SECTION HIGHLIGHTS

This section describes the resources and tools within the public health system that you can use to help address emergencies in your area.

- One of the primary ways that public health threats are detected is through surveillance systems that are set up at the local, state, and federal level.
- There are many tests that are available to confirm agents and/or illnesses.
- The nation has an extensive national network for testing illnesses and/or suspected bioterrorism agents.
- The Centers for Disease Control and Prevention (CDC) Health Alert Network (HAN) is a nationwide system designed to get the word out about public health emergencies. Many states also have their own HAN networks.
- CDC's Strategic National Stockpile (SNS) is set up to supply state and local public health agencies anywhere with medical supplies and equipment within 12 hours in the event of a national emergency.
- Vaccines, isolation, and quarantine are some of the tools that can be used during an emergency to help contain public health threats.
- The National Disaster Medical System (NDMS) is a program designed to provide a range of emergency medical services to support local response. It is a federally coordinated system involving collaboration with states and other appropriate public or private organizations.

PUBLIC HEALTH RESPONSE

Thousands of public health professionals work to promote health and prevent disease and disability across the nation in every community every day. Although this guide primarily focuses on the federal public health response to terrorism and other public health emergencies, understanding how public health works at the local and state levels is critical to understanding how a public health response to an emergency event might take place in your community.

This guide does not go into detail about how local and state health departments will function in a public health emergency; although each state has a state health department, the exact services that are offered and how they are administered vary greatly. All public health departments share similar functions and a philosophy about serving the public, but the federal government does not mandate how state and local health departments are structured. In some cases, certain public health-oriented services may even be provided by a department or agency other than the local or state health department (e.g., air and water security could be provided by an environmental department or agency).

HOW PUBLIC HEALTH DEPARTMENTS MAY BE ORGANIZED

- **Centralized organizational control: Local health departments function directly under the state's authority and are operated by a state health agency or a board of health (e.g., ME, RI, SC).**
- **Decentralized organizational control: Local governments directly operate local health departments with or without a board of health (e.g., CO, ID, IN, MI, NY, NC, OR, WA).**
- **Mixed organizational control: Local health services may be provided by the state health agency, local governmental units, boards of health, or health departments in other jurisdictions (e.g., NH).**
- **Shared organizational control: Local health departments are under the authority of the state health agency as well as the local government and a board of health (e.g., GA, KY, MD).**

Source: Association of State and Territorial Health Officials. (2003). Putting the pieces together: An analysis of state response to foodborne illness. http://www.astho.org/pubs/foodsafety_final.pdf.

Many public health officials have become versed in the Incident Command System and have obtained the skills needed to participate in an emergency response structure as described in the National Incident Management System (NIMS) (http://www.fema.gov/emergency/nims/index.shtm) so that they can work more efficiently with the traditional first responder community. In fact, in order to receive U.S. Department of Health and Human Services (HHS) Fiscal Year 2006 funding for public health preparedness, state, territorial, and local entities needed to demonstrate that they were moving towards compliance with NIMS during Fiscal Year 2006. In addition, public health officials have been working on creating communication plans, gathering public health communication resources, and addressing how they can work together and interact with public information officers and spokespersons from other agencies.

The main goal of the remainder of this section is to provide an overview of how federal government public health agencies would function in an emergency and, when applicable, how their actions would relate to those of state and local governments, first responders, and the private medical system. Some of the specific topics covered here include:

- Syndromic surveillance systems
- The role of epidemiology
- Laboratory testing and laboratory safety levels (biosafety levels)
- Information sharing in public health
- Strategic National Stockpile
- Vaccination strategies
- Critical infection control measures
- National Disaster Medical System

For more information on specific biological, chemical, and radiological agents as well as pandemic influenza, see appendices B–E.

IMPORTANT PUBLIC HEALTH QUESTIONS ABOUT YOUR COMMUNITY: TALK TO YOUR PUBLIC HEALTH LEADERS TO ANSWER THESE AND OTHER CRITICAL QUESTIONS.

- **What kind of public health structure exists in your state (e.g., centralized, decentralized), and how does this affect emergency response?**
- **How is disease surveillance conducted and documented at the state and local levels?**
- **What types of public health laboratories are present in your state and locality, and what are their capabilities? Where should you plan to send samples?**
- **Do hospitals and public health agencies have coordinated plans in your locality/region?**
- **Does your state have its own HAN? How does it work, and who controls it?**
- **What are the local plans for the distribution of SNS supplies if they are needed?**
- **What are your area's plans for mass vaccination/medicine distribution clinics?**
- **What are the local plans/authorities for isolation and quarantine?**
- **Does your locality have a Medical Reserve Corps? How do you mobilize it?**
- **What are the state/local plans for pandemic influenza?**
- **What about nongovernmental organizations (e.g., Red Cross) that operate in your community? Are they involved in the local public health planning?**

ACRONYM LIST

You may find it helpful to refer to the following list of acronyms as you read this section.

ATSDR	Agency of Toxic Substances and Disease Registry
BSL	Biosafety Level
CDC	Centers for Disease Control and Prevention
DHS	U.S. Department of Homeland Security
Epi-X	Epidemic Intelligence Exchange
FBI	Federal Bureau of Investigation
HAN	Health Alert Network
HHS	U.S. Department of Health and Human Services
LRN	Laboratory Response Network
NDMS	National Disaster Medical System
NEDSS	National Electronic Disease Surveillance System
NIAID	National Institute of Allergy and Infectious Diseases
NIH	National Institutes of Health
RRR	Rapid Response Registry
SNS	Strategic National Stockpile; formerly NPS
WHO	World Health Organization

If you need more information on public health topics, please visit the HHS Web site at http://www.hhs.gov/emergency, the CDC Web site at http://www.bt.cdc.gov, or call 1–800–CDC–INFO.

DETECTING PUBLIC HEALTH THREATS

SURVEILLANCE SYSTEMS

While some types of public health emergencies may be immediately obvious (e.g., bombs), others are more covert and unfold over time without an obvious beginning (e.g., transmitting a disease, like smallpox). These types of covert attacks may be identified by a process called syndromic surveillance, one of many kinds of surveillance systems. This process, performed in the public health and medical communities, involves the routine monitoring and analysis of data on disease patterns and deaths. As a result of an increase in the use of electronic health information programs, health professionals can track and analyze data more easily and more quickly than ever before. The rapid availability of data in some areas increases the probability that public health officials will identify a large-scale terror attack in its early stages.

The data fed into the local systems are often the result of alert health care professionals, such as:

- Epidemiologists
- Doctors, nurses, and others working in health care institutions and clinics
- Veterinarians and animal control personnel
- Medical examiners
- Pharmacists
- Laboratory scientists
- Emergency Medical Services Workers: In some locations, EMS dispatch systems or 911 centers have begun to develop software to capture relevant information.

When health care professionals see atypical diseases, unusual patterns of diseases (e.g., large numbers of cases of a disease not commonly seen in that part of the nation), higher than normal death rates from a disease, unusual rises or patterns in purchases of drugs, or uncommon test results, they contact local public health officials. These officials will start investigating and may contact state and federal officials as well as law enforcement, depending on the situation.

Reporting at the local health department level is often electronic, but is still done via paper forms in some places. Although data are entered into electronic systems, the transfer of the data is not always seamless or in real time. To address this issue, CDC is in the process of developing the National Electronic Disease Surveillance System (NEDSS) (http://www.cdc.gov/nedss/index.htm). NEDSS will create standards for the collection, management, transmission, analysis, access, and dissemination of data. Several pilot versions of NEDSS have been completed and are being used in some states, but the system is not yet fully operational. Some states have also developed their own Web-based disease reporting systems that are similar to NEDSS. You may want to check with your state or local health department to get more information about systems in place in your state.

BIOSENSE

BioSense (http://www.syndromic.org/pdf/work3-JL-BioSense.pdf) is a high-tech disease detection program operated by CDC. BioSense monitors and rapidly identifies any possible health emergencies by constantly scanning medical information from hospital emergency rooms and pharmacies. BioSense also scans environmental data from Project BioWatch, which is described in detail in section 5, Environmental Safety and Testing (see p. 35).

CASE: SYNDROMIC SURVEILLANCE UNCOVERS THE FIRST CASES OF WEST NILE VIRUS IN THE WESTERN HEMISPHERE

In August 1999, an infectious disease specialist contacted the New York City Department of Health about two patients with encephalitis in Queens. Preliminary investigations at nearby hospitals identified six additional cases. After talking to the patients' families, it became clear that all of the patients had participated in outdoor activities around their homes in the evenings, such as gardening. Mosquito breeding sites and larvae were also found in their area. Medical professionals believed at first that the disease was St. Louis encephalitis. However, 4 weeks after the outbreak in humans, a virus, later identified as West Nile virus, was isolated from specimens from crows and a flamingo in a nearby zoo and was determined to be the source of the outbreak for both animals and humans. These were the first cases of West Nile virus ever seen in the Western Hemisphere (Nash et al., 2001).

BioSense monitors enormous databases to find groups of common symptoms. The system can assess whether there are any sudden increases in the number of visits to emergency rooms or whether there are sharp increases of prescription and over-the-counter medication purchases in any given location. By comparing these increases with the normal number of visits and medication purchases, analysts can determine whether there might be a cluster of symptoms or an unusual pattern of symptoms that could signal a terrorist attack or other unusual public health problem that could be brewing (e.g., SARS). As real-time health data are collected, they are analyzed and provided to state and local health agencies, by jurisdiction, to better identify and assess potential acts of bioterrorism. Eventually, BioSense will expand to include information from ambulance dispatches, clinics, doctors' offices, school-based clinics, and worksites. Although high-tech programs can enhance surveillance, they don't replace the role of clinicians in detecting unusual cases or patterns of disease.

EARLY WARNING INFECTIOUS DISEASE SURVEILLANCE PROJECT

The Early Warning Infectious Disease Surveillance project, funded by the CDC, is specifically designed for states bordering Mexico and Canada (including the Great Lakes states). The funds have been awarded for the development and implementation of a program to provide early detection, identification, and reporting of infectious diseases associated with both potential bioterrorism agents and other major threats to public health. States included in this program are Alaska, Arizona, California, Idaho, Indiana, Illinois, Maine, Michigan, Minnesota, Montana, New Hampshire, New Mexico, New York, North Dakota, Ohio, Pennsylvania, Texas, Vermont, Washington, and Wisconsin (see the section on the Early Warning Infectious Disease Surveillance Project at http://www.borderhealth.org/usmbhc_early_warning_infectious_disease_surveillance_project.php?curr=programs). This project not only includes working with U.S. states, but also involves working with Canadian provinces and Mexican border states.

THE ROLE OF EPIDEMIOLOGY

Epidemiologists at the local, state, and federal levels conduct investigations of suspected or confirmed disease or injury outbreaks. In some cases, an epidemiologist may even be the person who spots the outbreak by noticing unusual patterns for a disease in routine surveillance data. Once a problem is identified, epidemiologists work with a multidisciplinary team to launch a more comprehensive investigation; this team includes experts in clinical medicine, environmental health, microbiology, behavioral science, and health education.

Part of their investigation is the interviewing of patients. These interviews provide epidemiologists with some of the data needed to map the spread of an outbreak (i.e., where it came from and where it might be going). For example, by talking to patients, epidemiologists may learn that all of the patients attended the same event, which provides clues about how the outbreak started. Interviews may allow the epidemiologists to determine the index case (the first known case), which may be critical to determining the origin of the outbreak. Epidemiologists also use interviews to identify the close contacts of each patient (e.g., family members, office mates, significant others). In the case of a contagious disease, these people must be found and treated or isolated to prevent the spread of the illness. (It is important to note that, although there are protections for patient privacy in these instances, states have different policies in this area.) The epidemiologic process is critical to infection control and one of the key ways that public health agencies determine how best to control outbreaks.

> **"EPIDEMIOLOGY IS THE STUDY OF** the patterns, causes, and control of disease in groups of people."
>
> *http://plan2005.cancer.gov/glossary.html*

CHARACTERISTICS OF OUTBREAKS THAT INDICATE POSSIBLE BIOTERRORISM

- A large number of cases appearing at the same time, particularly in a discrete population (e.g., people from the same town, people who attended the same event)
- A large number of cases of a rare disease or one considered a bioterrorism threat (e.g., plague, tularemia)
- More severe cases than typical for a given disease
- An unusual route of exposure
- A disease that is unusual in a given place or is out of season (e.g., a flu-like outbreak in the summer in the United States)
- Multiple simultaneous outbreaks of the same disease or different diseases
- A disease that affects animals as well as humans
- Unusual disease strains or uncommon antibiotic resistance to an organism

IS IT TERRORISM?

Health professionals will use the same methods to investigate a bioterror event that they would use to investigate any other outbreak. In many cases today, until proven otherwise, officials will consider whether terrorism is the possible cause of an outbreak. In some cases, an attack may be suspected either because there is evidence of a given agent (e.g., anthrax powder) or because of intelligence or claims of responsibility. In less obvious cases, there are also a few characteristics (see box above) that may indicate that an outbreak is intentional, particularly if several of these characteristics are true of the outbreak.

Even though these characteristics may point to bioterrorism, many of them may also be true in new and emerging naturally caused infectious diseases, like SARS or West Nile virus. Outbreaks of avian influenza in Southeast Asia are an example of an unusual but naturally occurring illness (more information on pandemic influenza can be found in appendix E [see p. 107]). Therefore, although the question "Is it bioterrorism?" is likely to be asked in unusual situations, public health officials will be careful not to prematurely assume that bioterrorism is or isn't the cause of an outbreak.

RESPONDING TO PUBLIC HEALTH THREATS

WHY DOES IT TAKE SO LONG TO GET LAB RESULTS?

Once a potential attack is identified, the public health response will immediately begin. Law enforcement, the Federal Bureau of Investigation (FBI), and local and state health and emergency officials will typically work together to determine if a suspicious outbreak is related to terrorism. If possible, the FBI will arrange for samples of the agent to be sent to a special laboratory for testing. It is likely that this lab would be a local or state lab that is a part of the national Laboratory Response Network (LRN), which is described in detail later in this section.

Unfortunately, it is difficult to predict how long testing will take, but understanding the factors that are involved will help in managing the public health emergency as well as the public's expectations regarding this issue. Many television programs currently portray this process as one which occurs quickly and offers straightforward results (e.g., the "CSI effect"). However, this may not always be the case. Some of the agents considered to be public health threats are relatively unknown and may not have specific tests designed to determine whether they are present in the environment or have infected specific individuals.

> "ALL INDICATIONS RIGHT NOW ARE THAT THIS [SARS] is a naturally occurring infectious disease, but we're keeping an open mind about terrorism, especially given the time period that we're operating in."
>
> *Julie Gerberding, Director of the Centers for Disease Control and Prevention, discussing the investigation of suspected SARS cases in the United States in March 2003*
>
> *CNN Health. (2003). More SARS cases investigated in U.S. http://www.cnn.com/2003/HEALTH/03/21/mystery.pneumonia/*

In addition, while a positive result from an initial screening test may occur more quickly, it does not provide confirmation. Initial field testing (onsite) is considered presumptive, which means that additional tests must be performed to confirm the original test result (Centers for Disease Control and Prevention, 2004a). In most cases, samples will need to be sent to labs with the ability to do the needed testing. HHS, at this time, recommends against the use of hand-held tests by first responders to evaluate and respond to an incident involving unknown substances suspected to be a public health threat. Samples should be evaluated by a lab in the LRN. Depending on what level of lab is needed (e.g., basic versus advanced) and where those labs are located (e.g., locally, near the suspected attack), timing may be affected.

Once samples have been sent to the appropriate laboratory, numerous tests can be used to analyze the samples—each is unique in how comprehensive it is and how long it takes to confirm results. In addition, how much of an agent is present in the sample will also affect the timing. Larger amounts will speed up the process while smaller amounts may take longer. If a specific agent is suspected, tests may also be used that are specific to that agent (if any exist).

Table 2–1 summarizes the factors affecting the timing of laboratory testing, but more detailed information on diagnostic testing for specific biological agents can be found in appendix B (see p. 80).

LABORATORY RESPONSE NETWORK

In most cases, local and state laboratories can manage lab testing for localized outbreaks or other local public health emergencies. However, the LRN is a growing network of laboratories around the country that work together in case of an act of terrorism or other major public health emergency and facilitate rapid identification of a bioterrorism agent. The LRN was developed by CDC (http://www.bt.cdc.gov/lrn), the Association of Public Health Laboratories (http://www.aphl.org), and the FBI.

The LRN has two major components: a network of public health laboratories dealing with biological agents and a network of public health laboratories dealing with chemical agents.

TABLE 2–1. SUMMARY OF FACTORS AFFECTING THE TIMING OF LABORATORY TESTING

TESTING FACTOR	DESCRIPTION
Identifying the agent	Because actual bioterrorism incidents have been very rare, physicians have limited experience in identifying these agents in the lab or treating affected patients. This may cause a delay in the effort to test for biological agents since the first patients who become sick may be mistakenly diagnosed with other illnesses.
Presumptive versus confirmatory diagnosis	Some tests can quickly give a presumptive diagnosis that an agent is present. In general, this can be done in about a day. However, confirmatory diagnosis, to give more conclusive results, can take 2–3 days.
Lab compatibilities	The overall timeline will be affected by where the needed tests can be done (e.g., local labs, near a suspected attack). Shipping samples to more advanced labs can tack on an extra day or two to the wait time. CDC's Laboratory Response Network helps facilitate this process.
Viral, bacterial, or toxin load	The "load" refers to how much of the agent is present in a patient. If relatively large amounts of an agent are present, cultures designed to grow the bacteria or virus could take as little as a few hours. If smaller amounts of the agent are present, these same culture tests could take up to 2 or 3 days.
The kind of test that is used	Numerous tests are employed to detect the presence of bioterror agents (e.g., blood cultures can take up to 3 days; gram stains can be ready within an hour). However, some of the quicker tests will only give preliminary information, which must be confirmed with more comprehensive tests.

Bio-LRN

The Bio-LRN network has about 120 labs in all 50 states that include local, state, and federal public health labs as well as international, veterinary diagnostic, military, and other specialized labs that test environmental samples, animals, and food. It is made up of three levels of labs that handle progressively more complex testing:

Sentinel Labs

- Include private and hospital labs that routinely process patient tests
- May be the first labs to test and/or recognize a suspicious organism
- Conduct tests to "rule out" less harmful organisms
- Refer samples to a reference lab if they cannot rule out the possibility that the sample is a bioterror agent

Reference Labs

- Have specialized equipment and trained personnel
- Perform tests to detect and confirm the presence of a bioterror agent
- Are capable of producing conclusive, confirmatory results
- Include local, state, and federal labs

National Labs

- Include CDC, the U.S. Army Medical Research Institute for Infectious Diseases in Maryland, and the Naval Medical Research Center, also in Maryland
- Perform highly specialized testing to identify specific disease strains and other characteristics of an investigated agent
- Test certain highly infectious agents that require special handling

Chem-LRN

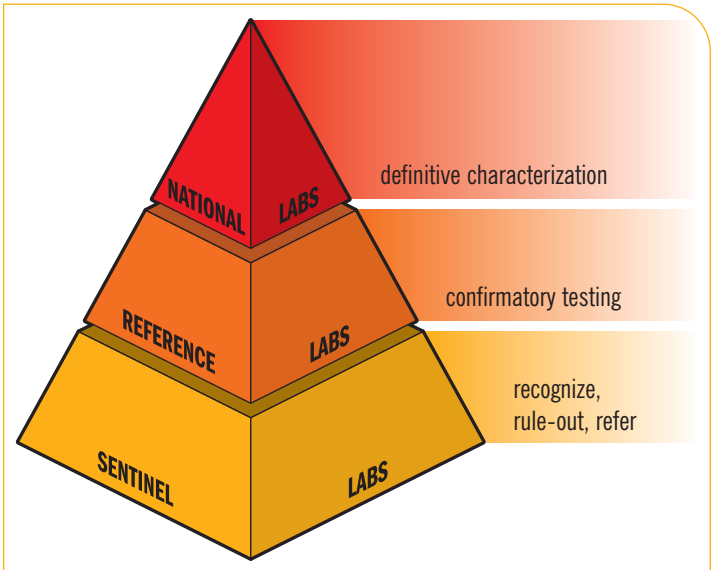
Chem-LRN is a network of 61 laboratories in all states and some territories and municipalities that test for chemical agents in human samples, such as urine or blood. Chem-LRN laboratories have three levels of activities. Each level builds on the preceding level.

- Level 1 (all laboratories): work with hospitals in their jurisdiction and maintain competency in clinical specimen collection, storage, and shipment
- Level 2 (41 laboratories): can detect exposure to a limited number of toxic chemical agents
- Level 3 (five laboratories): can detect exposure to an expanded number of chemicals, including those analyzed by Level 2 laboratories; mustard agents; nerve agents; and ricin

Responding to an Event

- At the request of state officials, CDC may deploy a Rapid Response Team to the affected state to assist with specimen collection, packaging, storage, and shipment.
- Representative samples from people who are suspected to be exposed are sent to CDC for analysis through the Rapid Toxic Screen, which can analyze people's blood or urine for a large number of chemical agents likely to be used by terrorists.
- Data produced from the Rapid Toxic Screen and the health implications associated with those exposures will be communicated in a secure, electronic manner to the affected state.

FIGURE 2–1: THE BIO-LABORATORY RESPONSE NETWORK



Source: Association of Public Health Laboratories. (2003). State public health laboratory bioterrorism capacity. *Public health laboratory issues in brief: Bioterrorism capacity,* 1–6. https://www.aphl.org/programs/emergency_preparedness/files/BT_Brief_2003--corrected.pdf.

› Hospitals and laboratories may be dealing with many people concerned about exposure. There will be a need to respond to these concerns and determine whether an individual has been exposed and at what level. CDC will contact the appropriate LRN labs to help participate in the response.

BIOSAFETY LEVEL CLASSIFICATIONS

All labs in the United States are rated according to a biosafety level (BSL) classification system. Levels range from 1 to 4. BSLs are used to determine the types of agents scientists can work with in their labs. Scientists use a combination of critical principles, practices, and safety devices to work with infectious materials safely and effectively. BSL classifications are designed not only to protect researchers and technicians from laboratory-acquired infection but also to prevent microorganisms from entering the environment. Many microorganisms may be studied at more than one level, depending on what kinds of activities are involved.

The four BSLs define proper laboratory techniques, safety equipment, and design, as described below:

› **BSL-1** labs are used to study agents not known to consistently cause disease in healthy adults (e.g., E. coli). Researchers follow basic safety procedures and require no special equipment or design features.

› **BSL-2** labs are used to study agents that pose a danger if accidentally inhaled, swallowed, or exposed to the skin (e.g., plague). Diseases related to these agents can be treated through available antibiotics or prevented through immunization. Safety measures include the use of protective gear such as gloves, eyewear, and lab coats as well as hand-washing sinks, methods of waste decontamination, and waste decontamination and safety equipment.

› **BSL-3** labs are used to study agents that can be transmitted through the air and cause potentially lethal infection (e.g., West Nile virus). Researchers perform lab manipulations in gas-tight enclosures. Other safety features include personal protective equipment, clothing decontamination, sealed windows, and specialized ventilation systems.

› **BSL-4** labs are used to study agents that pose a high risk of life-threatening disease for which no vaccine or therapy is available (e.g., Ebola). Lab personnel are required to wear full-body, air-supplied suits and shower when exiting the facility. The labs incorporate all BSL-2 and BSL-3 features. In addition, BSL-4 laboratories are negative-pressure rooms that are completely sealed and isolated to prevent release of viable agents into the environment (National Institute of Allergy and Infectious Diseases, 2004; Richmond, 2000).

All labs participating in the Bio-LRN are BSL-3 or BSL-4 labs.

SELECT AGENT PROGRAM

As a safeguard against the accidental or intentional exposure of dangerous agents outside of laboratories, CDC developed the Select Agent Program in 1996 to control the possession, packaging, labeling, and transport of certain agents that are capable of causing substantial harm to human health and safety. The program requires that facilities that work with such agents—including government agencies, universities, research institutions, and commercial entities—register with CDC. In addition to tracking and safeguarding the use of these agents, the Select Agent Program established systems for alerting authorities if unauthorized attempts are made to acquire these agents by terrorists or others. These requirements are outlined in the Select Agent Regulation, which was added to the Public Health Service Act (section 351A) by the Public Health Security and Bioterrorism Preparedness and Response Act of 2002. The regulation includes a list of dozens of agents to which it applies, including viral hemorrhagic fevers (like Ebola), smallpox, plague, ricin, anthrax, and avian flu. More detailed information on the Select Agent Program and the Select Agent Regulation can be obtained on the program's Web site (http://www.cdc.gov/od/sap/index.htm).

Please note that people who work with these agents need to apply for a security risk assessment from the U.S. Department of Justice.

THE RELATIONSHIPS BETWEEN HOSPITALS AND PUBLIC HEALTH

Almost all hospitals, with the exception of the U.S. Department of Veterans Affairs, U.S. Department of Defense (DOD), and Indian Health Service hospitals, are not directly supervised by the federal government. However, to strengthen local response, in 2002, HHS' Health Resources and Services Administration (HRSA) started the National Bioterrorism

Hospital Preparedness Program. The program was designed to improve hospital capabilities and surge capacity (the ability of a hospital to handle a large influx of patients at one time, often requiring specialized medical equipment and treatment), staff training, and the building of specialized facilities, such as decontamination areas. For mass casualty incidents, local officials may need to plan for the provision of medical care in a non-hospital environment if there is no capacity left in hospitals. They may also need to rely on mutual aid agreements with nearby jurisdictions.

The Pandemic and All Hazards Preparedness Act of 2006 transferred the National Bioterrorism Hospital Preparedness Program (NBHPP) from HRSA to the Assistant Secretary for Preparedness and Response (ASPR). The focus of the program is now all-hazards preparedness and not solely bioterrorism, and it is now called the Hospital Preparedness Program (http://www.hhs.gov/aspr/opeo/hpp/index.html).

Hospitals, outpatient facilities, health centers, poison control centers, EMS and other health care partners work with the appropriate state or local health department to acquire funding and develop health care system preparedness through this program. Funding is distributed directly to the state or local health department, cities, or counties, as appropriate.

While hospital preparedness is a vital part of preparedness for a public health emergency, it is important to realize that these activities are often separate from the activities of the larger scope of public health. Hospitals and public health agencies have similar goals of ensuring that people stay healthy, but their focus is different. Hospitals are concerned with individuals while public health agencies focus on the larger community. In addition, hospitals may be run as part of the private or public sector and not directly under government control, unlike public health agencies, which are always a government function. Regardless, in establishing and practicing emergency preparedness plans, it will be important to coordinate the efforts of hospitals and public health, as well as poison control centers, blood banks, and other health entities on the local level.

INFORMATION SHARING IN THE PUBLIC HEALTH COMMUNITY

Once lab tests confirm the presence of a biological, chemical, or radiological agent or contaminant, information will need to be distributed throughout the medical community quickly to facilitate identification of additional patients and advise health care providers about treatment. Over the past several years, CDC has been developing several national networks to encourage and facilitate the sharing of information within the public health community. The networks are designed to help health officials and hospitals around the country share information both before and during public health emergencies.

Health Alert Network

The Health Alert Network (HAN) (http://www2a.cdc.gov/han/index.asp) is a nationwide, integrated electronic information and communications system for the distribution of health alerts, prevention guidelines, national disease surveillance, and laboratory reporting. HAN is a collaboration between CDC, local and state health agencies, and national public health organizations. It allows for the sharing of information between state, local, tribal, and federal health agencies as well as hospitals, laboratories, and community health providers.

HAN is designed to assist public health and emergency response during a terrorism event or other public health emergency. It provides early warnings by broadcast fax and e-mail to alert officials at all levels about urgent health threats and appropriate actions. There are three categories of HAN messages:

- **Health Update:** provides updated information regarding an incident or situation; unlikely to require immediate action
- **Health Advisory:** provides important information for a specific incident or situation; may not require immediate action
- **Health Alert:** conveys the highest level of importance; warrants immediate action or attention

HAN messages are openly available on the Internet (http://www2a.cdc.gov/HAN/Archivesys/), but there is a short delay after HAN messages are broadcast to users before they are posted on the Web site (generally an hour or less). It is important to remember that HAN messages are also available to the media, so anything that appears on the HAN is a public information issue. If you are interested in signing up to receive HAN messages, contact your local or state health department and ask for their state HAN coordinator or Bioterrorism coordinator (varies by state).

> **"DURING ALL OF THE REPORTS ABOUT SMALLPOX,** we saw so much information in the local papers. So I created a local HAN for first responders. If issues were reported in the local papers or on television, I went on the CDC Web site and pulled the relevant information, and adapted it for the firefighters on the trucks."
>
> *Chris Dechant, Metropolitan Medical Response System Captain/Coordinator (Glendale, AZ)*

Many states have developed their own HAN networks. CDC is providing funding and technical assistance for state networks in conjunction with other health organizations, such as the National Association of County and City Health Officials and the Association of State and Territorial Health Officials.

CONTAINING PUBLIC HEALTH THREATS

Once an attack has been confirmed, public health officials may use a variety of tactics to control its effects, ranging from distributing antibiotics to using quarantine strategies. This section describes several methods that might be used for containment.

STRATEGIC NATIONAL STOCKPILE

The Strategic National Stockpile (SNS) (http://www.bt.cdc.gov/stockpile/index.asp) is a national repository of critical medical supplies and equipment designed to supplement and resupply state and local public health agencies in the event of a national emergency anywhere and at anytime within the United States or its territories. The Public Health Service Act (section 319F-2), officially specifies that the SNS is maintained to provide for the emergency health security of the United States. The SNS is managed by CDC's Division of Strategic National Stockpile (DSNS) working in conjunction with state and local communities who have responsibility for developing their own local plans for the receipt and distribution of SNS supplies and equipment. DSNS deploys medical supplies and equipment, some of which is configured and packed as 250-bed Federal Medical Stations (FMS)—it does not operate or staff mass casualty centers or clinics.

What SNS Includes

The SNS contains multiple caches of medical supplies and equipment stored in warehouses across the country. These caches include antibiotics, chemical antidotes, antitoxins, life-support medications, intravenous (IV) administration, ventilators, airway maintenance supplies, various medical/surgical items, and deployable FMS assets. Items included in the SNS are based upon threat assessments, the vulnerability of the U.S. civilian population, and availability and ease of distribution of supplies.

How SNS Is Activated and Managed

- The affected state's Governor's office requests SNS materials from HHS or CDC.
- HHS works with state and local representatives to assess the situation and determine prompt and appropriate action. This assessment could include consultation with other federal agencies and entities (e.g., the U.S. Department of Homeland Security [DHS]).
- Supplies may be sent in a "12-hour Push Package," which contains a broad range of products potentially needed in the early hours of an emergency to support mass treatment or prophylaxis of bioterrorist threats. The 12-hour Push Packages are maintained in a ready state for loading on trucks or aircrafts. Supplies would go directly to pre-designated Receiving, Staging and Storage Sites (RSS), depending on the situation and the plans already made by the affected community.
- Additional supplies can be tailored to provide pharmaceuticals, supplies, and/or products specific to the suspected or confirmed agent(s). These shipments can begin within 24–36 hours in addition to or instead of 12-hour Push Packages.

  An FMS unit may be deployed when treatment or quarantine capability is required. FMS units are designed to provide low to mid-level acuity of care or quarantine for 250 patients and can be employed as a platform for Special Needs Shelters,

quarantine station, or an alternate care facility to augment community hospital capacity or capability. FMS is intended to be installed in an existing structure (building or tentage) near an existing hospital.

- Local and state officials are responsible for the receipt, storage, and security, as well as distribution of SNS supplies once they arrive at agreed upon receiving sites.
- However, while SNS supplies are in transit, DSNS will deploy its Technical Advisory Response Unit to provide technical assistance and advice in receiving and distributing supplies upon arrival at the RSS. Local and state officials are also responsible for the reception, installation, and operation of FMS units. As with other material, DSNS will provide technical support to assist with receipt, installation, and transfer of FMS assets.

CITIES READINESS INITIATIVE

The Cities Readiness Initiative is a pilot program, begun in 2004, that now provides funding to 72 metropolitan areas throughout all 50 states to improve their operational capability to receive, distribute, and dispense SNS assets. In the wake of a major public health emergency, this program aims to prepare each designated city to provide medicine and medical supplies to its entire population within 48 hours of the time of the decision to do so. For a complete listing of cities and more information about the program, visit http://www.bt.cdc.gov/cri/.

VACCINATION STRATEGIES

Vaccination is an important outbreak control measure for some illnesses. However, vaccines are not available for many diseases and not all vaccines work the same way. Smallpox vaccine, for example, provides almost immediate immunity and can be beneficial even if someone is vaccinated a few days after exposure. Other vaccines, such as the anthrax vaccine, may require a number of doses over time before the recipient builds up immunity. Therefore, vaccines may or may not be helpful in a sudden outbreak, depending on the disease and incident. Scientists are currently doing research on vaccines to combat various bioterror agents, but currently, the only major bioterror agents for which vaccines are available in case of an attack are smallpox and anthrax. These vaccines are not currently available to the general public due to potential vaccine side effects and other issues. However, it is important to know these vaccines may become available in the case of an attack. It is important for public officials to know what options for vaccination will be available, because in the case of an attack, decisions about vaccination will have to be made quickly.

HOW A VACCINATION CLINIC OR MEDICINE DISTRIBUTION SITE MIGHT FUNCTION

Although most communities have done advance planning in terms of where clinics and dispensing sites may be held and how they will work, the exact location and setup will be incident specific. In such situations, it may be most useful to coordinate with the local media to get information out about who should go to one of these sites and where and when they will be open.

HHS has also recommended that, if a clinic or dispensing site (also referred to as a Point of Dispensing [POD]) needs to be used, the center should be open for the local media to tour before it is officially opened so that local media can provide information to the public about what to expect when they arrive at the site.

Public health officials will recommend that people bring the following information to receive appropriate treatment and preventative medicine:

- **Photo identification (driver's license, military ID, company badge)**
- **Medical records, including previous immunizations, current medications, and allergies**
- **Current age and weight of children**

It is helpful for people to gather this information before the emergency and keep it in a safe but easily accessible place.

This information would be requested strictly for medical reasons. Anyone who needs treatment or preventative medicine will be able to get it free of charge and regardless of immigration and residency status.

Smallpox Vaccination

Although vaccination before a smallpox event has been a hotly debated topic over the past several years due to potential side effects of the vaccine, in the case of a smallpox "outbreak," it

is likely that public health officials would turn to vaccination because the risks associated with the smallpox illness would be much higher than the risks of the possible vaccine side effects. There are two main ways to conduct vaccination for smallpox:

- Ring vaccination
- Mass vaccination

Ring Vaccination

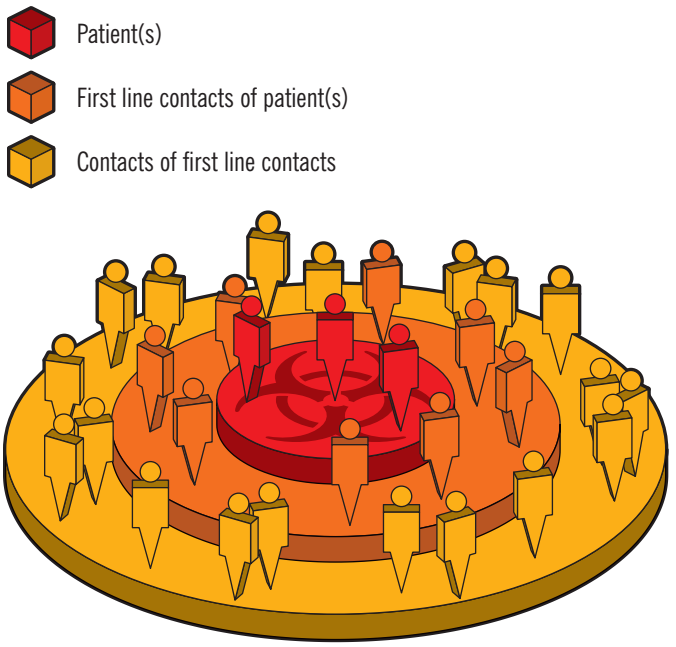
Ring vaccination was the primary strategy used to control smallpox outbreaks in the past and led to the complete eradication of the disease worldwide by 1980. It involves finding and vaccinating the contacts of smallpox patients. First line contacts are those who have had face-to-face contact (6 feet or less; for example, at school or the workplace) and those living in the same household as the person who has smallpox. Then, close contacts of the first line contacts are vaccinated to make sure to break the chain of transmission. For the contacts of contacts, those who have what are called contraindications (medical conditions that may cause adverse reactions to the vaccine; for example, eczema or immune deficiencies) are not typically vaccinated.

Ring vaccination is typically effective if the outbreak appears to be small and contacts can be identified quickly. It minimizes the number of people who will need to be vaccinated and who may have reactions to a vaccine.

Mass Vaccination

Depending on the nature of the outbreak, it is possible that public health officials may decide to use a mass vaccination strategy. Some reasons that a mass vaccination may be used include: if the number of cases is high, if outbreaks occur in a number of locations, and/or if the outbreaks continue to grow despite the use of ring vaccination. Because routine vaccination for smallpox in the United States ended for the general public in 1972 and there are large numbers of Americans who are susceptible to the virus, mass vaccination would be strongly considered for a smallpox outbreak. If mass vaccination were indicated, supplies from SNS would be used, and local plans for vaccine clinics would be put into action in affected areas. Public health departments across the country have been developing vaccination plans in the event of a smallpox outbreak as part of their preparedness efforts. Talk with your public health officials to learn more about specific plans for your locality.

FIGURE 2–2: RING VACCINATION



Source: CDC & the World Health Organization. (2003). Course: "Smallpox: Disease, prevention, and intervention." Day 2, Module 4: Vaccination strategies to contain an outbreak. PowerPoint presentation. http://www.bt.cdc.gov/agent/smallpox/training/overview.

CRITICAL INFECTION CONTROL MEASURES—ISOLATION AND QUARANTINE

To protect the public in the case of an outbreak of a highly contagious infectious disease, such as smallpox or plague, public health officials may employ quarantine and isolation strategies, separately or together, depending on the situation. These practices can reduce the public's exposure to an illness by separating and restricting the movements of persons known to be infected or who are suspected of infection. Both practices may be carried out voluntarily, but ultimately, government officials have the authority to impose quarantine and isolation, if necessary, to protect the public welfare.

Isolation removes people who are ill with contagious diseases from the general public and restricts their activities to stop the

spread of a disease. Isolation is not required for patients with noncontagious diseases, such as anthrax.

Isolation:

- Confines infected persons to their homes, hospitals, or designated health facilities
- Allows health care providers to provide infected persons with specialized care
- Is commonly used in hospitals for people with certain diseases, such as tuberculosis
- Is initiated mostly on a volunteer basis, but government officials at all levels have the authority to enforce it (Centers for Disease Control and Prevention, 2004b)

Quarantine separates people who have been potentially exposed to a contagious disease and may be infected, but who are not yet ill, to stop the spread of that disease.

Quarantine:

- Confines persons to their homes or community-based facilities
- Can apply to a group that has been exposed at a public gathering
- Can apply to persons who are believed to have been exposed while traveling, particularly overseas
- Can apply to an entire geographic area, in which case a community may be closed off by sealing its borders or by a barricade, traditionally known as a *cordon sanitaire*
- Is enforced at the state level and/or by CDC's Division of Global Migration and Quarantine

For more information on the legal issues surrounding isolation and quarantine, see section 7, Legal and Policy Considerations.

FEDERAL MEDICAL RESPONSE TEAMS

As the lead federal agency under the National Response Plan for Public Health and Medical Support, HHS has two primary sources for medical teams that can be quickly deployed to assist tribal, state, and local health officials—the U.S. Public Health Service Commissioned Officer Corps and the National Disaster Medical System teams described below. In addition to these teams, HHS may also reach out to the Department of Veterans Affairs and the Department of Defense if more medical personnel are needed.

U.S. Public Health Service Commissioned Officer Corps

The U.S. Public Health Service (USPHS) Commissioned Officer Corps, one of the seven uniformed U.S. services, is a unique source of 6,000 dedicated public health professionals who are available to respond rapidly to urgent public health challenges and health care emergencies. The USPHS Commissioned Officer Corps, led by the Surgeon General, will be a key personnel resource in a public health emergency.

The USPHS Commissioned Officer Corps will have 14 teams ready to deploy to assist in major public health emergencies. These include:

- Five deployable Rapid Deployment Force (RDF) teams—each RDF team will have USPHS officers trained to manage and staff Federal Medical Shelters (500 beds/team), Special Needs Shelters, community primary care services, immunization campaigns, and other general medical capabilities
- Four Applied Public Health teams—each with USPHS officers with experience and training to address needs in water safety; sewage, solid waste, and other environmental challenges; disease surveillance; and public health communications
- Five Mental Health teams—each with USPHS officers who are subject matter experts to help assess and provide early intervention in mental health requirements in disaster settings

National Disaster Medical System

If a state requires additional help to respond to a public health emergency, it can often obtain additional medical staff through prearranged mutual aid agreements. In addition, the federal government can offer help through the National Disaster Medical System (NDMS) (http://ndms.dhhs.gov). NDMS is a program designed to provide a range of emergency medical services to support local response. It is a federally coordinated system involving collaboration with states and other

appropriate public or private organizations. This system is made up of medical professionals who are specially trained and who can provide their services in case of an emergency as a supplement to local hospital systems. All NDMS members become temporary federal employees when NDMS is activated.

The Secretary of Health and Human Services is authorized to activate NDMS in the following situations: (1) to provide health-related and other appropriate services to assist victims of a public health emergency (whether or not officially declared as such), or (2) to be present in an area for a limited time that the Secretary deems at risk for a public health emergency. When the Secretary has activated NDMS at the federal level, the services are paid for by the federal government. In certain circumstances, state governments may request services from NDMS when the Secretary has not activated NDMS at the federal level. In these cases, the states will need to reimburse NDMS for any services they request. To request NDMS assistance, officials will work with the federal liaison staff at the state Emergency Operations Center and Joint Field Office to develop a medical assessment document that lists their needs. The request is then sent to the Federal Emergency Management Agency at the federal level for approval and action.

The five types of NDMS teams are:

- Disaster Medical Assistance Teams
- Disaster Mortuary Operational Response Teams
- National Veterinary Response Teams
- National Nurse Response Teams
- National Pharmacy Response Teams

Each of these teams will be described below.

Disaster Medical Assistance Teams

- Twenty-six teams across the country, composed of 35 local professional and paraprofessional medical personnel and logistical staff each; 20 additional teams are currently in development.
- Include four National Medical Response Teams, which are specially equipped and trained to deal with Weapons of Mass Destruction, and other specialized teams available to handle specific medical needs, such as burns, mental health, crash injuries, and pediatric emergencies.
- Designed as rapid-response units to supplement local services (e.g., triage, emergency care) until a situation is resolved or until additional resources—federal or private—can be activated.
- Deployed to affected areas with enough supplies to last 72 hours.
- May work at fixed or temporary medical sites.
- Each team is managed by a sponsoring organization, such as a public health agency or a nonprofit group, which operates under a Memorandum of Agreement with HHS.

Disaster Mortuary Operational Response Teams

- Ten regional teams formed to provide help to local officials in tasks relating to the recovery, identification, and burial of victims.
- One national team is specially trained to handle events involving Weapons of Mass Destruction.
- Members are private citizens with specialized expertise.
- Examples of types of team members include: funeral directors, medical examiners, coroners, and pathologists.
- Include two Disaster Portable Morgue Units, which are complete morgues that can be deployed to an affected site.

National Veterinary Response Teams

- Five nationally deployable teams of private citizens who provide veterinary care following major emergencies
- Examples of tasks include the following:
  - Medical treatment for rescued animals, farm animals, and pets
  - Tracking and assessment of disease in animals
  - Animal decontamination
- Examples of types of team members include:
  - Clinical veterinarians
  - Veterinary pathologists
  - Veterinary technicians
  - Microbiologist/virologists

- Epidemiologists
- Toxicologists

National Nurse Response Teams

These teams are currently being formed to assist with mass vaccinations and provide specialized services in case the nation's supply of nurses is overwhelmed during a major emergency. There will be 10 regional teams, which will each consist of approximately 200 civilian nurses, including burn nurses.

National Pharmacy Response Teams

Ten regional teams are being formed to help with emergency situations that may require the assistance of large numbers of pharmacy professionals, such as mass vaccinations. Members will be sponsored by the Joint Commission of Pharmacist Practitioners and will work in partnership with HHS.

Federal Coordinating Centers

In addition to the five types of teams, NDMS also coordinates a network of approximately 2,000 hospitals to assist in a disaster. NDMS relies on the voluntary assistance of accredited hospitals across the country—usually those with more than 100 beds and located in large metropolitan areas. Federal Coordinating Centers recruit these hospitals to commit a number of their acute-care beds for NDMS patients, if needed. If a hospital admits NDMS patients in an emergency, it is reimbursed by the federal government subject to available funding.

In the case of a major disaster, the Federal Coordinating Centers may coordinate the evacuation or transport of patients to NDMS network hospitals in unaffected areas. These activities are coordinated with DOD, which would be responsible for transporting patients over long distances.

OTHER HHS SUPPLEMENTARY PERSONNEL AND RESOURCES

In response to a public health emergency, the federal government may dispatch personnel from the Epidemic Intelligence Service (EIS) or the Medical Reserve Corps.

EIS (http://www.cdc.gov/eis) is a 2-year postgraduate program of service and on-the-job training for health professionals interested in epidemiology. EIS, which is managed by CDC, was developed more than 50 years ago to defend the nation against biological warfare. It also provides surveillance and response units for all types of outbreaks. Medical doctors, researchers, and scientists work in a range of subject areas, including infectious diseases, and are supervised by experienced epidemiologists at CDC and local and state health departments.

The Medical Reserve Corps (http://www.medicalreservecorps.gov) are teams of local volunteer medical and public health professionals who have offered to contribute their skills and expertise during times of community need. The Medical Reserve Corps program office is within HHS' Office of the Surgeon General, but the volunteer teams are operated out of local Citizen Corps, a national network of volunteers concerned with preparing their communities for disasters of all kinds.

AMERICAN RED CROSS

The American Red Cross (http://www.redcross.org) is another key player in responding to a public health emergency. The American Red Cross is a nonprofit humanitarian organization staffed mostly by volunteers and has been providing disaster recovery assistance to Americans since the 1880s. Although not a government organization, the American Red Cross was given authority through a Congressional Charter in 1905 to provide assistance in disasters, both domestically and internationally. As a result, American Red Cross Chapters work closely with federal, tribal, state, and local governments to respond to disasters.

The following are some of the services offered by the American Red Cross in a disaster:

- Emergency first aid
- Health care for minor injuries and illnesses at mass-care shelters or other sites
- Supportive counseling for victims and those affected by the event
- Personnel to assist at temporary infirmaries, immunization clinics, morgues, hospitals, and nursing homes
- Assistance with meeting basic needs (e.g., food, shelter)
- Provision of blood products

In addition to the American Red Cross, it is likely that many other volunteer organizations will also be involved in a response to a public health emergency in your community.

PANDEMIC INFLUENZA: PREPAREDNESS AND RESPONSE

The possibility of a future pandemic influenza outbreak is a concern among many public health officials. While this chapter generally describes the public health system's response to terrorism and other public health emergencies, many of the same methods and response activities would be employed in the event of a pandemic influenza outbreak.

For example, to prepare for a possible pandemic, federal health officials are currently:

- Monitoring disease spread internationally to support rapid response
- Developing vaccines and vaccine production capacity
- Stockpiling antiviral drugs and other medical countermeasures
- Coordinating preparedness and response planning with tribal, state, and local health officials
- Improving outreach and public communications planning

Many tribal, state, and local health departments are also in the process of developing their own pandemic preparedness plans. More detailed basic information on pandemic influenza can be found in appendix E (p. 107).

Additional resources and information on pandemic influenza, including the HHS Pandemic Influenza Plan and informational and planning resources for many audiences, such as individuals, schools, businesses, health care providers and facilities, and communities can be found at http://www.pandemicflu.gov.