

The Challenge of Training a Public Health Workforce in Bioterrorism Preparedness

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IN HIS ARTICLE DESCRIBING the task of preparing our state for the next episode of bioterrorism (BT), Dr. Cline states, "The disease surveillance system in North Carolina... is inadequate. It is not automated, it does not collect data in 'real time,' and it does not capture all the information needed for early detection." What are the reasons for our state having such an inadequate surveillance system? In fact, North Carolina's public health infrastructure is not greatly dissimilar to those of the other 49 states; they nearly all suffer from more than 30 years of deferred maintenance.

Dr. Cline notes that disease reporting in North Carolina is paper-based, incomplete, and covers primarily those infectious diseases historically deemed to be of public health importance, such as salmonella and typhoid fever. Many of the frontline staff responsible for acute diseases surveillance in our state's 100 counties have little formal training in public health and its core activities, including epidemiology. These public health workers are hard working, but most have had little exposure to modern real-time communications modes of the sort needed in an attack of bioterrorism.

Dr. Cline asks, "How likely is it that North Carolina will be a target of terrorist attacks? How vulnerable are we?" He lists several compelling reasons why our state could be involved in an episode of BT, but we don't run a major risk compared to other easy targets, like major metropolitan transit systems, the Golden Gate Bridge, or a large sports event such as the Superbowl. It is unlikely that frontline public health officials in North Carolina will ever be confronted with a BT episode in their own counties. Thus the real present challenge: How to build rapidly and maintain indefinitely a massive infrastructure for early detection of BT that may never be called on? This "hurry up and wait"

conundrum is implied in Dr. Cline's text when he states that, during the anthrax scare in October 2002, "the NC public health system was consumed with the anthrax response even though there were no confirmed cases of anthrax disease in our state." How often can one ask local health departments to do this? They need to be paid for establishing and maintaining a steady state of vigilance. How do you keep good people on the job, even if they were to be well paid, when there is very little for them to do during the long interim periods between BT events?

Dr. Cline discusses the large (by public health standards!) sums of money for BT preparedness that have rapidly become available across our state and the nation. At this time we are seeing unprecedented infusions of net new resources directed at shoring up a huge, decrepit system so that it can maintain heightened vigilance for an event that most of us will never directly confront. How might we use these new funds to strengthen *and* maintain a public health infrastructure that is the victim of over 30 years of deferred maintenance? Given the extent of its neglect, it is very unlikely that the present new resources will be sufficient to bring the infrastructure up to the required standard. There is a very real risk that the public health community will be held accountable in a year or two if another attack of BT comes along and we still are not ready. And, of perhaps more serious long-term consequence, the new infrastructure will need to be maintained. Heightened vigilance against BT, once established, can never stop. If we are fortunate enough not to have new BT incidents for the next several years, one has to wonder whether there will be sufficient political commitment to continue funding, or whether once again we will let the public health infrastructure fall into disrepair.

Dr. Cline has noted "the use of biologic agents as weapons of mass destruction is cause enough for us to reinvest in the public health system, which is designed to protect us from these organisms and the diseases they cause. Two other modern trends also compel us to focus on biologic agents: the globalization of disease and the emergence of new organ

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isms.” There is wide consensus that a major long-term goal in building an effective response to bioterrorist attacks is to rebuild the American public health infectious disease control capacity. Conceptually, many of the steps that the public health system needs to take in order to strengthen our national biodefense are very similar to those needed to prepare for a naturally occurring outbreak of infectious disease. An important component of biodefense—perhaps the only component in the earliest response phase—is robust, real-time surveillance and assessment of acute infectious disease syndromes compatible with signs and symptoms of BT-induced illnesses.

In recent years, several emerging and re-emerging infectious diseases have presented our nation with many of the same challenges as bioterrorism, namely, identifying changing threats and preparing for them to appear at any time. A recent example of this phenomenon is the introduction of West Nile Virus (WNV) in the New York City area two years ago. This mosquito-borne infection occurs normally in Eastern Africa, the Middle East, and Central Asia. Since its introduction in New York the virus has rapidly spread north and south along the Atlantic coast. The emergence of a new viral infection is a clear signal that there is a potential for any new infectious disease to become established in the United States. Whether a pathogenic organism arrives as a naturally emerging infectious agent or through a deliberate act of biological terrorism, the research challenges are very similar for combating its spread into a new population.

The Role of the UNC School of Public Health

What is the University of North Carolina’s School of Public Health doing to assist Dr. Cline and the state in their broad mandate? The North Carolina State Bioterrorism Program and its seven regional surveillance BT teams have been given responsibility for epidemiologic investigation and surveillance for BT and other public health concerns, including emerging infectious diseases. The UNC School of Public Health will play a central role in the training and establishment of a research agenda within this state-wide, active BT-surveillance program. This program will provide unparalleled opportunities for active surveillance for other new and re-emerging infectious diseases including Southern tick-associated rash illness (STARI), a tick-borne disease with significant morbidity common in North Carolina. The etiology and incidence of STARI remains poorly defined and can only be established through an active surveillance system such as the one being set up for BT.

At the UNC School of Public Health, the North Carolina Center for Public Health Preparedness (NCCPHP) is a regional representative in a nationwide system of Centers for Public Health Preparedness (CPHP) sponsored by the Centers for Disease Control and Prevention (CDC). This

activity represents a partnership among academic, specialty, and local exemplar centers throughout the country. The Academic CPHPs are the cornerstones of a system that links schools of public health, state and local public health agencies, and other academic and community health partners in an effort to ensure that frontline US public health workers have the skills and competencies to respond to emerging health threats in general and to bioterrorism and newly emerging and reemerging infectious diseases in particular. The overall goal of the CPHPs is to support a national public health network for developing practice-focused and competency-based curricula, competencies for Public Health Informatics, accelerated use of distance-learning technologies, certifying and credentialing professionals, and conducting research in workforce development needs.

The initial mission of the NCCPHP has been to help prepare the public health workforce in North Carolina and its neighboring states to respond to health threats by

- assessing the training needs of the public health workforce in core public health skills and bioterrorism preparedness;
- facilitating training to meet the identified needs;
- developing a model to increase epidemiological surveillance at local public health agencies.

Initial Steps Taken

To carry out these goals, a two-phase work plan for the NCCPHP was set up. In Phase I, begun in 2000, the Center focused on local public health departments in four North Carolina counties (Edgecombe, Cumberland, New Hanover, and Wake) where the assessment process, training products, and a surveillance model were developed, piloted, and evaluated. In Phase II, we plan to offer the products developed in Phase I to health departments elsewhere in North Carolina and in neighboring states (South Carolina, Tennessee, Virginia, and West Virginia).

In Year One of the grant we also began to assess the training needs of the public health workforce in core public health skills and bioterrorism preparedness in the four pilot counties. A specially designed survey instrument based on the Ten Essential Services of public health and the core public health competencies was developed by the NCCPHP and administered to all members of each health department in the four pilot counties. We are now in the process of analyzing the data and preparing a report to deliver to the Health Directors in the four counties.

In Year One we have also developed a model to increase epidemiological surveillance by local public health agencies. The goal of this part of the project was to evaluate and improve the core public health skills of county health department personnel through the paradigm of applied epidemiological research in an emerging infectious disease. Through

this process, public health workers in the state will be better prepared to identify emerging infections and recognize and respond to a bioterrorism event. Pilot studies were conducted in the four pilot counties (New Hanover, Wake, Cumberland, and Edgecombe). The NCCPHP partnered with each of the pilot health departments to establish a “learn-by-doing” surveillance model for determining the incidence and risk of morbidity and mortality for a new or emerging disease of particular significance in their jurisdiction. Each health department chose this health problem jointly with the NCCPHP. A key person or persons in each health department was then identified to work directly with a NCCPHP person (an epidemiology graduate student). The four pilot projects are listed below:

- Cumberland County: Analysis of sexually transmitted diseases, social-sexual network patterns among patients at Fort Bragg and Cumberland County Health Department clinics;
- Edgecombe County: Long-term effects of Hurricane Floyd among school-age children;
- Wake County: Infectious disease burden in registered and unregistered Mexican migrant workers;
- New Hanover: Cluster of shigella cases in infants, possibly transmitted by migratory birds.

In Year Two we are creating and implementing an active surveillance system pilot project in NC Region 6 (comprising approximately 20 counties in western NC). This program will provide workforce training in active and passive surveillance, enhance existing surveillance infrastructure, and facilitate interactions across state and local agencies involved with public health preparedness. A report describing how to implement the system at a regional level will be produced. This program will be a model for the remainder of North Carolina and neighboring states. Step-by-step, Internet-based CD-ROM training modules about these subjects will be developed and enhanced.

In Year Two we are also developing and field-testing a precise method for establishing a smooth and well-coordinated public health response to acute HIV infection as a model for response to first detected cases in a bioterrorism event. To provide public health responders with real-world experience in this area, we will support emergency notification and contact tracing by regional public health response teams for HIV cases originally reported as negative by ELISA test but found to be positive with PCR testing for viral RNA. These cases represent an acute public health infectious disease emergency not unlike the first detected case of smallpox in a rapidly unfolding BT event. These recently infected cases of HIV infection have been informed that they had a “negative” HIV test, but in fact, because of the “window period” in their HIV serology, they are at their most infectious period in the natural history of HIV infection. Regional public health response teams will be involved with emergency notification and contact tracing for persons initially told they were not positive for HIV but later found to be positive. Lessons learned from these activities will be used to improve protocols for rapid response to public health hazards (with a focus on the situation of one highly infectious individual not known to be infectious, living in the community). Moreover, this model and lessons learned from these emergency responses will be developed into Internet-based CD-ROM modules.

In this way we hope that the UNC School of Public Health can help the State Division of Public Health carry out its broad and ambitious bioterrorism mandate rapidly and successfully: to establish and maintain a state-wide system of public health vigilance for episodes of BT while at the same time using these crucial funds to ameliorate the 30 years of deferred maintenance that unfortunately characterize the inadequate state of our public health vigilance capacity prior to 9/11.