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CDC's 60th Anniversary: Director's Perspective --- William H. Foege, M.D., M.P.H., 1977--1983

Expansion of Public Health

Modern public health began 210 years ago, in 1796, when Edward Jenner, using material from a cowpox lesion on the hand of Sarah Nelmes, vaccinated James Phipps. A later attempt to give Phipps smallpox demonstrated his immunity, and the vaccination era had begun. Although Jenner lacked our understanding of viruses, the immune system, or vaccinology, his clinical observations had convinced him that milkmaids were protected from smallpox because of their previous exposure to cowpox, and he acted to see if nature could be replicated.

David Sencer reported on the conclusion to the smallpox saga in his Director's Perspective (*1*), describing how Jenner's actions were taken to their logical extension during the smallpox eradication program in the 1960s and 1970s. CDC contributed more than 300 workers to this global effort, many of them assigned to the World Health Organization for deployment throughout the world. The importance of this event in the collective energy that defined CDC in 1977 cannot be overstated. Workers at CDC believed they could make a difference. They thought globally, understood teamwork, and were proud to be part of the organization.

For much of the past 210 years, public health has been synonymous with combating infectious diseases. As Sencer points out, although public health had made excursions into occupational health and environmental health, nutrition, birth defects, smoking, and even family planning, the focus was predominantly on the prevention and control of infectious diseases. However, interest in the health of the public increasingly required concern over the toll of chronic diseases, exposure to chemical toxins, the role of intentional and unintentional injury, and the interaction of many risk factors beyond microbes. Public health was changing, and so were the demands on CDC.

Changing CDC Priorities and Structure

In 1977, an invitation went out to health workers in cities, counties, states, academic institutions, industry, government, and global organizations to provide suggestions regarding what CDC needed to do in its pursuit of three objectives: 1) reducing unnecessary suffering, 2) reducing premature mortality, and 3) improving life quality. Hundreds of responses and thousands of suggestions were received and assembled into categories by a team led by Seth Leibler.

Next, an outside committee, with J.D. Millar acting as liaison to CDC, was asked to consider these suggestions, along with patterns of morbidity and mortality in the United States and to provide guidance on the highest future priorities for CDC. The committee determined that mortality figures often were misleading in defining the importance of a health problem. At CDC this led to the use of "Years of Potential Life Lost," a concept used subsequently in many publications. Age 65 was accepted as the age for comparison, not because it defined the median or the desired, but because age 65 was commonly used in the reporting of global statistics. The committee recommended a dozen priorities for CDC.

During two retreats, managers at CDC considered the priorities to see whether they could support them. They accepted all 12 recommendations and, in the course of discussion, added an additional three for a total of 15 priorities for CDC to pursue.

Having agreed on objectives, priorities, and the need to expand CDC's activities, the difficult task of reorganizing the agency remained. In preceding years, every outbreak investigation had required matrix management, with experts drawn from epidemiology, statistics, laboratory sciences, and other disciplines to find the solution. With expanding priorities and the need for many additional forms of expertise, the solution of public health problems required a new structure. A new structure, with all of its unknowns, was not easy to implement and required special attention to communications and suggestions from those affected by the changes. The crucial ingredient was a director in each center who defined a path that workers were eager to follow. CDC was reorganized into different centers (e.g., Infectious Diseases, Occupational Health, Professional Development and Training, and Environmental Health), each staffed with persons with the various skills needed to solve particular problems. Matrix management was still required (e.g., to determine whether an outbreak was infectious or toxic), but the majority of health problems now related to a given center, and the agency name was changed to *Centers* for Disease Control.

Solving New Problems

Solving health problems was and still is a daily task at CDC. Sometimes these problems emerge as new outbreaks or observations. In the late 1970s and early 1980s, dozens of outbreak solutions were chronicled in *MMWR*. Investigators determined that newly identified Legionnaires organisms actually were common and had been involved in previously unsolved outbreaks (*2*). New problems included toxic shock syndrome, which made headlines in 1980 when hundreds of previously healthy women of child-bearing age exhibited fever associated with shock, multi-organ failures, and high death rates (*3*--5). Rapid identification of tampons as a risk factor, and identification of a specific product as posing especially high risk, helped to reduce but not eliminate this problem.

During the late 1970s, the world appeared faced with a new, emerging infectious disease (e.g., Lassa fever, toxic shock syndrome, and Legionnaires disease) every year. CDC workers, during the course of some of the most difficult outbreak investigations in history, defined the dynamics of virus transmission and isolated the Ebola virus in Zaire and Sudan (*6,7*). However, increasingly, outbreak investigations involved noninfectious health problems such as those involving baby foods and diet preparations. The deaths of women attempting to lose weight while consuming liquid-protein diet products led to an understanding of the risk for physiological consequences on cardiac function posed by such products and resulted in their subsequent regulation.

Although outbreak investigations command much of the media attention, the more routine daily work of thousands of health workers throughout the United States is what ultimately moves morbidity and mortality numbers to lower levels. Monitoring hospital infection rates and their causes, daily maintenance of water supplies, monitoring food handling practices, and improving air quality are only a few of the tasks that, when performed correctly, never become known to the public. Lead poisoning in children provides an example of successful intervention for a problem not involving infectious disease. Leaded gasoline and paint exposed

thousands of children to harmful levels of lead. The development of an inexpensive and rapid test in the 1970s made possible the screening of children, resulting in better surveillance, treatment, and prevention measures. The number of children with high lead levels was reduced, and the health and collective intelligence of subsequent cohorts of children was improved (*8*).

Redefining the Unacceptable

In the infectious disease field, immunizations have been both highly effective and cost effective and have resulted in the prevention of diseases that were leading causes of death a century ago. In 1977, with the support of the White House and the Department of Health, Education, and Welfare, new measures were taken to improve immunization rates. Many have noted that public health is constantly redefining the unacceptable. A quarter century ago, the objective of 90% school-age immunization coverage with common childhood vaccines was regarded by many as too ambitious. That objective proved achievable but still insufficient, as researchers determined that such levels of immunization coverage must be reached by age 2 to achieve optimal disease control.

In 1978, improvements in immunization rates led to the possibility of interrupting measles transmission in the United States. Some thought this unachievable and believed pursuing such an objective would only harm the reputation of CDC. Others felt the true barriers would not be determined unless this ultimate objective was selected; consequently, CDC set a goal of interrupting indigenous measles transmission. Month by month, every measles solution revealed a new problem, including transmission among military recruits (solved by vaccinating all recruits regardless of history), in day care centers, preschools, colleges, and even in unexpected settings such as stadiums or theme parks. Ultimately, when every other problem appeared solved, a final barrier was uncovered, namely the importation of measles into the United States on an average of twice a week. Today, implementation of measles immunization programs around the world continues to decrease the rate of importation into the United States. Meanwhile, in 2003, measles was declared no longer endemic in the Americas (*9*), and in the United States, rubella was declared no longer endemic in 2005 (*10*).

In 1981, the most devastating of the emerging infections, which would become known as human immunodeficiency virus (HIV) infection, was described in *MMWR*. During the following months, CDC investigators of sexually transmitted diseases under the leadership of Paul Weisner, and later agency-wide investigators headed by Jim Curran, devoted more resources to understanding HIV and acquired immunodeficiency syndrome (AIDS) than any other investigation in CDC history. Two years later, even before a virus had been isolated, the CDC team was able to outline in *MMWR*, on the basis of epidemiologic evidence, what was known about transmission and what could be done to reduce transmission rates. Their recommendations were remarkably accurate and reinforced by later findings. The frustration of the early years was gaining insight into transmission dynamics but having inadequate screening techniques for risk reduction. For example, with the second clinical report of HIV involving a person with hemophilia, the team knew the virus would pose risks for recipients of blood transfusions in general, yet no specific screening technique existed to identify contaminated units of blood. The only recourse was exclusion of groups as blood donors, based on risk factors. In later years, after a screening test for HIV infection was developed and implemented, frustration changed to disappointment as scientists found themselves able to understand HIV/AIDS transmission patterns but still faced with the difficulties of altering human behavior.

As CDC expanded beyond infectious diseases, new surveillance systems were developed for chronic diseases and risk factors that are followed inevitably by health impairments. CDC continued to document the impact of smoking on health but also worked on how best to educate the public and how to evaluate the value of school health curricula. In addition to smoking, work on heart disease, cancer, and obesity required expertise in nutrition, exercise, and human behavior, leading to a need for more public health workers trained in the social sciences. The methods used for infectious disease surveillance not only had relevance for

determining risk factors for chronic diseases but also for violence and injuries. Three of the top five causes of years lost prematurely involved homicide, suicide, and unintentional injuries. Creative work was done to define measures for preventing violence and injuries. The groundwork was set for the future establishment of the National Center for Injury Prevention (*11*).

Science Versus Politics

Every public health decision involves political decisions. A price came with CDC's expansion beyond infectious diseases, which generally do not have a group of persons who benefit from the disease and are lobbying to reduce control efforts. With infectious diseases, public health decisions usually can be based on the best science available; this is not always true in the larger public health arena. Tobacco companies make their profit by selling cigarettes and will actively fight efforts to reduce tobacco consumption. The new reality at CDC involved groups disputing its findings, such as gun lobbyists, and political pressures from both congressional and administrative personnel regarding occupational health decisions, lead abatement recommendations, and tobacco statements. One Senate Committee demanded the names of persons investigated in the liquid-protein diet deaths so that it could perform its own investigation. The names were not provided. A congressman demanded the names of persons in CDC files who tested positive for HIV. Again, the demand was refused. But the time and effort required to counter such political intrusions increased and became a fact of life that continues to decrease the efficiency of public health workers. CDC needs to continue to base its decisions on the best available science, but factors beyond science continue to contribute to public policy decisions.

A final example involves Reye syndrome, a problem that had concerned CDC for some years. By 1979, CDC had the results of three case-control studies from Arizona, Michigan, and Ohio, indicating that salicylates (i.e., aspirin) were a risk factor under certain conditions. Michigan performed another study during the 1980--81 influenza season that also determined salicylates were a risk factor for Reye syndrome.

None of the studies had reached statistical significance, in an era when meta-analysis for combining studies for statistical analysis was in its infancy. The National Institutes of Health, Food and Drug Administration (FDA), and CDC all had made statements regarding the possible association of medications with Reye syndrome; however, those statements had fallen short of advising against use of salicylates in children with influenza or chickenpox. Outside consultants all agreed that the various shortcomings of the studies were insufficient to neutralize the consistency of the findings. The aspirin manufacturers were unrelenting in their arguments that CDC's scientific reputation would be ruined if the studies were reported without having achieved statistical significance. But CDC and FDA decided to report on the studies in a joint statement, making their shortcomings very clear, in the belief that pediatricians and parents should have all the information that the Public Health Service had. The night before publication, FDA called to say it had received new information from the aspirin manufacturers and that CDC should delay publication.

However, the next day, CDC decided to proceed with its publication plan. The report in *MMWR* detailed the shortcomings of the studies and concluded with the following statement: "Until definitive information is available, CDC advises physicians and parents of the possible increased risk of Reye syndrome associated with the use of salicylates for children with chickenpox or influenza-like illnesses (*12*)."

The very surprised aspirin manufacturers descended on the assistant secretary of health, who supported the statement. They went to the secretary of Health and Human Services, who supported the statement. They then went to the White House, which told CDC to start a new study. But the word was already out. Salicylates were withheld in children with chickenpox and influenza, reports of Reye syndrome declined, lives were saved, and science had trumped politics. The challenge for the future is to continue making the best science available for the benefit of everyone.

References

1. CDC. CDC's 60th anniversary: director's perspective---David J. Sencer, M.D., M.P.H., 1966--1977. MMWR 2006;55:745--9.
2. Fields BS, Benson RF, Besser RE. Legionella and Legionnaires' disease: 25 years of investigation. Clin Microbiol Rev 2002;15:506--26.
3. Reingold AL, Hargrett NT, Shands KN, et al. Toxic shock syndrome surveillance in the United States, 1980 to 1981. Ann Intern Med 1982;96(6 Pt 2):875--80.
4. Hajjeh RA, Reingold A, Weil A, Shutt K, Schuchat A, Perkins BA. Toxic shock syndrome in the United States: surveillance update, 1979--1996. Emerg Infect Dis 1999;5:807--10.
5. CDC. Toxic shock syndrome---United States. MMWR 1997;46:492--6.
6. World Health Organization. Ebola haemorrhagic fever in Zaire, 1976. Bull World Health Organ 1978;56:271--93.
7. World Health Organization. Ebola haemorrhagic fever in Sudan, 1976. Report of a WHO/International Study Team. Bull World Health Organ 1978;56:247--70.
8. CDC. Preventing lead poisoning in young children: a statement by the Centers for Disease Control: January 1985. Atlanta, GA: US Department of Health and Human Services, CDC; 1985.
9. Katz SL, Hinman AR. Summary and conclusions: measles elimination meeting, 16--17 March 2000. J Infect Dis 2004;189(Suppl 1):S43--7.
10. CDC. Achievements in public health: elimination of rubella and congenital rubella syndrome---United States, 1969--2004. MMWR 2005;54;279--82.
11. Committee on Trauma Research, Commission on Life Sciences, National Research Council, Institute of Medicine. Injury in America: a continuing public health problem. Washington, DC: National Academy Press; 1985.
12. CDC. National surveillance for Reye syndrome, 1981: update, Reye syndrome and salicylate usage. MMWR 1982;31:53--6,61.

In commemoration of CDC's 60th Anniversary, MMWR *is departing from its usual report format. This is the second in a series of occasional commentaries by directors of CDC. The directors were invited to give their personal perspectives on the key public health achievements and challenges that occurred during their tenures.*

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**Questions or messages regarding errors in formatting should be addressed to mmwrq@cdc.gov.

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