Against invisible armies

A brief history of American public health

by Melissa Schenkman / illustrations by Sandra Kwak

In a time when our lives can be taken from us at nearly any moment, whether by a car accident or plane crash, or even by walking across the street, we want to enjoy living while we can. Public health has helped us not only learn the secret to living longer, but to having a quality of life which is worth living.

In the beginning

When the English colonists arrived at Jamestown around 1629, they did not realize it was a place where diseases reigned freely. Over the course of the subsequent fifty years, colonists would face bouts of malaria, smallpox and yellow fever. All these epidemics happened in the absence of a public health safety net.

As the metropolitan centers of America expanded, they quickly became overcrowded places, lacking portable water, sanitation, sanitary food and adequate housing. Constant epidemics and high childhood mortality rates resulted, giving children a 50% chance of living until age five. Mothers were also dying prematurely, and as of 1857, postpartum puerperal fever claimed mothers' lives in 19 of every 54 pregnancies. This death rate led to population decline.

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The advancement of the public health system was and continues to be a social and political issue. Infectious disease disproportionately affected the poor living in urban centers. The wealthy, and hence those in political power, lived in clean, spacious homes, and unlike the poor, had access to private healthcare providers. Infectious disease and the need for public health solutions were problems of the poor, not the wealthy;

thus, the wealthy and the affluent--the very people who held the power to initiate a public health system--had little concern for its development. It would not be until New York City felt the widespread economic impact of smallpox and yellow fever epidemics that politicians and other leaders would begin to take notice of the need for public health interventions.

In 1796, the state legislature of New York passed the first all-encompassing public health law in the nation. It created a New York City Office of Health and an office for a State Commissioner of Health. These offices took action by creating: quarantine regulations for ships conducting trade, "pest houses" for quarantine of citizens with contagious diseases, and a system of fines for those who failed to comply with quarantine and sanitation mandates. In contrast with the current public health system in the United States, this initial attempt at improving public health had the autonomy and authority to enforce its guidelines directly on the people.

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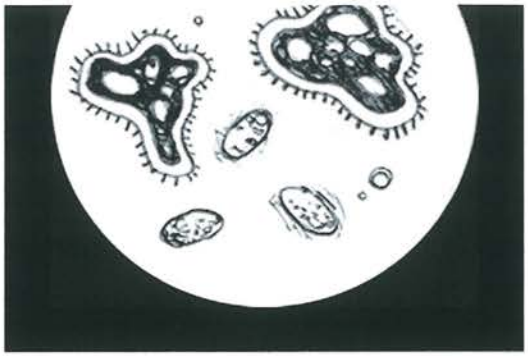
Although large cities across the nation would soon adopt New York City's model, the public health attempt in New York quickly became hampered by political corruption. When Tammany Hall took over New York's government around 1835, the political machine corrupted the public health system there by replacing its workers with "cronies" who had no public health objectives. The effects of Tammany Hall would plague New York for a century; after only 15 years under Tammany Hall, the mortality rate was 10% higher in New York than it was in 1750.

Meanwhile, the sanitization movement began, and cleaning the cities became the objective of public health. In 1842, British physician Edwin Chadwick published a compelling paper that was one of the first to advocate organized public health and health via proper sanitation. The same year, John Griscom of New York advocated Chadwick's message, but on a smaller scale, focusing only on New York City. In France in 1840, the Semmelweis technique of sterilizing one's hands before touching patients was developed. However, skeptical Americans did not practice this technique until the 1890s. In 1850, Dr. John Snow removed the handle of a communal water pump in a cholera-laden neighborhood in London, ending the local epidemic and thereby suggesting the disease's choice of transportation: water. Remarkably, Snow made the connection between the contaminated water source and the cholera without any knowledge of its causative germ, which was still undiscovered.

In 1870, Dr. Joseph Lister discovered antiseptics and their ability to prevent infection, while France's Louis Pasteur published his earth-shattering Germ Theory of Disease in



1880. Pasteur argued that all contagious diseases are caused by microscopic organisms that damage the human victim at the cellular level. Pasteur's theory was just the leverage American public health pioneers needed to convince skeptical politicians that money for laboratory study and public health measures like vaccine programs was undoubtedly necessary. In fact, because of Pasteur's theory, New York City's abominable public health system took a 180-degree turn, losing only nine people to the 1892 cholera epidemic while many thousands died from it in England.

Although these discoveries seemed to hold the answers to effectively caring for and curing patients of communicable disease, American physicians and even the American Medical Association remained skeptical. According to Laurie Garret's book *Betrayal of Trust*, "They felt their autonomous powers over patients were threatened." Doctors felt that public health workers usurped their autonomy and would therefore not abide by public health mandates. For example, in Minnesota, Dr. Charles Hewitt stopped a smallpox epidemic from sweeping the state by practicing what he preached about disease prevention. He mandated active disease hunting to find the source of the disease and stop it in its tracks. By establishing checkpoints along the railway where Hewitt determined a passenger with smallpox traveled, he avoided an epidemic toll; only seven people died. Nevertheless, doctors en masse did not abide by Hewitt's instructions for prevention.

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Finally, in the year 1901, the U.S. Public Health Service (USPHS) was recognized as a success by the public after one of its microbiologists, Joseph Kinyoun, stopped the plague from ravishing San Francisco's Chinatown. Kinyoun, a microbiologist at Angel Island, California's immigration center, found the plague bacterium, Yersinia pestis, in the blood of both a human and a rat from Chinatown. He alerted authorities in both California and Washington D.C., but was met with adamant skepticism. Although the governor of California, Henry Gage, said Kinyoun's findings were false, a review commission confirmed the findings 18 months later. For the first time, federal health authorities were in control of implementing plans to halt an epidemic.

Another factor contributing to the growth of public health was President Franklin Delano Roosevelt's "New Deal" policy in 1933, which enhanced the nation's public health infrastructure by creating over a dozen public health

agencies.

Public health's primary concern was still infectious disease and, at the beginning of the 20th century, tuberculosis and smallpox were rampant in the U.S. As the century progressed, the development of new vaccines and antibiotics allowed the medical and public health systems to triumph over many infectious diseases. In 1961, the oral polio vaccine began the quest to eliminate polio, but public health was still a game of trial and error. The first version of the polio vaccine had been an injection that still allowed a transmittable form of the virus to pass into the stool . The year 1977 marked the astounding global eradication of smallpox, causing the public to see the scourge of infectious disease as a thing of the past.

Today's public health system

Before HIV/AIDS arrived in the early 1980s, the focus of public health had shifted to chronic diseases like cancer and heart disease. However, by the 1990s, infectious disease came back to haunt the U.S. with the resurgence of tuberculosis in New York City.

"Many public health and infectious disease experts began to realize that we would continue to battle infectious diseases throughout our lifetime," said Ruth Berkelman, M.D., a 20-year Centers for Disease Control and Prevention (CDC) veteran and professor in the departments of Epidemiology and International Health at the Emory University's Rollins School of Public Health.

Today, more than a dozen health-related government agencies, including the CDC and the National Institutes of Health (NIH), work to make our lives healthier and safer everyday. There are 32 schools of public health across the nation that educate future public health leaders, and there are local and state health departments in every state.

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country's concern with bioterrorism has brought public health's national role to center stage. Public health professionals and professors have become valuable resources in preparing public health for bioterrorist attacks. As the public health system in the U.S. adapts to its new responsibility of preparing the nation for bioterrorism, the public health school curriculum has already started to change in order to better prepare future public health workers for bioterrorist attacks.

Several new courses specifically dedicated to combating bioterrorist threats emerged at the start of the fall 2002 semester at Emory. A course entitled "War and Public Health Disaster Preparedness" is currently being offered through the department of environmental health. Students can now be a part of the DeKalb County Board of Health in a pilot training program called "Student Outbreak Response Team" (SORT). Students can volunteer to learn first-hand about issues of early recognition and the use of the 911 emergency system to warn the public of an attack.

The future

Although public health curricula have not traditionally focused on bioterrorism preparedness, they have indirectly incorporated it with years of study on infectious disease, the agents of biological warfare.

Currently, the CDC has prioritized biological agents into three categories, dependent on their level of threat: A, B and C, with A including the most pressing threats. The government has given federal funding to state health departments to conduct more research and to further train health workers. Some in the field believe the renewed threat of bioterrorism is a blessing in disguise for public health because it is allowing the system to get the necessary funds for building a top-notch force.

Bioterrorism scenarios that have been proposed and will be examined include: the crop-duster, a plague striking a population, suspicious mail packages, a suicidal bioterrorist spreading an illness by simply coming in contact with others, and a hand-held aerosol sprayer spraying infectious viruses or bacteria.

The public health system has continued to maintain a national pharmaceutical stockpile which, in the event of bioterrorism, would be able to disperse drugs to the public within days of attack, though some in the public have expressed concern about drugs arriving to a disaster site in time.

The public health system also faces the challenges of administering the correct treatment in an appropriate amount of time and controlling the scene of a biological attack. In the sarin attack in Tokyo in 1995, physicians recognized the symptoms of a nerve gas and quickly gave atropine, an anticholinergic drug, to those affected. Sarin, along with many other nerve gases, enhance

transmission of the chemical acetylcholine, which "plugs into" receptors on cells and causes increased heart rate, salivation, nausea and vomiting, convulsions, respiratory arrest and death. Atropine counters these effects of increased acetylcholine by blocking these receptors. However, if physicians and disaster response personnel are not educated properly to become familiar with possible chemical and biological agents, then treatment may not reach patients in time. The U.S. Department of Health and Human Services (DHHS) oversees a National Disaster Medical Service (NDMS) composed of federal Disaster Medical Assistance Teams (DMATs) based in each state. These teams, whose members are part of the U.S. Public Health Service (USPHS), work with local and state authorities and are trained to decontaminate patients at a disaster site, set up treatment sites and administer emergency treatment in the event of an attack. One problem DMATs face is that the majority of patients in a disaster are "walking wounded;" that is, they leave the disaster scene and go to the hospital, contaminating both those in the hospital and bystanders.

Despite the many hypothetical bioterrorism scenarios proposed by experts, there will always be other possibilities. Since public health's inception, infectious disease has shown us that public health's work is never done; thus, constant alertness and education are our best weapons.

As Dr. Leona Baumgartner, New York's health commissioner in the mid-1950s, concluded: "[P]ublic health and the work of the health department is ever-changing, for the nature of health problems change. As one is solved, another emerges."

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