Addressing the Potential Threat of Bioterrorism—Value Added to an Improved Public Health Infrastructure

The use of biological weapons was banned in 1972 by the Convention on the Prohibition of the Deployment, Production, and Stockpiling of Bacteriological and Toxin Weapons (1). Caches of biological weapons still exist, however, and their illegal use in military operations cannot be discounted entirely (2).

The threat of biological warfare seems remote to industrialized nations, which have enjoyed decades of peace and prosperity. In contrast, the threat of bioterrorism, in which biological agents are used by extremists as weapons against civilian populations, generates considerable anxiety. Although the likelihood of a bioterrorist attack is difficult to predict, the consequences of a successful attack could be devastating and cannot be ignored. Unlike attacks involving conventional or even chemical weapons, which could be readily detected and limited to a specific geographic area, an attack with a biological agent (and the resulting symptoms of exposed persons) could remain undetected for days, would be widely scattered, and depending on the etiologic agent, might not be identified immediately as a manmade event. Secondary cases would confound epidemiologic investigations as well.

Regardless of the source, surveillance of infectious diseases, detection and investigation of outbreaks, identification of etiologic agents and their modes of transmission, and the development of prevention and control strategies are responsibilities of public health agencies. Acquiring and sustaining the capability for an adequate response to bioterrorism requires thoughtful analysis and carefully integrated planning by these agencies, as well as law enforcement officials, emergency response physicians and other first responders, the military, and others. New partnerships will need to be forged and old ones strengthened.

Preliminary assessments of our nation's capabilities for responding to possible bioterrorist attacks have identified many deficiencies. From the public health perspective, these deficiencies include inadequate surveillance systems; lack of rapid diagnostic techniques; insufficient stockpiles and distribution systems of antimicrobial agents and vaccines; inefficient communication systems; and insufficient training of physicians, epidemiologists, and laboratorians. The deficiencies may be more pressing in certain disease areas than in others. Some diseases that are considered bioterrorist threats, such as anthrax and plague, are no longer important public health problems in most industrialized nations, so the capabilities and capacities for responding to outbreaks of these diseases may be at historic lows. These deficiencies in response capacity can be traced to the 1960s and 1970s, when complacency began to erode essential components of the public health infrastructure. Since the early 1970s, at least 25 previously unknown pathogenic agents and diseases have been identified, and in recent years mounting resistance to antimicrobial agents has confounded the treatment of many illnesses (3).

A strategic plan for reducing the consequences of new and reemerging infectious diseases (4) proposes corrective measures for addressing the infrastructure deficiencies: instituting better surveillance systems, improving diagnostic techniques, developing new vaccines and drugs, and conducting research and providing training in several areas. The measures needed to prevent and control emerging infections are strikingly similar to those needed to check the threat of bioterrorism. Improving capabilities and capacities for responding to one issue will almost certainly benefit the other. For example, developing rapid diagnostic techniques that would make it possible to quickly detect bioterrorist attacks involving anthrax, plague, or Q fever would have considerable usefulness in the routine clinical diagnosis of pneumonia. Distribution systems set up to deliver antimicrobial agents and vaccines after bioterrorist attacks would be indispensable in delivering antiviral compounds and influenza vaccine during a large pandemic. Surveillance and communication systems are fundamental components of an adequate public health infrastructure, so an electronic, integrated surveillance system based on standard architecture and vocabulary would serve all needs.

A value-added approach to infrastructure development is not a new concept in public health. In 1951, at the beginning of the cold war, the Epidemic Intelligence Service (EIS) was founded at the Center for Disease Control (CDC) (5,6). The EIS concept originated with Joseph W.

Mountin, founder of CDC, and was implemented by Alexander D. Langmuir. Noting the "dearth of trained epidemiologists," Langmuir proposed training a corps of young physicians that could "investigate outbreaks of disease in strategic areas." He also noted, "A broader but equally pressing need is to make available competent epidemiologists to assist in the planning and organization of the total civil defense program at all levels." Langmuir also observed that while "this dearth exists even in peacetime, defense needs exaggerate this deficiency."

In 1951, 22 young physicians and one sanitary engineer signed on as EIS Officers at CDC, where they received several weeks of instruction in epidemiology, biostatistics, and public health administration and then served for 2 years as field epidemiologists, either at CDC or in state health departments. EIS has been in operation since then, and as the purview of CDC expanded beyond infectious diseases, so have the size and composition of EIS and the training of EIS Officers. Surveillance, outbreak investigations, and research on the epidemiology of new diseases remain standard activities, however. EIS has rarely had occasion to investigate outbreaks caused by the intentional release of microorganisms (7,8). However, as Langmuir predicted in 1951, the program has increased public health preparedness and made important contributions to the control of communicable diseases. EIS now has more than 2,000 alumni, including nearly 200 scientists from abroad. Many alumni have moved on to distinguished careers in academia, industry, and clinical practice, but many others have filled key positions at federal and state public health agencies. Trained to consider diseases as problems of populations, EIS alumni remain a valuable resource when disease outbreaks occur.

As in 1951, civil defense, and particularly the use of biological agents against civilian populations, is of utmost concern. Efforts are under way to improve the capabilities of the public health system for detecting and responding to this threat. Also as in 1951, we have an opportunity to ensure that improvements made in response to the threat of bioterrorism have multiple uses and can be applied to other public health emergencies. Planning efforts to date have adopted this viewpoint. Developing a separate infrastructure for responding to acts of bioterrorism would be poor use of scarce resources, particularly if this infrastructure is never used. "Value added" should be the watchwords of the current initiative.

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