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CHAPTER 11
Response at the State and Local Level

All disasters are local.

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Objectives
The study of this chapter will enable you to:

1. Discuss the roles and responsibilities of various key agencies in response to a biological event.
2. Discuss the need for command and coordination systems in the event of a biological attack.
3. Describe the importance of the National Incident Management System and the Incident Command System.
4. Discuss the roles of key federal agencies and officials when it comes to response to a biological event at the local level.
5. Discuss life safety issues for responders attending to the scene of a biological event.
6. Discuss considerations and describe methods for biosampling.
7. Describe outbreak containment measures used by public health agencies.

INTRODUCTION

The aim of this chapter is to make the reader aware of local and state activities that affect our ability to respond effectively to natural or intentional disease outbreaks. Routine responsibility for disease prevention and outbreak investigation falls on public health agencies. Responsibility for medical management of illness caused by disease rests with the medical systems of communities. The investigational and prosecutorial aspects of intentional acts with disease threat falls into the hands of federal law enforcement officials. Finally, responsibility for all hazards preparedness and resource allocations falls onto the shoulders of emergency managers.

Disasters causing many casualties typically fall into the natural disaster realm. Tornadoes, earthquakes, floods, storms, and influenza are examples that apply. Human error or technical disasters typically do not create as many casualties. For instance, the accidental release of 90 tons of chlorine in Graniteville, South Carolina, and the collapse of the I35 Bridge in Minnesota are examples of technical disasters with limited impact. Human malevolence through acts such as the terrorist attacks of September 11, 2001, and the bombing of the Murrah Building may not produce casualties to the extent of natural
disasters, but it resonates with the public into a lasting memory. Terrorist tactics are evolving from the terrorism of the past to the new terrorism, where the targets are indiscriminate and the intent is to injure or kill as many people as possible (Martin, 2008).

Locally, emergency management officials establish programs to minimize the adverse effects to life, property, and the environment from potential hazards based on a jurisdiction vulnerability risk assessment. State emergency management provides the statewide emergency management program direction, coordination, and in some cases passage through federal funding for local emergency management programs. Response to any event begins at the local level, unless it is based on intelligence at a higher level and the sensitivity (“need to know”) associated with such information precludes local involvement. Unfortunately, the development of effective response strategies and operational plans is a melding of information analysis from all sources followed by implementation of joint authority. We must shift from the need-to-know manner of conducting business to a “need to share” philosophy. “Recommendation: Information procedures should provide incentives for sharing, to restore a better balance between security and shared knowledge” (9/11 Commission Report, 2004).

With respect to preparedness for an act of bioterrorism, one of the greatest challenges that community officials face is balancing preparedness and mitigation programs for all other hazards against the low probability of a biological event. As part of the risk assessment process, the community looks at its vulnerability to biological events, and as the 2001 Amerithrax incident revealed, each community has some vulnerability to bioterrorism. Community planners and emergency managers need to evaluate the consequence of such an event and ask the question: If it were to happen here, how bad might it be? Along with this question, they must assess their organic capability to handle anticipated consequences. That said, many community planners would determine that, even if a biological event were to happen, the consequences would be minimal. Although that assessment might prove to be true with respect to adverse effects to life, property, and the environment, it greatly underestimates the economic and societal impact of an act of bioterrorism.

**Critical Thinking**

The 2001 Amerithrax incident did not create a large pool of casualties (5 deaths out of 22 total cases), which supports the argument that an intentional biological release is a low-consequence event from a medical perspective, therefore not requiring significant mitigation activities. On the other hand, significant resources are now deployed to prevent and provide early detection of another similar attack. Is the main objective to minimize the medical consequences in another attack or is it an attempt to restore confidence in the government’s ability to protect the American public?

This chapter is broadly subdivided into several sections. Each section covers a major area for local and state jurisdictions to consider when preparing for and
responding to biological threats. The first, “Recognition,” is a short discussion about the importance of surveillance and the different types of surveillance useful in recognizing that an unusual disease trend has emerged within the community. As local communities prepare for a biological event, they must develop emergency operations plans that include systems for command and coordination. Because an act of bioterrorism involves numerous agencies at all levels of government, the next section outlines the National Incident Management System (NIMS), the Incident Command System (ICS), unified command, and specific agencies and officials of the federal government with which local responders must plan to work. Finally, response issues are covered, which include life safety, biosampling, and public health containment measures.

**RECOGNITION: SURVEILLANCE**

The disease surveillance capacities of many state and local public health systems depend, in part, on the surveillance capabilities of hospitals and local primary care providers. Whether a disease outbreak occurs naturally or is due to the intentional release of a harmful biological agent, much of the initial response occurs at the local level, particularly at hospitals and their emergency departments. Therefore hospital personnel are some of the first health-care workers with the opportunity to identify an infectious disease outbreak or a bioterrorist event. The same circumstances that place these medical professionals in an optimal position to recognize the onset of an outbreak also places them at greatest risk from the disease event itself.

Infectious diseases include naturally occurring outbreaks, such as severe acute respiratory syndrome (SARS), norovirus, and influenza, as well as diseases from biological agents that could be intentionally released by a terrorist, such as smallpox. An infectious disease outbreak, either naturally occurring or from an intentional release, may not be recognized for a week or more because symptoms may not appear for several days after the initial exposure, during which time a communicable disease could be spread to those who were not initially exposed (eg, pneumonic plague).

The initial response to an infectious disease of any type, including a bioterrorist attack, is generally a local responsibility that could involve multiple jurisdictions in a region, with state as well as the federal government providing additional support when needed or requested. Just as in a naturally occurring outbreak, exposed individuals seek out local health-care providers, such as private physicians or medical staff in hospital emergency departments or public clinics. Health-care providers should report any illness patterns or diagnostic clues that might indicate an unusual infectious disease outbreak associated with the intentional release of a biologic agent to their local health departments. Public health provides medical professionals with a list of “reportable” diseases to assist public health in recognizing clusters or unusual cases.
To be adequately prepared for infectious disease outbreaks in the United States, state and local public health agencies need to have several basic capabilities, either directly or have access to them through regional agreements:

- Public health departments need to have disease surveillance systems and epidemiologists to detect clusters of suspicious symptoms or diseases to facilitate early detection of disease and treatment of victims.
- Laboratories need to have adequate capacity and necessary staff to test clinical and environmental samples to identify an agent promptly so that proper treatment can be started and reduce spreading of infectious diseases.
- All organizations involved in the response must be able to communicate easily with one another as events unfold and critical information is acquired, especially in a large-scale infectious disease outbreak.

In the event of an outbreak, hospitals and their emergency departments would be on the front line, and their personnel would take on the role of first receiver. Because hospital emergency departments are open 24h a day, 7 days a week, exposed individuals would likely seek treatment from the medical staff on duty. Such staff need to be able to recognize and know how to report any illness patterns or diagnostic clues that might indicate an unusual infectious disease outbreak to their local health department. Hospitals need the capacity and staff necessary to treat severely ill patients as well as implement appropriate prevention and control measures to limit the spread of infectious disease (U.S. Government Accountability Office, 2003). Every facility providing medical care should have an exposure control plan in place.

Because infected individuals might go to emergency departments for treatment, hospital personnel would likely be some of the first health-care workers with the opportunity to identify an emerging infectious disease outbreak. Therefore, the disease surveillance capacities of many state and local public health systems depend, in part, on the surveillance capabilities of hospitals. Hospitals and general medical providers are in many respects the gatekeepers for a healthy and safe public. Surveillance can be defined as ongoing systematic collection, collation, analysis, and interpretation of data and the dissemination of information to those who need to know for action to be taken. Effective communicable disease control relies on an effective surveillance and response system that promotes better coordination and integration of surveillance functions (WHO, n.d.). Surveillance is a continuous and systematic process consisting of three primary activities:

- collection of relevant data for a specified population, time period, and/or geographic area;
- accurate analysis of data; and
- rapid dissemination of interpreted data.

The primary objective of disease surveillance is to identify trends in infectious disease and determine the risk of disease transmission so that prevention and control measures
can be applied to minimize the burden of illness. Surveillance data must be timely and complete to accurately reflect the occurrence and distribution of disease. The types of surveillance currently used are:

- **Passive** disease surveillance refers to the receipt of reports of infections and diseases from physicians, laboratories, and other health professionals required to submit the reports required by public health statute.
- **Active** disease surveillance is guided by public health statute in each state and refers to the routine gathering of data in an effort to identify cases. This type of surveillance can be seasonal or initiated by a mass casualty event that has resulted in an increased number of individuals or potential cohorts presenting with similar symptoms or illnesses.
- **Syndromic surveillance** has been used for early detection of outbreaks; to follow the size, spread, and tempo of outbreaks; to monitor disease trends; and to provide reassurance that an outbreak has not occurred. Syndromic surveillance systems seek to use existing health data in real time to provide immediate analysis and feedback to those charged with the investigation and follow-up of potential outbreaks.

The fundamental objective of syndromic surveillance is to identify illness clusters early, before diagnoses are confirmed and reported to public health agencies, and to mobilize a rapid response, thereby reducing morbidity and mortality. Passive surveillance systems rely on laboratory and hospital staff, physicians, and other relevant sources to take the initiative to provide data on illnesses to the health department, where officials analyze and interpret the information as it arrives. In contrast, in an active disease surveillance system, public health officials contact sources, such as laboratories, hospitals, and physicians, to obtain information on conditions or diseases to identify cases. In theory, active surveillance can provide more complete detection of disease patterns than a system that is wholly dependent on voluntary reporting. Having dedicated personnel to accomplish active surveillance is a challenge for any administrator. Public health departments are traditionally thin on staffing. Taking staff time to look for a problem that may or may not exist, at the expense of one of the many ongoing daily health department programs, is problematic.

**COMMAND AND COORDINATION**

Command and coordination are essential to effectively respond to a biological incident. Whenever an act of biological terrorism occurs, no matter how seemingly insignificant, facets of the federal government are set into motion. As such, local communities and state governments must be prepared to receive and work with elements of the federal government. Previous incidents, disasters, and catastrophic events made it clear that the nation needed a uniform approach to managing an incident. Accordingly, Homeland Security Presidential Directive 5 called for the NIMS to respond to and manage
domestic incidents by establishing a single, comprehensive incident management system. The command and management component of NIMS mandates the use of the ICS to allow for a consistent command structure and clear, concise communications through common language to support interoperability between responders from the local level to the federal level. For hospitals, this framework has been extended through the Hospital Incident Command System. For public health agencies, a similar but new framework, known as the Public Health Incident Command System, is being adopted (Qureshi et al., 2005). Regardless of the agency, small or large, the framework remains the same, although the roles and responsibilities vary based on the agencies’ jurisdictional duties and statute.

The Incident Command System

The ICS is a component of the NIMS. Federal, state, local, and tribal governments had to be in full compliance with NIMS by September 30, 2006. The ICS is a proven modular management tool that expands and contracts as the incident warrants. ICS provides a framework for coordinated effort to ensure an effective response and the efficient, safe use of resources, regardless of the size or agencies involved. The concept of ICS was developed more than 30 years ago in the aftermath of a devastating wildfire in California. Over a 13-day period in 1970, 700 structures were destroyed and 16 lives were lost, some because of lack of coordination and poor command and control. As a result, Congress mandated that the US Forest Service design a system to effectively coordinate interagency actions. As such, Firefighting Resources of California Organized for Potential Emergencies (FIRESCOPE) was established as a primary command and control system (California Office of Emergency Services, FIRESCOPE, 2004). Its organization delineated job responsibilities and organizational structure for managing the day-to-day operations of all types of emergency incidents. FIRESCOPE eventually led to the ICS.

Regardless of its application, ICS is a management system designed to enable effective and efficient domestic incident management by integrating a combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure, designed to enable effective and efficient domestic incident management (U.S. Department of Homeland Security, 2004a,b). The ICS is the combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure, designed to aid in domestic incident management activities. It is used for a broad spectrum of emergencies, from small to complex incidents, both natural and human made, including acts of catastrophic terrorism. ICS is used by all levels of government—federal, state, local, and tribal. ICS is usually organized around five major functional areas: command, operations, planning, logistics, and finance and administration (U.S. Department of Homeland Security, 2004a). A sixth optional function, intelligence, may be needed to collect and establish facts in the investigation.
The ICS organization has the capability to expand or reduce to meet the needs of the incident, but all incidents, regardless of size or complexity, will have an incident commander (IC). A basic ICS operating guideline is that the IC is responsible for on-scene management until command authority is transferred to another person, who then becomes the IC. Command primarily consists of the IC and command staff. Command staff positions are established to assign responsibility for key activities not specifically identified in the general staff functional elements. These positions may include the public information officer, safety officer, and liaison officer, in addition to various others, as required and assigned by the IC. The general staff comprises the incident management personnel who represent the major functional elements of the ICS, including the operations section chief, planning section chief, logistics section chief, and finance/administration section chief. The command staff and general staff must continually interact and share vital information and estimates of the current and future situation to develop recommended courses of action for consideration by the IC.

**Unified Command**

A mass casualty incident, such as a major outbreak of an infectious disease, requires a unified command within the ICS structure. Fig. 11.1 illustrates the ICS structure. The branches and units remain the same between agencies, yet the functional roles and

![Figure 11.1](image-url)
responsibilities vary. In a mass casualty incident, the Department of Health and Human Services (HHS) is the lead coordinating agency for Emergency Support Function 8 (Health and Medical Annex of the Federal Response Plan). This responsibility remains the same at the state and local levels. In a declared emergency, all information must be directed through the Emergency Operations Center, with the defined organizational structure to ensure integrated communications and an effective response. A public health liaison officer facilitates communication between the health department and medical community, including primary care providers, hospitals, home health agencies, nursing homes, foster homes, community-based health centers, and any agency responsible for the health and medical needs of vulnerable populations. How this is coordinated may vary, depending on the size and demographics of the community, yet the organizational structure will remain the same within ICS.

Unified command is an important element in multijurisdictional or multiagency domestic incident management. It provides guidelines to enable agencies with different legal, geographic, and functional responsibilities to effectively coordinate, plan, and interact. As a team effort, unified command overcomes much of the inefficiency and duplication of effort that can occur when agencies from different functional and geographic jurisdictions or at different levels of government operate without a common system or organizational framework.

All agencies with jurisdictional authority or functional responsibility for any aspects of an incident participate in the unified command structure and contribute to the process of determining overall incident strategies; selecting objectives; ensuring that joint planning for tactical activities is accomplished in accordance with approved incident objectives; ensuring the integration of tactical operations; and approving, committing, and making optimum use of all assigned resources. The exact composition of the unified command structure depends on the location and the type of the incident. In some cases, **area command** is activated only if necessary, depending on the complexity of the incident and span-of-control considerations. An area command is established either to oversee the management of multiple incidents that are being handled by separate ICS organizations or to oversee the management of a very large incident that involves multiple ICS organizations. It is important to note that area command does not have operational responsibilities. For incidents under its authority, the area command

- Sets overall agency incident-related priorities,
- Allocates critical resources according to established priorities,
- Ensures that incidents are managed properly,
- Ensures effective communications,
- Ensures that incident management objectives are met and do not conflict with each other or with agency policies,
- Identifies critical resource needs and reports them to the Emergency Operations Center(s),
• Ensures that short-term emergency recovery is coordinated to assist in the transition to full recovery operations, and
• Provides for personnel accountability and a safe operating environment.

Role of Federal Agencies at a Biological Incident

The response to any terrorist incident within the United States will entail a highly coordinated, multiagency local, state, and federal response. The following primary federal agencies will likely provide the core response as was discussed in the National Response Plan (U.S. Department of Homeland Security, 2004b) and is now detailed in the National Response Framework (NRF), Biological Incident Annex (FEMA, 2008).

The Secretary of the Department of Homeland Security (DHS) is the principal federal official for domestic incident management. The secretary is responsible for coordinating federal operations within the United States to prepare for, respond to, and recover from terrorist attacks, major disasters, and other emergencies. The attorney general has lead responsibility for criminal investigations of terrorist acts or terrorist threats by individuals or groups inside of the United States or directed at US institutions abroad, where such acts are within the federal criminal jurisdiction of the United States (U.S. Department of Homeland Security, Homeland Security Presidential Directive 5, 2003). The Federal Bureau of Investigation (FBI), under the authority of the attorney general, handles all crime scenes where a terrorist act involving a weapon of mass destruction (WMD) has occurred. In fact, each state has an FBI agent assigned to act as WMD Coordinator should a chemical, biological, radiological/nuclear, and explosive (CBRNE) event occur.

Critical Thinking

The NRF incorporates best practices and procedures from incident management disciplines—homeland security, emergency management, law enforcement, firefighting, public works, public health, responder and recovery worker health and safety, Emergency Medical Services, and the private sector—and integrates them into a unified structure. It forms the basis of how the federal government coordinates with state, local, and tribal governments and the private sector during incidents. After a biological incident (act of bioterrorism, biocrime, or major outbreak), assistance will come from various federal agencies under the NRF, depending on the scope of the incident. How big a footprint will federal agencies have in a community? What impact do they have on an operation even after the event has been through all incident phases?

Department of Homeland Security

The DHS is the nation’s lead agency in dealing with terrorism and CBRNE destruction. The goals of the department are to make the nation less
vulnerable to terrorism, prevent attacks, minimize the damage from attacks, and oversee recovery efforts. The DHS works closely with other federal agencies and state and local governments to coordinate disaster planning and relief efforts.

- The Secretary of Homeland Security is the principal federal official for domestic incident management. Pursuant to the Homeland Security Act of 2002, the secretary is responsible for coordinating federal operations within the United States to prepare for, respond to, and recover from terrorist attacks, major disasters, and other emergencies, including biological incidents.
- The HHS serves as the federal government’s primary agency for the public health and medical preparation and planning for and response to a biological terrorism attack or naturally occurring outbreak.

NRF, Biological Incident Annex (FEMA, 2008).

### Health and Human Services

The HHS works with states to build the strongest possible network of protection and response capability for Americans faced with health and medical problems in emergencies. The Centers for Disease Control and Prevention (CDC), under the HHS, helps assess incident effects and develops strategies for public health aspects of an emergency; two key roles are disease surveillance and disease investigation. The HHS Office of Preparedness and Response, under Emergency Support Function 8, maintains responsibility for the National Disaster Medical System. This system includes disaster medical assistance teams and disaster mortuary response teams. Disaster medical assistance teams deploy to disaster sites with adequate supplies and equipment to support themselves for 72 h while providing medical care at a fixed or temporary medical site. Disaster medical assistance teams are principally a community resource to support local, regional, and state requirements; however, they can be federalized to provide interstate aid. Also a part of the National Disaster Medical System, the disaster mortuary response teams can be rapidly deployed to disaster sites to help identify, track, and process fatalities at a CBRNE event. Their specialty is forensics, identification of remains, and temporary holding of corpses pending outcome of the investigation. HHS, through the CDC, maintains the Strategic National Stockpile program, which can provide immediate logistical support for certain vaccines, antibiotics, and antivirals that may be critical in the wake of a major biological incident.

### Department of Agriculture

The US Department of Agriculture (USDA) serves as the government’s primary agency for outbreaks and/or attacks that may occur in animals or crops used in the commercial production of food. USDA may also serve as the government’s primary agency for attacks on food processing and slaughtering facilities under its
regulatory purview. In the event of a food or animal event, HHS may provide additional public health and veterinary epidemiological assistance to USDA (NRF, Biological Incident Annex, 2008).

**Department of Justice**

The Department of Justice has the primary responsibility for preventing and investigating terrorist incidents and oversees several important assets, including the Critical Incident Response Group (CIRG), evidence response team, and the FBI.

The CIRG facilitates the FBI’s rapid response to and the management of crisis incidents. The CIRG was established in 1994 to integrate tactical and investigative resources and expertise for critical incidents. Each of the three major areas of CIRG—Operations Support Branch, Tactical Support Branch, and the National Center for the Analysis of Violent Crime—furnishes distinctive operational assistance and training to FBI field offices as well as state and local law enforcement agencies.

The evidence response team is responsible for crime scene documentation and evidence collection. An evidence response team can vary in number from 8 to 50. The FBI’s evidence response teams include special agents and support personnel who specialize in organizing and collecting evidence using various technical evidence recovery techniques.

The FBI coordinates federal crisis management efforts. It is the lead federal investigative agency for CBRNE incidents through the CBRNE operations unit. There are 56 FBI field offices, 4 specialized field installations, and more than 40 foreign liaison posts. Representatives from 20 federal agencies are assigned to the Counterterrorism Center at FBI headquarters.

At the field-operational level, the FBI has approximately 60 Joint Terrorism Task Force teams based out of its field offices. The task forces are designed to maximize inter-agency cooperation and coordination among federal, state, and local law enforcement. The FBI has five rapid deployment teams that can respond to multiple incidents (two teams stationed in Washington, DC; one each in New York City, Miami, and Los Angeles). The FBI’s Hazardous Materials Response Unit (HMRU), based in Quantico, Virginia, is designed to enhance evidence-gathering capabilities in extreme environments. The HMRU worked the Senate Hart Building and the contaminated postal buildings after the 2001 Amerithrax incident.

**Federal Emergency Management Agency**

The Federal Emergency Management Agency (FEMA) is a department within the DHS. FEMA’s response division coordinates federal response efforts relating to all hazards and terrorist attacks. FEMA promotes the effective response by federal agencies at the national level and at the scene of an incident. FEMA provides funding for
the Metropolitan Medical Response System (MMRS), which is utilized in the event of a CBRNE incident with mass casualties. The MMRS provides initial on-site response and safe patient transport to emergency rooms in the event of a terrorist attack. It also provides medical and mental health care to victims of such attacks and can move victims to other regions should local resources be overrun. MMRS is a local resource activated by local authorities; however, its members are federally trained and funded. The team is characterized by specially trained responders, special pharmaceuticals and decontamination equipment, on-site health care, and enhanced emergency medical transportation and emergency room capabilities. MMRS-funded communities must work closely with other federally funded entities involved in the initial response to ensure seamless integration of MMRS assets. There are 124 US cities funded under the MMRS program.

**Environmental Protection Agency**

The Environmental Protection Agency (EPA) provides technical support to the lead federal agency, typically monitoring and assessing chemical, biological, and radiological threats. The EPA’s environmental response team supports on-scene coordinators. The response teams have portable chemical agent instruments to detect and identify agents in low- and subparts-per-million quantities. The teams can also measure $\alpha$-, $\beta$-, and $\gamma$-radiation. The environmental response teams offer 24-h access to decontamination equipment, and members have access to Levels A through C protective gear. EPA is also prepared to conduct environmental sampling in the wake of a biological incident. Laboratory Response Network (LRN) laboratories will process environmental samples collected by EPA to determine the extent of the contamination and to check on decontamination efforts.

**RESPONSE: SAFETY**

All responders with the potential to encounter contaminated victims or exposure to contaminated material must wear the appropriate level of personal protective equipment (PPE) and respiratory protection to the hazard. Responders can ensure the maximum safety of themselves and victims by following safety precautions and local protocol (29 CFR, Part, 1910.120).

PPE is associated with several physical and psychological potential limitations, including:

- **Time to put on.** The higher the level, the more time it takes to don and doff PPE.
- **Impaired communication.** Wearing a face piece or mask may result in poor communication or speech intelligibility.
- **Impaired vision.** Face pieces may limit field of vision. Prescription eyewear cannot be worn with a self-contained breathing apparatus (SCBA).
- **Heat-related issues.** Encapsulation and moisture-impermeable materials invariably lead to heat stress.
• **Increased weight.** The suit and SCBA add additional weight.
• **Encapsulation.** Gear adds to the psychological trauma of responders and patients.
• **Limited duration of use.** Wearing PPE Level B is contingent on many factors, including the total air supply, weather, work stress, and breathing.
• **Limited oxygen availability.** SCBAs can be used only for the period of time allowed by the air in the tank. Air-purifying respirators can be used only in environments in which the ambient air provides sufficient oxygen.
• **Dexterity issues.** Weight and bulkiness of the PPE may result in impaired mobility.

When wearing PPE, responders should always use the buddy system (29 CFR, Part 1910.120). All actions should be done in groups of two or more. The buddy system is used so that responders can assist each other should one of them become fatigued. The approach to any potentially hazardous atmosphere, including biological hazards, must be made with a plan that includes an assessment of hazard and exposure potential, respiratory protection needs, entry conditions, exit routes, and decontamination strategies. Any plan involving a biological hazard should be based on relevant infectious disease or biological safety recommendations by the CDC and other expert bodies including emergency first responders, law enforcement, and public health officials. The need for decontamination and treatment of all first responders with antibiotics or other medications should be decided in consultation with local public health authorities. Safety recommendations reiterated here come from an interim statement issued by the CDC in October 2001 after the Amerithrax incident (Centers for Disease Control, 2001). They are based on current understanding of the potential threats and existing recommendations issued for biological aerosols.

An important aspect of crime scene sample processing at the scene of a suspected biological incident is presubmission safety screening. Crime scene samples that are destined for an LRN facility must be screened for radiological, chemical, and explosive hazards before submission (refer to Fig. 11.2 for the FBI). The LRN laboratory will not accept any sample that has not been confirmed to be free of these other hazards.

**Personal Protection Against Biological Agents**

When using respiratory protection, the type of respirator is selected on the basis of the hazard and its airborne concentration. For a biological agent, the air concentration of infectious particles depends on the method used to release the agent. Current data suggest that the SCBA, shown in Fig. 11.3, that first responders currently use for entry into potentially hazardous atmospheres provides those responders with respiratory protection against biological exposures associated with a suspected act of biological terrorism (National Fire Protection Association, 2008).

Protective clothing, including gloves and booties, also may be required for the response to a suspected act of biological terrorism. Protective clothing may be needed to prevent skin exposure or contamination of other clothing. The type of protective clothing needed depends on the type of agent, concentration, and route of exposure.
The interim recommendations for PPE, including respiratory protection and protective clothing, are based on the anticipated level of exposure risk associated with different response situations, as follows:

- Responders should use a National Institute for Occupational Safety and Health (NIOSH)-approved, pressure-demand SCBA in conjunction with a Level A protective suit in responding to a suspected biological incident where any of the following information is unknown or the event is uncontrolled:
  - The type(s) of airborne agent(s).
  - The dissemination method.
  - If dissemination via an aerosol-generating device is still occurring or it has stopped but there is no information on the duration of dissemination or what the exposure concentration might be.

**Figure 11.2** This flowchart represents actions taken by first responders on the scene of a potential biocrime or small-scale biological incident. Initially, the lead investigator (Federal Bureau of Investigations Weapons of Mass Destruction Coordinator) would open a case and submit documentation to his/her higher command. Local hazmat technicians would then take a sample and subject that sample to radiological and chemical screening field tests to ensure that the sample would not present a threat to the Laboratory Research Network staff and laboratory technicians who are not protected from those type of hazards. Safety screening is an essential part of getting the suspect sample into the hands of the most capable element that can determine if a biothreat pathogen or toxin is present. *CBRN*, chemical, biological, and radiological/nuclear.
• Responders may use a Level B protective suit with an exposed or enclosed NIOSH-approved pressure-demand SCBA if the situation can be defined in which the suspected biological aerosol is no longer being generated or other conditions may present a splash hazard.
• Responders may use a full face-piece respirator with a P100 filter or powered air-purifying respirator with high-efficiency particulate air filters when it can be determined that an aerosol-generating device was not used to create high airborne concentration or dissemination was by a letter or package that can be easily bagged. Care should be taken when bagging letters and packages to minimize creating a puff of air that could spread pathogens. It is best to avoid large bags and to work very slowly and carefully when placing objects in bags. Disposable hooded coveralls, gloves, and foot coverings also should be used. NIOSH recommends against wearing standard firefighter turnout gear into potentially contaminated areas when responding to reports involving biological agents.

**Decontamination**

Decontamination of protective equipment and clothing, shown in Fig. 11.4, is an important precaution to make sure that any particles that might have settled on the outside of protective equipment are removed before taking off gear. Decontamination sequences currently used for hazardous material emergencies should be used as appropriate for the
level of protection used. Equipment can be decontaminated using soap and water, and 0.5% hypochlorite solution (1 part household bleach to 9 parts water) can be used as appropriate or if gear has any visible contamination. Note that bleach may damage some types of firefighter turnout gear (one reason why it should not be used for biological agent response actions). After taking off gear, response workers should shower using copious quantities of soap and water. In a known or suspected release, decontamination of biological materials is a four-step process. That process is detailed as follows:

1. Wet down the person; this allows the biological material (contamination) to adhere to clothing and skin, thus reducing the airborne hazard and the potential for ingestion and inhalation.
2. Strip contaminated clothing.
3. Flush the victim with a large amount of water, using soap if available, to remove any remaining contamination from skin and hair. Do not use bleach solutions to decontaminate skin surfaces.
4. Cover for protection and modesty.

Cross-contamination could occur during decontamination procedures if responders do not have appropriate PPE; therefore the victims may perform self-decontamination. If this is the case, then self-decontamination (for ambulatory victims) involves the removal of hazardous contamination from their own bodies. Victims should be advised to remove their own clothing (if contaminated) and the contaminating material in any way possible.

Figure 11.4 Members of the Sixth Weapons of Mass Destruction Civil Support Team go through a decontamination clean-up station after inspecting a vessel for hazardous materials during an exercise at the US Coast Guard Station, Galveston, Texas. The sixth civil support team is using Coast Guard expertise to help train for boarding and inspecting vessels at sea. Courtesy of the US Department of the Defense, Armed Forces Press Service.
RESPONSE: BIOSAMPLING

Biological agents pose new challenges to law enforcement and public health officials in their efforts to minimize the effects of a biological attack and apprehend those responsible for the attack. In the past it was not uncommon for law enforcement and public health officials to conduct separate, independent investigations. However, a biological attack requires a high level of cooperation between these two disciplines to achieve their respective objectives of identifying the biological agent, preventing the spread of the disease, preventing public panic, and apprehending those responsible. The lack of mutual awareness and understanding, as well as the absence of established communication procedures, could hinder the effectiveness of law enforcement’s and public health’s separate, but often overlapping, investigations. Because of the continued likelihood of biological attacks, the effective use of all resources during a biological incident is critical to ensure an efficient and appropriate response.

When communities are faced with biocrimes, responders may be called on to collect and preserve microbial forensic evidence (Schutzer et al., 2005). These actions are paramount to efficient and successful investigation and attribution. If evidence is not collected, is degraded, or is contaminated during collection, handling, transport, or storage, the downstream characterization and attribution analyses may be compromised. Many experts believe that the inherent rigidity in a standard operating protocol for crime scene processing could be unwieldy and impractical in a bioterrorism event, which may compromise evidence collection in some cases. Therefore consultation among the different entities involved in a response should provide best-practice options framed on established guidelines. The plan can be modified after greater scrutiny of the crime scene or as more information is obtained during the course of the investigation. If the forensic situation fits a pattern or template for which a sample collection methodology or sampling strategy already has been validated, then the sampling activities could be well defined and more focused (Budowle et al., 2006). One such scenario involving suspicious powdery substances found on hard surfaces provides the setting for routine sample collection and as is often the scenario or setting for most exercises or biological threat suspect incidents. Figs. 11.5 and 11.6 show examples of a response exercise in progress.

Numerous “white powder” incidents occur each year. If a ricin or anthrax incident occurred, then it would be extremely unlikely that this would be a natural event. Therefore any incident involving biological agents should be treated as a terrorist or criminal incident until proven otherwise. This requires that the FBI be notified, which would in turn notify the DHS Operations Center. The Terrorism Incident Law Enforcement Annex of the NRP provides additional information on the FBI’s role in pursuing the investigative response to a terrorist event.

For credible threats involving biological agents, the responding hazmat team should also notify local public health and emergency management officials through local procedures. Local public health officials should notify the CDC, which in turn will notify
Figure 11.5  A survey team member from a Weapons of Mass Destruction Civil Support Team prepares a specimen for presumptive analysis. This was a local major accident response exercise, in which a suspicious package containing unknown substances was left on a military member’s desk. Courtesy of US Department of Defense, Armed Forces Press Service.

Figure 11.6  First responders take a sample in an exercise at the Center for Domestic Preparedness (Department of Homeland Security/Federal Emergency Management Agency) where a biological agent is suspected to be present on the surface of a table in a training scenario. Courtesy of US Department of Homeland Security, Federal Emergency Management Agency.
HHS headquarters. HHS and the National Response Center, staffed by US Coast Guard personnel, should also receive notification via the DHS Operations Center.

**RESPONSE: CONTAINMENT**

Controlling the spread of a communicable disease in a community requires a multifaceted approach that includes traditional epidemiology, education of medical providers and the public, and provision of treatment and prophylaxis (see chapter: Biosecurity Programs and Assets), if available. Once an index case has been identified, contact tracing should begin. In addition, specific conditions may dictate the need for more extensive control measures designed to limit contact between persons who are (or may be) contagious and others who are susceptible to infection. Isolation and quarantine are two such measures. The legal aspects of these two important elements were covered in chapter Legal Aspects of Biosecurity. As stated, the legal authority to impose isolation and quarantine exists in most local health jurisdictions, but the successful implementation of either measure on a broad scale within a community requires careful planning.

**Contact Tracing**

On initiation of an outbreak and recognition that a problem exists, the public health officer assigns an epidemiologist to begin a disease outbreak investigation and contact tracing. The epidemiologist will trace contacts to determine the extent of the spread and possible secondary transmission. Once a potential contact has been identified, there are escalating methods of dealing with limiting the spread of infection by an individual. Passive monitoring is a process in which the contact is asked to perform self-assessment at least twice daily and to contact authorities immediately if respiratory symptoms or fever occur. It may be useful for situations in which the risk of exposure and subsequent development of disease is low, and the risk to others if recognition of disease is delayed is also low. The benefits are that it requires minimal resources and places few constraints on individual freedoms. It does rely on self-reporting, and affected persons may not be able to perform an adequate self-assessment. To help ensure fulfillment of these responsibilities, the public health official may provide necessary supplies (thermometer, symptom log, written instructions) and staff a hotline to notify authorities about symptoms or needs.

If warranted, the next step in escalation of this process might include active monitoring by a health-care worker designee, such as a community health nurse or local emergency medical services provider. The contact is evaluated on a regular basis by phone or in person for signs and symptoms suggestive of disease. This monitoring may be called for in situations in which the risk of exposure to and subsequent development of disease is moderate to high, resources permit close observation of individuals, and the risk of delayed recognition of symptoms is low to moderate. The benefit is,
once again, few constraints on individual liberties, but it does require trained staffing
and a system to track information and verify monitoring and appropriate actions based
on findings.

**Isolation and Quarantine**

By definition, isolation and quarantine restrict the movement of individuals. Although
voluntary isolation and quarantine are often successful, involuntary restriction may be
required in some circumstances or with particular individuals, especially early in an
emerging infection. Any plan for implementation of isolation or quarantine requires
clear delineation of the relevant legal authorities and responsibilities. To avoid unneces-
sary and potentially dangerous delays and barriers, it is crucial that public health person-
nel, law enforcement, the judicial system, and other local authorities are familiar with
these legal issues.

Isolation means separation, during the period of communicability, of a person
infected with a communicable disease, in a place and under conditions to prevent direct
or indirect transmission of an infectious agent to others. It may mean extremely limited
contact with an ill person who is diagnosed with, or suspected of having, a communi-
cable disease. The isolation can occur in a hospital setting in a negative airflow room for
very infectious airborne diseases. Isolation usually requires health-care providers and
visitors to use gowns, masks or respirators, goggles, and gloves as a means of protecting
the visitors but also to protect the patient from exposure to new diseases that his or her
weakened immune system may not be able to overcome.

Quarantine means restrictions, during or immediately before a period of communi-
cability, of activities or travel of an otherwise healthy person who likely has been exposed
to a communicable disease. The restrictions are intended to prevent disease transmission
during the period of communicability in the event the person is infected. This period is
commonly known as the incubation period of a disease. This means the person to be
quarantined has been exposed to an individual with a communicable disease and may
also be developing the disease. Some diseases are not communicable until symptoms
appear; other diseases may be communicable for hours or days before the person shows
any signs of the disease.

Quarantine can be accomplished by various means, including having the person stay
in his or her own home and avoid contact with others (including family members) to
having the person or group of persons stay in a designated facility, to restricting travel
out of an affected area. The contact remains separated from others for a specified period
(generally 10–14 days postexposure), during which he or she is assessed on a regular basis
for signs and symptoms of disease. Persons with fever or respiratory or other early influ-
enza symptoms require immediate evaluation by a trained health-care provider. Restrict-
tions may be voluntary or legally mandated; confinement may be at home or in an
appropriate facility.
**Group Quarantine**

Group quarantine may be considered when specific groups are at risk and is designed to reduce interactions and thereby transmission risk within the group. When focused, the intervention is applied to groups or persons identified in specific sites or buildings, most but not necessarily all of who are at risk of exposure. It may be useful when transmission is believed to have occurred, where the links between cases are unclear at the time of evaluation, and where restrictions placed only on persons known to have been exposed are considered insufficient to prevent further transmission. It may be difficult to achieve compliance if popular buildings are closed or events canceled. Excellent communication skills explaining the rationale, duration, support services, and replacement sites for critical activities are required. Canadian health authorities used voluntary home quarantine during the SARS outbreak and obtained good public compliance (SARS Commission, 2006).

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**Critical Thinking: Draconian Measures**

At first, quarantine sounds like a prudent measure for public health officials to use during an outbreak. However, large-scale quarantine comes with many requirements and responsibilities. If a public health official is going to confine people to a location, the city or state must provide for their needs. In addition, if a public health official is going to mandate them to remain under control, then that mandate must be enforced. Is deadly force an acceptable method of enforcing quarantine? Does a law enforcement officer have the authority to shoot someone who is fleeing from a quarantine barrier? Would images such as these undermine a community official’s authority or ability to quell fear? What about the kinder and gentler measure of social distancing programs? Can we count on the public to limit their contact with others?

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**Community Quarantine**

In extreme circumstances, public health officials may consider the use of widespread or communitywide quarantine, which is the most stringent and restrictive containment measure. Strictly speaking, *widespread community quarantine* is a misnomer because *quarantine* refers to separation of exposed persons only and usually allows provision of services and support to affected persons. Widespread community quarantine involves asking everyone to stay home. It may involve a legally enforceable action and it restricts travel into or out of an area circumscribed by a real or virtual “sanitary barrier” or “cordon sanitaire” except to authorized persons, such as public health or health-care workers.

Large-scale quarantine requires a wide range of services to be provided for individuals confined to one location. In the United States, payment for these services must be addressed up front. Will this cost be borne by the entity ordering the quarantine or state or federal agencies? Furthermore, will reimbursement change based on a community declaring a state of emergency or disaster? Will individuals be required to pay for food,
services, and supplies they receive while in quarantine and how can they support such expenditures if they are unable to work? Will private for-profit entities be allowed to compete with government or social service providers, and how much can they charge? Who and how will repairs be handled for essential utility and communication services?

The community must be clear what local, state, and federal legislative framework allows restriction of movement of individuals for the purposes of controlling communicable diseases and who has the authority to declare a public health emergency in the jurisdiction. In some cases, connecting the implementation of isolation or quarantine to a declaration of an emergency may be beneficial in achieving desired results and smoothing over supportive activities.

An effective and comprehensive response to a fast-moving, contagious, and potentially fatal disease with limited possibilities for prevention, treatment, or other medical intervention requires the unprecedented coordination and collaboration of a wide range of government and nongovernment parties. Government officials must provide leadership, but they cannot provide all of the services required to contain a disease and support an affected community.

Likewise, although response to a public health crisis must rely heavily on public health, medical, and scientific experts, it will also require support from law enforcement personnel, mental health providers, transportation authorities, emergency management directors, and other key service providers, who may know little about disease transmission or control measures.

**Medical Surge**

The approach to meeting surges in demands for care requires partnerships and rationing of care not typically seen. This includes systems of triage that enables the care of victims assigned to lower levels of definitive medical care to be transferred to higher-level care sites, and vice versa. An extension of this strategy is the promotion and support of home care. Taken together, these strategies are geared to lessen the chance that emergency departments and hospitals will be inundated with patients who could be successfully managed in nonhospital or lower-level care settings, reserving hospital care for those most in need. Exactly who will provide this care, protocols that are to be followed, reimbursement for services, and protection against liability are issues to be solved locally by all preparedness partners.

**Zoonotic Connection**

Thinking back to the points made in Part III of this book, one cannot forget that in many instances, animal health and human health may be inextricably linked. The release of a disease agent, regardless of the intended target, may have implications for animal and human hosts. A bioterrorist incident aimed at human populations may manifest in animals. In fact, the animals may show signs of the disease before the human targets. In this
way animals may act as a sentinel host. In addition, animals may also be infected by the release and serve to maintain the pathogen in an area. In this instance, the animals may act as a reservoir for the disease agent. What this suggests is that animal health and human health officials should have good working relationships and that surveillance data must be shared.

CONCLUSION

The consequences of a biological incident are potentially complex and are likely to result in a convergence of state and federal government agencies on the scene of the incident. Many agencies from the federal government will respond to a CBRNE incident, providing necessary resources. Planners within local jurisdictions need to maintain a list of the agencies, the contact numbers, and the resources available from each. State and local governments must be fully compliant with NIMS. This includes the adaptation of the ICS. Unified or area command is an essential element in domestic incident management in which multiple jurisdictions and agencies are involved. It provides guidelines to enable agencies with different legal, geographic, and functional responsibilities to effectively coordinate, plan, and interact. Unified or area command removes much of the inefficiency and duplication of effort that can occur when agencies from different functional and geographic jurisdictions or agencies at different levels of government operate without a common system or organizational framework.

Acts of bioterrorism may also result in a mass casualty incident, where there are many victims and serious implications for first responders and public health agencies. The life and safety of responders and civilians are vitally important functions. First responders and health-care personnel need to be equipped with the knowledge to handle the immediate issues of a biological attack. Public health officials will need to be familiar with containment measures that enable them to limit the spread of the disease and restore the community back to its predisaster state.

ESSENTIAL TERMINOLOGY

- **Area command.** An organization established to oversee the management of multiple incidents that are each being handled by an ICS organization or to oversee the management of large or multiple incidents where several incident management teams have been assigned. Area command has the responsibility to set overall strategy and priorities, allocate critical resources according to those priorities, ensure that incidents are properly managed, and ensure that objectives are met and strategies followed. Area command becomes unified area command when incidents are multi-jurisdictional. Area command may be established at an emergency operations center facility or at some location other than an incident command post.
• **Contact tracing.** The identification and diagnosis of persons who may have come into contact with an infected person. For sexually transmitted diseases, this is generally limited to sexual partners, but for highly virulent diseases, such as viral hemorrhagic fevers and plague, a thorough contact tracing would require information regarding casual contacts.

• **Incident Command System (ICS).** This is a systematic tool used for the command, control, and coordination of emergency response. ICS allows agencies to work together using common terminology and operating procedures to control personnel, facilities, equipment, and communications at a single incident scene. It facilitates a consistent response to any incident by using a common organizational structure that can be expanded and contracted in a logical manner based on the level of required response.

• **National Incident Management System.** This is a system mandated by Homeland Security Presidential Directive five that provides a consistent nationwide approach for governments, the private sector, and nongovernmental organizations to work effectively and efficiently together to prepare for, respond to, and recover from domestic incidents, regardless of cause, size, or complexity.

• **Surveillance.** The systematic collection, analysis, interpretation, and dissemination of health data to assist in the planning, implementation, and evaluation of public health interventions and programs.

• **Unified command.** This is one of two methods of performing the command function that employs multiple ranking personnel. Unified command is used when an incident affects multiple political or legal jurisdictions or involves several responding agencies with contrasting functional responsibilities and missions.

**DISCUSSION QUESTIONS**

• Discuss the meaning of “credible threat” when it comes to the scene of a possible biological incident.

• Discuss the role of the Federal Bureau of Investigations Weapons of Mass Destruction Coordinator at the scene of a possible biological incident.

• Discuss the actions necessary to field screen a sample destined for a Laboratory Response Network laboratory.

• Discuss the roles of key federal agencies that come into play after a biological incident.

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