost of medical care is again rising rapidly, and the trend is economically unsustainable. Employers are shifting the costs to their employees, who are paying an increasing share through higher premiums and copayments. The number of Americans who lack health insurance continues to rise. As the 2003 Institute of Medicine report comments, "the loss of trust in the idea of managed care is also the loss of a great opportunity to improve quality and restrain costs."^{4(p.241)}

President Obama and the Congress have been working on plans to reform the healthcare system, with the goals of increasing access to health insurance and controlling costs. As of fall 2009, it is not clear what the result of this effort will be, although any of the proposals would be likely to provide some improvement. However, the public health community is concerned that the reformers are focusing too much on providing and paying for illness care rather than what should be done to create the healthiest population possible.¹⁵

Information Technology

Advances in information technology offer extraordinary opportunities for collaboration between public health and medical care. For example, epidemiologic surveillance using the Internet would allow a system linking state and local health departments, public health laboratories, hospitals, and doctors' offices to collect data in real time and rapidly analyze it to detect unusual disease patterns. Such a system could simultaneously disseminate the information among all participants. However, at this time, there is no single system. Instead, there are multiple systems that do not necessarily communicate with each other.

One important system is the CDC's Public Health Information Network (PHIN), coordinated by the National Center for Public Health Informatics (NCPHI). The PHIN provides a framework to improve the capacity of public health to use and exchange information electronically by promoting the use of standards and defining functional and technical requirements. Using such information exchange systems, the NCPHI facilitates a number of programs, including, for example, biosurveillance, outbreak management, national notifiable disease surveillance, and communities of practice. The biosurveillance program, called BioSense, integrates data from over 1730 hospitals across the country, to enhance national situational awareness by real-time disease detection and monitoring. The Outbreak Management System assists public health workers in the management of outbreaks by enabling the integration of data on demographics, case investigations, laboratory results, exposures and relationships between persons, and other factors relevant to an outbreak. The National Notifiable Diseases Surveillance Program is a state-based system that facilitates exchange of data between public health, laboratories, and clinical providers about conditions designated as nationally notifiable. The Communities of Practice Program promotes collaboration by bringing public health practitioners together to solve problems and share lessons learned.¹⁶

Another program linked with PHIN is the National Environmental Public Health Tracking Network (EPHT), in which the CDC funds health departments in sixteen states and one city to build local tracking networks. Other partners are the Environmental Protection Agency, the U.S. Geological Survey, the National Cancer Institute, and the National Aeronautics and Space Administration. The EPHT Network was established in 2002 to improve environmental public health surveillance by tracking and reporting environmental hazards and the health problems that may be related to them. It allows scientists, health professionals, and members of the public to see where these hazards and health problems are occurring and how they are changing over time. The network is currently focusing on data regarding noninfectious diseases or other conditions: poisoning by carbon monoxide or lead, asthma, cancers, and heart attacks; the concentrations of certain chemicals inside people's bodies, for example, lead levels in the blood of children; and hazardous contaminants and pollutants that may be found in air and water.¹⁷

As the 2003 Institute of Medicine report noted, the anthrax attacks of fall 2001 demonstrated the weaknesses of public health communication and information systems being used at the time. Only half of the nation's state, local, and territorial health departments had Internet capability. Another 20 percent of these health agencies lacked e-mail.⁴ Federal funding for bioterrorism preparedness has helped to bring many of the local health departments up to modern standards of information technology, and by 2006 93 percent had continuous, high-speed Internet access.¹⁸

In addition to being used in epidemiologic surveillance, information technology is already transforming the assessment and evaluation activities that are so important to the practice of public health and that promise also to improve outcomes in the practice of medicine. States and some counties maintain electronic databases on vital statistics, notifiable diseases, chronic diseases, hospital discharges, and immunizations; many of these are tied into the PHIN. Billing records on patients covered by the Medicare program have proven useful in assessing outcomes of medical care, as seen in Chapter 27.

Information networks are also being developed by MCOs and other nongovernmental providers of health services. Giant healthcare companies have streamlined procedures for storing and exchanging data on medical tests, procedures, costs, and outcomes. However, as noted by Paul Starr, historian of the relationship between medicine and public health (see Chapter 25), "National policy has yet to resolve two of the most fundamental questions about computerized health information: how to keep private what ought to be private, and how to make public what ought to be public."¹⁹(p.103)

President Obama, in his efforts to reform the healthcare system, has proposed the use of health information technology to improve the efficiency and quality of medical care for all American citizens. A uniform system of electronic medical records for all patients would help to overcome the fragmentation of medical care, which, for example, leads to duplication of services when doctors do not have information about procedures and testing a patient has received during previous visits to other doctors. A uniform system of billing could also reduce some of the administrative costs that contribute to the high medical expenditures in the United States.

An investment of \$19.5 billion for health information technology was passed by Congress in early 2009, and President Obama appointed a national coordinator to lead the implementation of a nationwide interoperable, privacy-protected health information technology infrastructure. The Department of Health and Human Services has developed software that is available to hospitals, physicians' offices, pharmacies, labs, insurance companies, and other components of the healthcare system, to enable them to connect to each other and to share data. The Department also published guidelines on securing health information by making it unreadable by unauthorized individuals.^{20,21,22}

A federal law passed by Congress in 1996, which became effective in 2003, was designed to protect the privacy of medical records. The Health Insurance Portability and Accountability Act (HIPAA) forbids “wrongful disclosure of individually identifiable health information.” While this provision helps to eliminate some abuses, it has raised concerns that the privacy measures obstruct the use of medical data for many useful purposes. For example, researchers have complained that they cannot conduct outcomes studies, such as comparisons of different treatments for cancer.²³ The privacy rules also have discouraged the creation of public databases that consumers could use to make optimal decisions concerning their health and health care.¹⁹

The rise of the Internet presents major new opportunities and challenges for individuals who wish to understand and make choices concerning their personal health. People have access to vast quantities of health information—and misinformation—on the Internet. As discussed in Chapter 8, many state and federal public health agencies provide the latest and most accurate information about health issues on their Web pages. Many nongovernmental sites also offer good advice and information, which can raise people’s awareness of health risks, provide them with motivation and skills to reduce these risks, offer a helpful sense of connection to others who are in similar situations, and furnish information about difficult choices. However, caution is necessary in using the information presented on Web sites that lack authoritative sponsors. This information may be biased because of the Web site creators’ commercial interests, distrust of science, or ignorance.

The Internet poses challenges to government agencies charged with regulating medical care because of the lack of accountability on the part of those who create Web sites. For example, doctors set up Web sites to diagnose and prescribe for patients’ ills without examining the patients. Prescription drugs are sometimes sold over the Internet to people without valid prescriptions. Drugs that are not approved in the United States can be ordered from foreign markets. Even prescription drugs that are available in the United States may cost more here than in other countries, including Canada, and many people choose to buy them over the Internet in order to save money. The traditional role of the Food and Drug Administration (FDA) and other governmental agencies—to protect consumers from fraudulent and irresponsible medical practice—is made much more difficult by the free-wheeling culture of Internet commerce. At the same time, the FDA’s opposition to importing cheaper drugs from Canada has begun to seem like a ploy to protect the American drug industry’s profits, generating skepticism about the integrity of the agency’s mission.

The Challenge of Biotechnology

Biotechnology promises to solve many medical problems with new drugs and procedures that will contribute to the spiraling costs of medical care. Information from the Human Genome Project, for example, allows the detection of individual differences in people's response to various drugs, with the promise that doctors can choose among medications to prescribe for a patient based on genetic tests. Discoveries in cancer genomics offer to provide information on individual tumors that will allow treatments specifically targeted toward a single patient. These promises of "personalized medicine" come with a caveat, however: At a time when medical costs are spiraling out of control, and when a significant proportion of the American population does not have access to even the most basic health care, who will have access to these expensive treatments? Public health should have a voice in deciding how many of these "miracles" our society can afford, and how priorities should be set when resources are limited.

Biotechnology offers even more unprecedented possibilities, such as that of choosing the characteristics of future children through genetic engineering and cloning or of slowing the aging process. These developments will raise many legal and ethical issues, which will have to be faced through public debate and difficult policy choices.

The Ultimate Challenge to Public Health in the Twenty-First Century

"If public health's mission is to fulfill society's interest in assuring conditions in which people can be healthy [The *Future of Public Health* definition], public health has yet to succeed in fostering a national debate on the relative return on investment to improve population health."^{24(p.xxiii)} As Jonathan E. Fielding noted, in a review of public health in the 20th century, the enormous expansion of the medical care system—a system that is largely inaccessible to much of the population that needs it most—occurred without consideration of whether this investment could have yielded more benefits to health if invested elsewhere. Public health agencies are chronically starved for funding to carry out essential public health services that are clearly cost-effective in raising the health status of communities.²⁴

Health is determined by the social, physical, and economic environments; health behaviors; and genetics. Health is affected only marginally by medical interventions. The challenge for public health continues to be educating the public and policy makers about the role of these nonmedical factors in determining people's health and convincing people of the importance of

the core public health functions in protecting and promoting the health of the entire population. As it becomes increasingly apparent that advances in high-technology medical care have become economically unsustainable, the nation must focus on assuring conditions in which people can be healthy—the mission of public health—in the 21st century.

Conclusion

The United States has made great progress in public health during the 20th century. The threat of infectious diseases has been greatly reduced, risk factors for some chronic diseases are well understood, the environment has been substantially cleaned up, and a great deal has been learned about how health is affected by behavior. The ability to assess the state of the public's health and to evaluate the impact of medical and public health interventions has advanced dramatically because of the existence of vast stores of health-related data and computer software capable of analyzing it.

During the 20th century, the life expectancy of Americans has been extended by thirty years. Much of this improvement came from ten great public health achievements identified by the CDC: vaccination, motor vehicle safety, safer workplaces, control of infectious diseases, decline in deaths from coronary heart disease and stroke, safer and healthier foods, healthier mothers and babies, family planning, fluoridation of drinking water, and recognition of tobacco use as a health hazard.

Still, public health faces many challenges in the 21st century. Some of these challenges come from new forms of familiar public health problems such as infectious diseases and environmental pollution. Others are posed by efforts to change people's unhealthy behavior, the factor that now contributes the most to premature mortality.

A trend toward decentralizing governmental responsibilities and authority has prompted public health to adopt a planning process called "management by objectives." This process involves setting measurable goals and objectives and periodically assessing progress. The federal government has led this planning process over the past three decades, and involvement has expanded to include state, county, and local communities. The result has been substantial progress toward achieving public health goals, but the goals must be constantly reset.

The trend toward managed care as a strategy for controlling medical care costs moved the incentives of medical practice closer to the mission of public health. However, the unpopularity of managed care and the failure to communicate the health benefits it offers led to a backlash. Consequently medical costs have resumed their upward spiral, raising concerns that medical care will become even less affordable in the 21st century, and the number of uninsured will continue to rise.

Advances in information technology have led to great improvements in public health surveillance capabilities. The bioterrorism attacks of fall 2001 stimulated a flow of federal funds to state and county health departments for preparedness, allowing improvements in information systems at all levels of government. Information technology also makes possible much of the assessment and evaluation activity that is becoming important to the practice of public health and medicine. President Obama has identified integrated health information systems as a priority in his efforts to reform the healthcare system. The rise of the Internet as a source of information and commerce also poses challenges to individual consumers on how to evaluate the information and to government regulators on how to protect consumers from fraudulent and irresponsible medical practice.

Perhaps the most important challenge faced by public health in the 21st century will be to encourage a society-wide debate on how public resources should be allocated to most effectively improve the health of the population as a whole.

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