



Testimony

**Before the Committee on Government Reform,
Subcommittee on National Security, Emerging**

CDC's Public Health Surveillance Activities

Statement of

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Good morning, Mr. Chairman and Members of the Subcommittee. I am Dr. David Fleming, MD, Deputy Director for Public Health Science at the Centers for Disease Control and Prevention (CDC). Thank you for the opportunity to update you on CDC's public health surveillance activities. I will describe the function of our current surveillance systems, update you on recent efforts to build surveillance capacity in state and local health departments, and discuss the status of our global disease surveillance activities.

As the nation's disease prevention and control agency, CDC has the responsibility on behalf of the Department of Health and Human Services (HHS) to provide national and international leadership in the public health and medical communities to detect, diagnose, respond to, and prevent illnesses, including those that occur as a result of a deliberate release of biological agents. This task is an integral part of CDC's overall mission to monitor and protect the health of the U.S. population. The ongoing response to the outbreak of Severe Acute Respiratory Syndrome (SARS) demonstrates the crucial importance of watchfulness to detect problems and control the spread of disease.

Public health surveillance is the ongoing collection, analysis and dissemination of public health data related to disease and injury. It is a crucial monitoring function for CDC and its partners, both domestically and internationally. These ongoing data collection and analysis activities help us detect threats to the health of the public. Without our public health surveillance systems, we might not identify outbreaks or other important problems in time to prevent the further spread of disease. We cannot investigate problems, identify their causes, and

implement control measures if we have not detected them. Recent events, including the SARS outbreak, have underscored this essential role of public health surveillance. For most of our surveillance data, the initial source of information is provided by health care professionals; a physician's ability to recognize, for example, a suspected case of SARS and his or her responsibility for reporting it to the state or local health department has been critical to CDC's ability to recognize unfolding disease events. Indeed, identification of cases of SARS relies on heightened awareness among health care professionals who recognize that the respiratory syndromes they were seeing were actually an unusual illness, not influenza.

Current Surveillance Systems

One key to successful defense against any threat to the health of the public, whether naturally occurring or deliberately caused, continues to be accurate, timely recognition of a problem. Awareness and diagnosis of a condition by a clinician or laboratory is a key element of our current surveillance system. Clinicians and laboratories report diseases to State and Local health departments, which share information with CDC. CDC works with our public health partners to define conditions that should be reported to public health departments. Health departments share these definitions and guidelines with health care providers, infection control practitioners, emergency department physicians, laboratorians, and other members of the health care system to ensure accurate and timely reporting.

Our surveillance systems generally use paper or facsimile reporting by health care providers to

health. If a case of illness is particularly unusual or severe (such as a case of anthrax or rabies), the provider may call the local health department immediately. As mentioned, health care provider recognition of the illness and awareness that certain health events require immediate notification of public health authorities, is critical to our ability to detect problems and mount a public health response. Such reporting requirements are mandated at the state level. For routine public health surveillance, this largely paper-based system is burdensome both to providers and health departments, often resulting in reports which are not complete or timely. In addition, the volume of paper reports and the need to enter the information collected into various information systems leads to errors and duplication of efforts.

These shortfalls influence more than our ability to detect an event; surveillance also plays a pivotal role in event management. Surveillance data help us to determine where cases are occurring and who is affected (e.g., particular age groups or occupations such as children or postal workers), when cases are occurring (i.e., are cases still occurring; are the numbers increasing or decreasing with time?), and matching such information to the laboratory data about the particular agent, to trace its origin as well as to identify whether cases in different geographic locations might have resulted from the same source. Such information is vital to directing our investigation and control efforts, but it requires a well-designed system to input and analyze the voluminous data required, such as the thousands of swabs tested for anthrax.

Integrated, Electronic Surveillance Information Systems

Given the crucial function of public health surveillance, we have recognized the need to take advantage of information technology advances to bring our surveillance systems into the 21st century. First, I will describe the overall direction that we are headed to transform our public health surveillance systems, and then I will describe some of our short-term efforts to enhance current surveillance systems in light of the threat posed by emerging and re-emerging infectious diseases and terrorism.

CDC and its partners have recognized the need to build more timely, comprehensive surveillance information systems that are less burdensome to data providers. Several years ago, we initiated the development of the National Electronic Disease Surveillance System (NEDSS). The ultimate goal of NEDSS is the electronic, real-time reporting of information for public health action. NEDSS will include direct electronic linkages with the health care system; for example, medical information about important diagnostic tests can be shared electronically with public health as soon as a clinical laboratory receives a specimen, or makes a diagnosis. In the future, NEDSS coupled with a electronic real-time reporting of births and deaths (vital statistics) and computerized medical records, not only in hospitals but also in ambulatory care offices, could facilitate immediate awareness of unusual illnesses such as anthrax or smallpox, as well as our ability to detect more subtle problems that may be dispersed across the country.

NEDSS integrates the numerous existing surveillance systems using a standards-based approach, with standards for data, information architecture, security, and information

technology. This adherence to standards will ensure that data need only be entered once, at the point of care for a patient, without a need for re-entry of data by our local and state partners. Use of standards is critical to ensure that our public health partners can use technology more effectively and collaboratively. The NEDSS strategy provides for State implementation of the CDC-developed version of NEDSS or state systems compatible with NEDSS. Currently, 30 States have requested installation of the system and four have been installed to date.

As NEDSS progresses, we are ensuring that the data standards we use are compatible with those used in the health care system generally so that we can make sense of health-related data and therefore detect potentially related cases across the country. Moreover, NEDSS is fully consistent with applicable aspects of HHS Secretary Thompson's recently announced consolidated health informatics (CHI) standards which are health data interoperability standards established under one of the Administration's electronic government projects covering the federal health care enterprise. In addition, a standard information and high-level security architecture will enable public health partners to share data in a secure fashion, which is critical for identifying problems that cross jurisdictional boundaries. And finally, the reliance on industry voluntary consensus standards for information technology ensures the availability of multiple commercial products to meet the needs of our public health partners, including state-of-the-art analytic tools and geographic information system capacity.

CDC's Public Health Information Network (PHIN) initiative transforms a broader continuum of public health practice. Essentially, PHIN expands the NEDSS approach of standards-based

systems integration and applies it to other functions of the information life-cycle of public health PHIN will electronically enable real-time data flow, computer assisted analysis, decision support, professional collaboration, and rapid dissemination of information to public health, the clinical care community, and the public through a common integrated and standards-based framework for public health systems and functions to reduce reporting burden by using existing electronic clinical data, monitor the nations health through continuous detection and evaluation of threats, and provide information and decision support to the public and public health professionals.

Near Term Surveillance Efforts - Building State and Local Surveillance Capacity

The Nation's public health surveillance capability requires a strong foundation of surveillance capacity at all levels of local, state, and federal public health and the ability to rapidly, consistently, and securely exchange and share such data and information to detect events and take appropriate public health actions. With Congressional support, CDC has been working with State and local health agencies to build and enhance surveillance and epidemiological capacity for many years largely through categorical disease grant programs and providing technical assistance. Following September 11, 2001, Congress appropriated \$918 million for State health agency grants to enhance terrorism preparedness and response. Two of the five focus areas for these grants in FY 2002 and again this fiscal year are: 1) enhancing epidemiological and surveillance capacity, and 2) developing and leveraging information technology and systems to support various public health functions. Guidance for this funding

directs partners to use voluntary industry health data interoperability Public Health Information Network standards, such as those announced by Secretary Thompson, when they invest in information technology to support preparedness efforts. The use of these standards permits states to address immediate needs while still considering interoperability of systems.

Recognizing the urgent need for increased capacity, CDC and its public health partners initiated various activities to improve their ability to detect events of importance to the health of the public. Funding for countering terrorism and other public health emergencies has enabled state and local health agencies to increase their public health surveillance capacities. In addition to hiring qualified epidemiologists, several states have improved their ability to detect and respond to disease reports. For example:

- Michigan has begun implementation of a secure web-based disease surveillance system to improve the timeliness and accuracy of disease reporting.
- Missouri has implemented a new hospital tracking system to detect possible outbreaks by monitoring the number of admissions and ambulance diversions at hospitals. This system provides a way for hospitals to obtain instant messages and alerts.
- Pennsylvania is developing an early warning system, using symptom data from emergency departments, as a way to detect unusual patterns of illness which will allow for the detection of unusual patterns of disease and automatically alert hospitals and public health agencies when the incidence of disease exceeds a critical threshold. This

system enables the earliest possible response and intervention before an outbreak or epidemic spreads.

- Virginia, Maryland, and Washington DC are working on a similar capability as that described for Pennsylvania.
- New York City has a well-established surveillance system of nontraditional data sources, of pre-diagnostic indicators for surveillance and event detection.

The latter three efforts and “syndromic surveillance” projects undertaken by academic colleagues, and the Department of Defense represent a novel approach to early detection surveillance. Syndromic surveillance is an investigational approach to early detection of outbreaks through the monitoring of real-time, electronic data that are screened for indicators of disease as early in the course of illness as possible. Although promising, this approach to public health surveillance has not undergone rigorous evaluation and validation for its usefulness and value. There is still much to be learned about the most useful data sources, analytic strategies, and methods for presenting the information from the multiple possible data sources to State and local health department partners in coherent usable format. This is particularly critical because state and local partners have limited human resources to do follow up investigations on “alerts,” many of which may be false alarms. CDC has taken a leadership role in developing a systematic approach to evaluating syndromic systems, and believes it is critical to undertake such evaluations before these systems can be recommended for widespread use.

Other related activities useful for early detection of emerging infections or other critical biological agents include CDC's Emerging Infections Programs (EIP). CDC funds EIP cooperative agreements with state and local health departments to conduct population-based surveillance and research that goes beyond the routine functions of health departments to develop "next generation" surveillance science, and often involve partnerships among public health agencies and academic medical centers. Of note, NEDSS supports many EIP information system needs.

In addition, CDC has established other networks of clinicians-- whether infectious disease or travel medicine specialists, or emergency department physicians-- whose functions are to serve as "early warning systems" for public health by providing information about unusual cases encountered in the clinical practices of its members. It is important to note that these relationships, particularly between health care providers and local health departments, are the foundation on which our surveillance systems operate. The state and local health department is the front-line of defense for the public health system.

Emergency Preparedness

In addition to these efforts, CDC is enhancing its capacity to detect unusual clusters of illness, whether from intentional threats or naturally occurring problems such as SARS, by building upon a long30 year history of successful surveillance collaborations with healthcare providers.

Through a collaboration with our public health partners and the American Association of Health

Plans (AAHP), CDC is working with epidemiologists and experts in informatics at Harvard Pilgrim Health Care to create a nationwide system of access to real-time electronic ambulatory care data through the National Bioterrorism Syndromic Surveillance Demonstration Program (NBSSDP).

This program, which expands a successful project operating in Massachusetts since late 2001, targets will provide geographically targeted oriented information about possible clusters of specific health events to State health departments within 24 hours or less. The program makes use of information both from local health plans and from a national telephone triage system, in which nurses screen calls from health plan members. The systems currently participating in the program serve over 20 million people throughout the U.S. Expansion to local health plans in Minnesota and Colorado are first, with on-line reports to health departments and CDC from sites outside Massachusetts scheduled to begin on or about May 1. Incorporation of nurse call data from all 50 states is expected soon thereafter, to be followed by data from health plans in Texas and California. To ensure that the needs of the public health system are integrated into this program at every stage, an advisory group with active participation by State health officials guides the implementation of data collection and reporting activities.

In addition to early warnings of a bioterrorist attack, this system should prove invaluable in facilitating the daily surveillance work of State and local health departments. CDC is working to make parts of this system available now to address our public health partners' needs for managing possible responses to the SARS epidemic.

Global Disease Surveillance

Since 1994, CDC has been engaged in a nationwide effort to revitalize national capacity to protect the public from infectious diseases. The emergence of SARS, a previously unrecognized microbial threat, has provided a strong reminder of the threat posed by emerging infectious diseases. In March 2003, the Institute of Medicine (IOM) published *Microbial Threats to Health: Emergence, Detection, and Response*, a report describing the spectrum of microbial threats to national and global health, factors affecting their emergence or resurgence, and measures needed to address them effectively. Although much progress has been made, especially in the areas of strengthened surveillance and laboratory capacity, the IOM recommends much remains to be done both domestically and internationally..

In many countries, participation in disease surveillance outside of their borders is not a major health priority. For these countries, control of endemic diseases - major killers of children - is a far more urgent need. From a global health perspective, however, the capability of these countries to recognize and report disease outbreaks is crucial because new diseases are most likely to emerge in poor rural areas where disease rates are high. The WHO International Health Regulations that are currently being revised are expected to address will include an assessment of countries' abilities to detect and respond to events of international health importance.

CDC is intensifying its efforts to work with the World Health Organization (WHO) and other

partners to create a comprehensive global network that detects and controls local outbreaks before they grow into worldwide pandemics. Currently, there are Field Epidemiology Training Programs (FETP's) in 30 countries throughout the world that support disease detection activities and provide an essential link in global surveillance. These FETP's have been developed under the auspices of CDC and with the support of WHO. They have been modeled after developed in the model of the Epidemic Intelligence Service (EIS) training program which focuses its attention on epidemiology and surveillance and their application as a means to control an outbreak and to prevent further disease spread. Additionally, there is a concerted effort to develop and expand other fledgling regional disease surveillance networks that include less developed nations as members. These networks, which can build on the established FETP's or on their model, include the Caribbean Epidemiology Center's disease surveillance network, the Amazon and Southern Cone networks in South America, the Integrated Disease Surveillance and Epidemic Preparedness and Response Project in Africa, and the Mekong Basin Disease Surveillance system in Southeast Asia. In the years ahead, these regional disease surveillance networks are likely to grow in number and geographical scope. Over the long-run, these networks can expand, interact, and become the building blocks of a worldwide "network of networks" that monitors priority diseases of global concern, including pandemic influenza, drug-resistant diseases, and diseases caused by biological agents. They will also provide early warning of new and re-emerging threats.

CDC has also created two International Emerging Infections Programs (IEIPs)--one in Thailand (established in 2001) and one in Kenya (scheduled to open in 2003)--that are modeled

on the domestic EIP Programs described earlier that have been so successful in the United States. The IEIPs will serve a double purpose: fostering the next generation of international public health leaders while providing high quality disease surveillance data and rapid response capacity for new and emerging diseases. A pilotflagship IEIP site– established in Bangkok in 2001 as a collaboration with the Thai Ministry of Public Health (MOPH)– is currently serving as a regional hub for CDC's SARS control activities in Asia, coordinating the shipment of diagnostic specimens from Taiwan, Thailand, and Vietnam, and deploying staff, as requested, to Hong Kong, Laos, and Taiwan. When SARS occurred in Thailand on March 11, carried by an arriving airline passenger, the IEIP was able to respond within minutes by isolating the passenger at the airport and implementing strict infection control procedures at the hospital. These procedures remained in place over the subsequent 3 weeks and no health care workers or other community members became infected. Within hours the IEIP began assisting the Thai MOPH, and WHO to contain transmission at other hospitals, implement a nationwide SARS surveillance system, and train public health workers in appropriate control measures.

Further, there is an FETP located in China (CFETP) which has taken a significant lead on the management and control of the SARS outbreak there. Teams of epidemiologists and other scientists were assembled to investigate and direct the national response to the ongoing epidemic. A CFETP trainee is included on these teams. These trainees have had a role in coordinating the surveillance efforts required to track and stem the outbreak of cases. Chinese health officials credit the ability to draw on the FETP staff and trainees and their medical expertise regarding epidemiology and surveillance with helping to preventing the uncontrollable spread of SARS in

at least one of China's most densely populated provinces.

Additionally, two years ago, during the anthrax investigation in the United States, the Bangkok IEIP responded to requests for advice, diagnostics, and testing of suspected materials not only from the Thai MOPH, but also from U.S. embassies in other Asian countries. Global programs like the IEIP and the FETP's builds in-country public health expertise to diagnose or rule out known diseases and to recognize and report new or unusual illnesses to the global community.

Conclusion

In conclusion, CDC is committed to working with other federal agencies and partners as well as state and local public health departments to protect the public's health. To this end, our best public health strategy against illness, ensure the health and medical care of our citizens. The best public health strategy to protect the health of civilians against illness, regardless of cause, is the development, organization, and enhancement of public health surveillance systems and tools.

Our public health surveillance systems provide a critical piece of the public health infrastructure for recognizing and controlling deliberate bioterrorist threats as well as naturally occurring new or re-emerging diseases and other threats to health. We have made substantial progress to date in enhancing the nation's capability to detect and respond to problems that threaten the public's health. Recognizing that there is no simple solution for our surveillance needs, we have supported augmenting the staff in state and local health departments, as well as

special projects to explore the usefulness of various clinical data sources. We are undertaking a critical review of current efforts to determine what would be feasible and useful to implement more broadly. We are implementing the National Electronic Disease Surveillance System, which will provide direct linkages with the health care system, improving the timeliness, efficiency, and usefulness of our surveillance efforts. These cross-cutting efforts to build the surveillance infrastructure will be useful to detect any problem, not just potential bioterrorist events; the ongoing use of this surveillance infrastructure will ensure assure that it is familiar and functional should bioterrorist events continue to occur. A strong and flexible public health infrastructure is the best defense against any disease outbreak.

As we have seen recently, infectious diseases are a continuing threat to our nation's health. Although some diseases have been conquered by modern advances, such as antibiotics and vaccines, new ones, such as SARS and West Nile Virus, are constantly emerging. SARS reinforces the inextricable link between U.S. health and global health, and that fulfilling CDC's domestic mission -- to promote health and quality of life by preventing and controlling disease, injury and disability --requires global awareness and collaboration with domestic and international partners to prevent the emergence and spread of infectious diseases.

Thank you very much for your attention. I will be happy to answer any questions you may have.