

HISTORICAL NOTES

Medical Milestone, Millennial Mission

The word “breakthrough” is often heard in medical reports, especially when a drug, device, or other technology is being promoted as the “next big thing” in medical practice. But not all innovations are breakthroughs, not all breakthroughs are advances, and not all advances are milestones. The latter represent markers of accomplishment. In medicine, a true milestone alters how a phenomenon is seen and how it is addressed. Moreover, it has a dramatic effect on health and disease.

In 2007, the *British Medical Journal* gave its readers the opportunity to ponder what constitutes a significant medical milestone. Specifically, readers were asked to choose “the most important medical milestone” since 1840, when the *BMJ* began publication (1). After an initial round of nominations, a panel of experts whittled down the list to 15 milestones. Readers then had the opportunity to vote for their choices over the course of 10 days. More than 11,000 readers from all over the world cast their votes (2). The winner: the “sanitary revolution,” with 15.8% of the vote. This was followed by antibiotics, with 15%, and anesthesia with 14%. Some notches down were two additional options: the introduction of vaccines (12%) and the discovery of the structure of DNA (9%).

The *BMJ*'s selection is a tribute to the valiant efforts of Edwin Chadwick, a 19th century lawyer who pioneered the introduction of piped water and sewage disposal in England. The choice also recognized that, although lacking the razzle-dazzle of disease-specific cures, improved sanitation has had a widespread and lasting effect on many of the causes of disease, proving that “passive protection against health hazards is often the best way to improve population health” (3).

Yet even an “intervention” as seemingly innocuous as sanitation and clean water met with the opposition of interested parties in Chadwick's time, and he had to wage a long battle against these. But his tenacious advocacy ultimately prevailed, and he changed how people lived as well as how they died.

Chadwick's Challenges

Born in 1800, Chadwick was a young lawyer and follower of Jeremy Bentham when he became a Member of the Royal Commission of Inquiry on the Poor Laws, which sought to study the social security system which had been in place in England since the 16th century to give relief to the unemployed, the old, and the sick (4). This piqued his interest in what we now call the “social determinants of health”: those factors that influence the

health status of a population, including not only their access to medical care, but also the environment in which they live, where they work and what they do, and the habits they adopt. In 1837 and 1838, in the wake of influenza and typhoid epidemics which devastated England, Chadwick headed an inquiry into sanitation. His report, *The Sanitary Conditions of the Labouring Population* (1842), was an eye-opener. Combining Dickensian images of squalor and hopelessness with data on class-based mortality, Chadwick's treatise called attention to socio-economic differences in death rates and highlighted the importance of addressing the preventable causes of death (5).

At that time, neither the germ theory nor the doctrine of “specific etiology,” which linked specific disease to particular pathogens, had taken hold. Like most of his contemporaries, Chadwick believed that disease was caused by miasmas, or air made impure by decomposing matter. He therefore underlined the causal significance of the circumstances that caused or aggravated disease (“atmospheric impurities . . . , damp and filth, and close and overcrowded dwellings”) and urged that these be removed by “drainage, proper cleansing, better ventilation and other means of diminishing atmospheric impurity” (6). Even when his understanding of disease causation was flawed and incomplete, Chadwick's prescriptions were sound: he pressed for measures aimed at cleaning the environment, including removing refuse and improving the water supply.

Although an advocate of using the power of government to better individual and collective health, Chadwick was a conservative at heart: he believed that a healthier population would be able to work harder and therefore cost less to support (7). His major concern was therefore reducing the number of persons seeking poor-law relief, and he considered the promotion of civic and personal cleanliness a precondition to improving the moral condition of the population and nurturing “sound morality and refinement in manners and health” (6). But his call to action was disavowed by the Poor Law commissioners, who disclaimed all responsibility for the report, saying that it had been prepared by Chadwick on his own (8). And because the report threatened the private water companies and a number of “offensive trades” such as slaughtering and tanning, Chadwick also earned the enmity of the business community (4).

Moreover, Chadwick's 1842 report challenged the prevailing laissez-faire of the government. He therefore had to wait for a more congenial political environment

for his ideas to gain notice. In 1848, both pressure from Chadwick and fear of an impending cholera epidemic led Parliament to pass the first British Public Health Act establishing central and local boards of health. Chadwick headed the central Board of Health between 1848 and 1854, when he was dismissed following pressure from local authorities who resented both his reforms and his abrasive personality. Some found him rude and dictatorial; indeed, those who favored local autonomy proclaimed that they would rather take their chances with cholera than abide by Chadwick's dictates (4). The Board was subsequently disbanded.

This effectively ended Chadwick's civil service career, although it freed him to engage in advocacy. He continued to testify before royal commissions, and drew up reform plans and programs over the next 36 years (8). His agenda, in addition to the "sanitary idea," included factory reform, public administration, and increased accountability in government. In his 90th year, he was knighted by Queen Victoria. And his name has been immortalized in a bas-relief frieze on the façade of the prestigious London School of Hygiene and Tropical Medicine, where he is recognized among the "great and the good" in the fields of hygiene and public health (9).

The Sanitary Revolution's Unfinished Business

The movement to which Chadwick devoted most of his life is now part of a global agenda, because the promises of the Sanitary Revolution remain unfulfilled in many countries. Much of the technology that we take for granted until it fails us (e.g., when a dam breaks, or water becomes a medium of contamination, or a sewer backs up) is inaccessible to large swaths of the world's population. Worldwide, approximately 1.1 billion people lack access to safe water (10); about 2 million people die each year from waterborne diseases (11).

Yet clean water is indispensable to the success of many health and development initiatives. As the world economy becomes increasingly interdependent, more governments, nonprofit organizations, and companies are recognizing the wisdom of investing in clean water technologies. The Millennium Water Alliance, a group of nongovernmental associations, is working worldwide to achieve one of the United Nations' Millennium Goals for Sustainable Development: to reduce by half the proportion of people without access to safe and affordable drinking water and sanitation by the year 2015 (12). And Global Water Challenge is a coalition of corporations and organizations based at the United Nations Foundation; its goal is to provide safe drinking water, sanitation, and hygiene education worldwide to those who lack these services.

The sanitation goal has attracted the interest of a number of companies who, motivated by enlightened self-interest, have made clean water their cause. Because they are major consumers of water, they recognize that they can do good at the same time that they do well by increasing water stewardship and protecting the safety and availability of the water supply. These companies are sponsoring a wide range of community water projects and wastewater treatment efforts, bringing drinking water to poor communities (13). It thus seems that entrepreneurs and secular philanthropists have replaced individual advocates as the purveyors of sanitary practices. As in Chadwick's time, these initiatives stem from mixed motives and a belief in what has been called the "gospel of cleanliness." The voters of the *BMJ* poll therefore recognized a medical milestone that continues to empower and inspire.

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