Chapter 4

CONSEQUENCE MANAGEMENT: THE LOCAL AND NATIONAL RESPONSE

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INTRODUCTION

Consequence management is critical to minimizing the long-term impact from any natural or manmade disaster. A common aim of organizations that seek to induce terror is to cause maximum disruption to societies with no regard for the impact on human life. Effective consequence management will minimize a disaster's impact on a society, its people, its infrastructure, and its economy. It will deliver the right solutions at the right time to the right locations in a coordinated and controlled response. Many, but not all, consequences of a catastrophic event are predictable, and many catastrophic events share common types of consequences. An effective consequence management plan focuses on the critical functions and capabilities necessary to span multiple types of disasters that effectively minimize the disaster's impact. The plan must be comprehensive, flexible, and scalable. It must be adaptable to variable outcomes of varying magnitude and potential cascading effects of catastrophic events that may require a rapid transition from the initial plan to a more comprehensive one.

Constructing an effective consequence management plan starts with understanding the threats to a populace, geographic location, or specific entity and the potential impact of those threats on all facets of the affected area. It must identify local response capabilities and functions and develop an activation strategy for timely implementation. It should also demonstrate an understanding of regional, state, and federal response capabilities and functions and outline a mechanism for requesting assistance. Effective consequence management starts at the local level, but can rapidly escalate with the need to coordinate higher-level supportive response with ongoing local response and recovery efforts.

Federal response and recovery key planning considerations and responsibilities are identified in the National Response Framework (NRF) and the National Disaster Recovery Framework (NDRF), available for download from the Department of Homeland Security (DHS) and the Federal Emergency Management Agency (FEMA) digital libraries. They identify essential support functions and recovery support functions that guide local, state, and interagency federal all-hazards planning for response and recovery. The Biological Incident Annex to the NRF outlines the actions, roles, and responsibilities associated with a human disease outbreak of known or unknown origin requiring federal assistance. These documents emphasize a common theme: response and recovery will start at the local level and local involvement throughout is critical to success. Robust local planning to reduce an entity's vulnerability to the threats of biological incidents, with a well-thought plan for disaster response and recovery that meshes well with state and federal assistance plans, can save lives, minimize impact, and defeat terrorist objectives.

CONSEQUENCE MANAGEMENT

The definition of consequence management has evolved over time. At one time a clear separation existed between crisis management and consequence management. In a November 20, 2003 hearing before the House of Representatives, Subcommittee on Crime, Terrorism, and Homeland Security, Mr. Howard Coble defined crisis management as actions taken to anticipate, prevent, or resolve a threat, with consequence management fulfilling the cleanup and restoration functions after an attack.[1] To truly mitigate the short-term and long-term impacts of catastrophic events, one must think and plan over a continuum of prevention, protection, and mitigation through response and recovery.

The NDRF emphasizes that community recovery can be accelerated through a community's efforts in predisaster preparedness, mitigation, and recovery capacity building.[2] Recovery efforts must not interfere with immediate response efforts to preserve life and health and maintain critical infrastructure. However, immediate response efforts can mitigate long-term effects and the overall impact of the disaster with significant impact on postdisaster recovery—positively or negatively—and the two should be planned and executed in harmony.

The NDRF emphasizes that recovery encompasses far more than the restoration of a community's physical structures; it must also provide a continuum of care to meet the needs of the affected community members who have experienced financial, emotional, or physical impacts.[2] Good communication and coordination early and throughout a disaster response will help inform long-term recovery planning as well as prevent selection of short-term solutions that may result in negative long-term impact. Integration among the frameworks is considered one of the key themes of the National Preparedness Goal (NPG).[3]

Planning must be risk based and risk assessments must be comprehensive and standardized. Planners, regardless of their affiliation, must understand what threats have the greatest potential impact on their area of responsibility. Threat and hazard identification and

risk assessment guidance is provided in the Comprehensive Preparedness Guide 201.[4] The guide describes a five-step process for threat and hazard identification and risk assessment:

1. identifying threats and hazards of concern;
2. giving them context;
3. examining core capabilities;
4. establishing capability targets; and
5. applying results.

The Army Techniques Publication No. 5-19 outlines a risk management approach to analyzing and mitigating hazardous operations. Core components of risk management are conducting a hazard analysis based on source, mechanism, and outcome of each hazard; an assessment of risk based on the probability the hazard will be experienced; and the severity of the outcome, followed by development of a strategy to mitigate risk that focuses on lowering the probability or lessening the severity resulting in an acceptable level of residual risk. Risk assessment must be continuous and updated throughout the course of a response to hazardous conditions, and it must be specific to the environment, local infrastructure, and population. Severity of outcomes will likely vary significantly between heavily populated areas and sparsely populated areas and could vary considerably within the same city depending on what part of the city is affected, time of day, or whether the incident occurs during a workweek, weekend, or special event.

Both risk management systems stress the importance of identifying hazards through lessons learned from past events and subject matter expert opinion, understanding how they may affect an entity's operations, identifying capabilities that can mitigate the impact of the hazard, and proper resourcing to implement the necessary control measures. These systems can assist planners with selecting controls to mitigate outcomes, inform predisaster resourcing to enhance preparedness (eg, establishment of memoranda of agreement), decrease the residual risk, and assist with comprehensive consequence management planning. An example of where this can assist consequence management following a population's exposure to a biological agent or toxin is to factor in the mechanism by which the resultant disease can spread.

Some aspects of consequence management following exposure to a biological agent that causes contagious disease could significantly differ from one that is not. An overreaction for a disease-causing agent that is not contagious could cause unnecessary negative impact to the local infrastructure and economy and further complicate long-term recovery. Conversely,

a lack of planning or inability to control the spread of a contagious disease could result in uncontrolled spread beyond the contamination zone with severe to catastrophic impact on life, health, infrastructure, and economy over a broad geographic region. A contagion will likely require implementation of quarantine and/or isolation as a control measure, but quarantine and/or isolation may not be appropriate for an agent that does not cause a contagious disease. The mechanism by which a hazard produces negative outcomes is important. When local planners do not have subject matter experts available to assist with planning, they should seek assistance from county, state, and federal public health professionals.

The general population does not understand the unique differences among the various potential pathogens, their mechanisms of transmission, and the differences in risk created by each. Misinformation disseminated through rumors or poorly informed news outlets can create additional challenges to the response and recovery effort. It can lead to confusion as well as a loss of confidence in those leading the response and recovery effort. Timely accurate information dissemination to the community is important, whenever a threat to public safety occurs.

An analysis of the human response to the catastrophic events of September 11, 2001 reveals that fear during a crisis situation does not automatically result in panic, and the negative impact of fear may manifest more significantly during the consequence management period when considerable uncertainty exists.[5] It revealed a tremendous spirit of cooperation and compassion among the affected population during the crisis period. Timely release of accurate information can mitigate the effects of misinformation and facilitate a spirit of teamwork throughout response and recovery. Close coordination of press releases with public affairs professionals is critical to accurate information dissemination.

One intending to induce terror will rely on a hazard's natural and intended consequences but will also benefit from unintended consequences that are a product of poor or narrowly focused planning, that is not flexible and scalable, resulting in an inefficient response with poor communication. Similarly, the magnitude of impact from a naturally occurring outbreak of infectious disease can be minimized or magnified by the quality of response planning and efficiency of execution.

Selecting the appropriate medical countermeasures and understanding the potential effects will rely on accurate agent identification at the time of the incident, but detailed planning for specified agents would be an inefficient approach to general consequence manage-

ment and would risk not having an actionable plan in place when needed. Local, state, and federal response and recovery planning can leverage common mecha-

nisms and common potential outcomes to be prepared for many potential threats rather than constructing plans for every possible disease causing agent.

CONSEQUENCES OF A BIOLOGICAL INCIDENT

Biological incidents may be one of the most challenging threat conditions for planning consequence management. Response and recovery for most disasters follow a major catastrophic event that is relatively rapidly definable in scope and magnitude of impact. Conversely, it is unlikely that a biological incident will present as a well defined major catastrophic event. However, it carries the potential for significant casualties and major disruption to a community, region, or nation's infrastructure and economy, with a significant fear factor and potential for panic among a nation's population. If it involves a contagion, it also has the potential to spread well beyond the original target area in a short period of time. If it involves a zoonotic disease-causing agent, or is equally infectious to a local animal population, secondary spread from human–animal contact may persist and human health efforts must be synchronized with that of the animal health and feral animal control industries. With the exception of an emerging infectious disease with pandemic potential, where initial cases have already been identified, no warning or opportunity will likely occur for leaders to proactively surge or position resources. A scalable response must be part of a community's and nation's normal framework.

A series of framework documents can guide planners through consequence management planning and execution:

- National Prevention Framework,
- National Mitigation Framework,
- NRF, and
- NDRF.

All disasters have the potential for cascading effects, especially for a biological incident. Those intending to induce terror will attempt to leverage this potential to achieve their objectives and the response and recovery efforts must control them to minimize the impact on a society. Whether a biological incident is intentional, accidental, or results from a natural disease outbreak, it is important to rapidly identify the potentially affected area and population and control movement. Without these controls rapidly implemented, the zone of potential contamination will grow. Concurrent with controlling movement into and out of the affected area, the agent or agents involved must be rapidly identified. Differing biological agents have differing incubation periods, environmental survivability, and modes of transmission. Appropriate medical countermeasure

and decontamination procedure identification and implementation timelines will rely on accurate agent identification. If animals and insect vectors can be potential sources of residual infection and sources for spreading the disease causing agents, the appropriate subject matter experts must be included in response and recovery planning.

Sick people with relatively generic conditions show up in emergency departments, urgent care clinics, and primary care clinics on a daily basis. It is likely that a disaster will not be declared until their condition is identified as part of a natural disease with pandemic potential or tied to an act of bioterrorism. By this time the consequences of the causative event are being experienced, and the challenge of determining where it started and what caused it exists. The immediate consequences are obvious and rely on availability of the appropriate diagnostic assays and medical countermeasures. Some critical questions must be immediately answered:

- Is this disease typical of the human population or geographic location?
- Is it contagious?
- Are animals also affected?
- Is it zoonotic?
- Does the pattern of disease in the population suggest a natural outbreak or an intentional release?

Answers to these questions will inform immediate response and identify potential cascading effects and consequences that must be managed. If the incident is determined to be suspicious for an intentional release, a criminal investigation must immediately accompany the public health and epidemiologic investigations. These efforts must be synchronized to ensure no disruption to response efforts intended to preserve life and health while also preserving evidence to facilitate the criminal investigation.

A biological incident will present a significant amount of uncertainty for professionals responding to the incident and this will be magnified throughout the community. Timely accurate dissemination of information can mitigate a public reaction that may compound the problem if not appropriately managed.

The National Incident Management System, which calls for a unified approach to multiagency coordination during response and recovery operations,

emphasizes the unified approach concept based on chain of command, unity of command, unity of effort, and when implemented, unified command.[6] Unity of effort is critical to disseminating consistent informative messages at the right time to assist with managing public fear and reaction. Conflicting information from multiple agencies creates confusion, a lack of confidence in the response and recovery effort, and potential panic.

The anthrax (*Bacillus anthracis*) attacks of 2001 provide lessons on the value of effective risk communications and public reaction. Confusion following the initial reports was widespread on a national scale. Examples of communication failures include the following:

- 46% of the population thought anthrax was a contagious disease.
- 70% of the New Jersey population were concerned that they or someone close to them had been exposed.
- Agencies were overwhelmed by requests for information.
- Reports of discontent with both quality and timeliness of information were heard.[7]

An example of risk communication success came from a multiagency task force in New Jersey that was reported as beneficial for enhancing cooperation between law enforcement and health organizations and reducing tensions. Law enforcement and health organizations approach communications differently, with law enforcement leaning toward secrecy and public health valuing openness.[7] By managing disparate philosophies through a task force or unified command element, messaging can be less confusing for the recipients, with greater efficiency in providing informative messages in a timely manner that do not compromise criminal investigations and serve to palliate public fear and reaction.

Preserving the life and health of an affected population must be the primary concern during response and recovery, but consequence management planning and execution for a biological incident cannot be narrowly focused on individual patient care. If a biological agent is intentionally dispersed, the dispersion method must be rapidly characterized to determine the extent of contamination and identify the affected human and/or animal population(s). If agent dispersion is covert and the first indication of an act of bioterrorism or criminal act involving a biological agent is one or more patients presenting with clinical disease, determining the extent of contamination and the affected population will be challenging but critical to effectively managing the consequences. Once the affected area is determined,

access to and egress from the area must be controlled, but controls must be tailored to the type of agent(s) identified.

A detailed assessment of the affected area that includes personnel and equipment movement, wild and domestic animal populations and movement, and surface water flow patterns must be conducted to determine the potential for contamination spread and other potentially affected populations. If the affected area involves significant community services, planners will need to determine how to continue providing those services to the unaffected community to minimize the incident's overall impact, especially if it involved any services critical to the response and recovery effort. The initial assessment of causative agent, method of dispersion, and extent of contamination will also assist health providers and planners on selection of medical countermeasures and the potential number of expected human casualties. If the extent of contamination is large or multifocal, or if the causative agent is a contagion, patient care facilities and medical countermeasures could be rapidly overwhelmed, necessitating the need for rapid coordination of external support. Plans and support agreements to manage this potential consequence must be in place before an incident. These agreements are an area where neighboring communities and neighboring states can seek mutual aid and support when one or the other is affected by a catastrophic event.

The impact of a biological incident will likely extend well beyond the primary concern of human health considerations. Whether secondary hazards from a biological incident are real or perceived, they will have significant impact on the affected entity and surrounding population. Biological incidents have the potential to overwhelm local healthcare resources and render any business or public service provider inoperable. If a community's healthcare facility and emergency response capabilities are contaminated, it is imperative that a backup plan for care and emergency response is in place. How effectively a community conducts waste management will either create or mitigate secondary concerns and the impact of accumulating waste. Waste may also require special treatment that is not part of a community's standard operating procedures, and special assistance may be required.

Communities should develop continuity of operations plans to identify backup resourcing for critical services. Businesses should also develop continuity of operations plans to protect their livelihood in case they are directly or indirectly affected by an emergent situation and unable to occupy their normal place of business. The former $3.8 million American Media Inc. building in Boca Raton, Florida, was quarantined on October 10, 2001, sold for $40,000 in April 2003, and

was not reported to be clear of *Bacillus anthracis* until February 7, 2007.[8] The Hart Senate Office Building reopened after it cost $27 million to decontaminate it. Economic impact on an affected business can be catastrophic and a protracted disruption to services can occur when a public service facility is affected.

LOCAL AND NATIONAL RESPONSE

The NPG suggests that successful consequence management of a biological incident will result from capabilities being available across the whole community to prevent, protect against, mitigate, respond to, and recover from the threats and hazards that pose the greatest risk.[9] The NPG and supporting framework documents emphasize that an effective response starts at the local level with individuals, community organizations, the private and nonprofit sector, faith-based organizations, and local governments all having a critical role with support from the state and federal governments.

The NPG identifies core capabilities for five mission areas: (1) prevention, (2) protection, (3) mitigation, (4) response, and (5) recovery. It recognizes that the core capabilities listed are ambitious and will require a national effort involving the whole community to be effective, with three core capabilities spanning all five mission areas: (1) planning, (2) public information and warning, and (3) operational coordination.[9] The NPG lists five key findings from the Strategic National Risk Assessment; two key risk areas correlate with the subject of this chapter: a virulent strain of pandemic influenza and terrorist use of weapons of mass destruction.[9]

Planners at all levels should assess their level of readiness to manage consequences associated with these risks, but not limit their planning to just these risks. Every community and state may have differing priority lists for planning. Military planners routinely assess two types of risks to operations: most likely and most dangerous. This approach can also prove valuable for planners as they develop local and state core capabilities for effectively managing risks posed by various biological threats.

Although planners should be familiar with several framework documents, the remainder of this chapter will primarily focus on guidance from the NRF, the NRF Biological Incident Annex, the NDRF, and other supportive documents. Framework documents emphasize the significance of local readiness and response and provide federal agency level guidance that can be tailored to all levels of government planning. With a few exceptions, federal assets will not be mobilized until local and state capabilities have been or likely will be exceeded and a state's governor requests federal assistance under the Stafford Act. These documents provide valuable guidance for planning at all levels.

The NRF lists 14 core capabilities, 15 emergency support functions, and four priorities for the response mission area that local and state planners can use as a template for their planning activities. Core capabilities include the following:

1. planning;
2. public information and warning;
3. operational coordination;
4. critical transportation;
5. environmental response/health and safety;
6. fatality management services;
7. infrastructure systems;
8. mass care services;
9. mass search and rescue operations;
10. on-scene security and protection;
11. operational communications;
12. public and private services and resources;
13. public health and medical services; and
14. situational assessment.[10]

Emergency support functions (ESF) include the following:

1. ESF1 transportation;
2. ESF2 communications;
3. ESF3 public works and engineering;
4. ESF4 firefighting;
5. ESF5 information and planning;
6. ESF6 mass care, emergency assistance, temporary housing and human services;
7. ESF7 logistics;
8. ESF8 public health and medical services;
9. ESF9 search and rescue;
10. ESF10 oil and hazardous materials response;
11. ESF11 agriculture and natural resources;
12. ESF12 energy;
13. ESF13 public safety and security;
14. ESF14 (replaced by the NDRF); and
15. ESF15 external affairs.

Response mission priorities include the following:

1. save lives;
2. protect property and the environment;
3. stabilize the incident; and
4. provide for basic human needs.[10]

Coordinating agencies are identified for each of the emergency support functions at the federal level; local and state planners should identify assets for planning at their respective levels. Objectives for each of the core capabilities listed in the NRF are summarized in Table 4-1. Local planners will likely not have resources available to meet all of these objectives, but the list can assist them with determining what local assets need to be factored into a local response plan and what support requirements are needed to coordinate with neighboring communities or the private sector through support agreements, or requests from county, state, or federal partners.

The effective response to a catastrophic event will require meeting many of the core capability objectives through local assets, at least for initial response and later to augment state or federal response efforts. Local assets may include individuals, the private sector, nongovernmental organizations, and neighboring communities.

TABLE 4-1

CORE CAPABILITIES AND OBJECTIVES

Capability	Objectives
Planning	Conduct a systematic process engaging the whole community in the development of executable strategic, operational, and/or community-based approaches to meet defined objectives.
Public Information and Warning	Deliver coordinated, prompt, reliable, and actionable information to the whole community through the use of clear, consistent, accessible, and culturally and linguistically appropriate methods to effectively relay information regarding any threat or hazard and the actions being taken and the assistance being made available.
Operational Coordination	Establish and maintain a unified and coordinated operational structure and process that appropriately integrates all critical stakeholders and supports the execution of core capabilities.
Critical Transportation	Provide transportation (including infrastructure access and accessible transportation services) for response priority objectives, including the evacuation of people and animals, and the delivery of vital response personnel, equipment, and services to the affected areas.
Environmental Response/Health and Safety	Ensure the availability of guidance and resources to address all hazards, including hazardous materials, acts of terrorism, and natural disasters, in support of the responder operations and the affected communities.
Fatality Management Services	Provide fatality management services, including body recovery and victim identification to provide temporary mortuary solutions, sharing information with Mass Care Services for the purpose of reunifying family members and caregivers with missing persons/remains, and providing counseling to the bereaved.
Infrastructure Systems	Stabilize critical infrastructure functions, minimize health and safety threats, and efficiently restore and revitalize systems and services to support a viable resilient community.
Mass Care Services	Provide life-sustaining services to the affected population with a focus on hydration, feeding, and sheltering to those with the most need, as well as support for reunifying families.
Mass Search and Rescue Operations	Deliver traditional and atypical search and rescue capabilities, including personnel services, animals, and assets to survivors in need, with the goal of saving the greatest number of endangered lives in the shortest time possible.
On-scene Security and Protection	Ensure a safe and secure environment through law enforcement and related security and protection operations for people and communities located within affected areas and for all traditional and atypical response personnel engaged in lifesaving and life-sustaining operations.
Operational Communications	Ensure the capacity for timely communications in support of security, situational awareness, and operations by any and all means available between affected communities in the impact area and all response forces.
Public and Private Services and Resources	Provide essential public and private services and resources to the affected population and surrounding communities to include emergency power to critical facilities, fuel support for emergency responders, and access to community staples (eg, grocery stores, pharmacies, and banks) and fire and other first response services.
Public Health and Medical Services	Provide lifesaving medical treatment via emergency medical services and related operations, and avoid additional disease and injury by providing targeted public health and medical support and products to all people in need within the affected area.
Situational Assessment	Provide all decision makers with decision-relevant information regarding the nature and extent of the hazard, any cascading effects, and the status of the response.

Data source: Department of Homeland Security. *National Response Framework.* 2nd ed. Washington, DC: DHS; May 2013.

Individuals within a community possess talents and experience that can be organized for response through community organizations. Individuals should participate in community preparedness planning activities and develop household emergency plans.[10] Individuals can also participate in FEMA's Community Emergency Response Team Program, which educates people on how to prepare for hazards that may affect their area and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations.[11] Community Emergency Response Team Program trained individuals can play a critical role in assisting with local planning and response. Private sector entities can support local emergency management and should also participate in community preparedness planning activities.[10] Private sector entities should also conduct continuity of operations planning within their own organization to establish a plan that will foster their continued support or service to the community while also preserving their livelihood.

Nongovernmental organizations may factor into any level: local, state, or federal response. They manage volunteers and resources to support incident response through collaboration with responders, all levels of government, and other agencies and organizations.[10]

Neighboring communities can play a critical role in consequence management for a biological incident. Community dynamics can be significantly disrupted within the contamination zone of a biological incident, but life outside the contamination zone will continue with no change in requirement for services and support. If a community's critical services are located within the contamination zone and are rendered inoperable because of real or perceived contamination, then mutual aid agreements among communities can fill critical gaps in the response effort as well as continuation of services to the unaffected parts of the community.

When local resources are exhausted or prove to be inadequate, local authorities may seek county or state assistance; in some situations, local authorities may seek assistance directly from the federal government for non-Stafford Act incidents.[10] Some federal departments or agencies, using funding sources other than the President's Disaster Relief Fund, can conduct or lead federal response actions under their own authorities.[10] Examples include immediate lifesaving assistance, wild-land firefighting, response to an agricultural disease, cybersecurity incidents, and oil and hazardous substance response operations.[10] The Secretary of the Department of Health and Human Services (DHHS) has the authority to take actions to protect the public health and welfare and declare a public health emergency.[10]

State governors are responsible for the public safety and welfare of their state's residents. Their responsibilities and authorities include making, amending, or suspending orders or regulations associated with response; communicating to the public; coordinating with tribal governments; commanding the state military force (National Guard personnel not in federal service); coordinating assistance from other states; and requesting federal assistance.[10] A state's response to emergency situations is coordinated through the state emergency management agency.

Numerous state departments and agencies have a role in response and recovery, but the National Guard is one of the governor's key assets for a biological incident. National Guard members can be valuable to consequence management because of their expertise in emergency medical response; communications; logistics; search and rescue; civil engineering; and chemical, biological, radiological, and nuclear response, planning, and decontamination.[10] Weapons of mass destruction/civil support teams are highly specialized National Guard units designed to provide unique capabilities for response to chemical, biological, radiological, or nuclear incidents, primarily in a Title 32 operational status within Washington, DC, the United States, its territories, and its possessions.[12]

Federal financial aid or other support to response, recovery, and mitigation efforts are authorized following a Stafford Act emergency or major disaster declaration by the president. An emergency declaration is more limited in scope, provides fewer federal programs, and is not normally associated with recovery programs, but it may be used before an incident to mitigate the threat of a potential catastrophe.[10] Most of the president's authority under the Stafford Act has been delegated to the FEMA administrator through the Secretary of Homeland Security.[10] A state's governor may request federal assistance through the FEMA regional administrator when the situation is considered beyond the capabilities of the state and affected local government.[10]

The DHHS is the coordinating agency for the biological incident annex to the NRF. Federal government objectives for response to a biological incident—naturally occurring or as an act of terrorism—are as follows:

- detect the event through disease surveillance and environmental monitoring;
- identify and protect the population(s) at risk;
- determine the source of the disease;
- assess the public health, law enforcement, and international implications;
- control and contain any possible epidemic;
- augment and surge public health and medical services;

- identify the cause and prevent the recurrence of any potential resurgence, additional outbreaks, or further spread of disease; and
- assess the extent of residual biological contamination and conduct response, restoration, and recovery actions.[13]

Detection of a biological incident may be by the presentation of disease in humans or animals or environmental surveillance systems, or by acts of bioterrorism detected though the normal operations of other cooperating departments and agencies.[13] The National Biosurveillance Integration System is a tool that supports detecting disease outbreaks by leveraging data from multiple surveillance systems that monitor human health, animal health, plant health, and food and water.[13] Monitoring for dangerous pathogens in some heavily populated places is accomplished through the BioWatch program, which serves as an early detection and warning system.[14] This program has been criticized for creating false alarms, but those criticisms probably come from individuals who do not fully understand the technologies used, intent of the program, and confirmatory process that follows an alert. DHS partners with public health laboratories through the Laboratory Response Network to rapidly confirm any alerts from BioWatch systems.

Detection technologies need to be rapid and sensitive; they need to ensure that no false negatives occur. Specificity is ensured through the laboratory confirmatory process that follows. People will live with a few false alarms, but they will become sick and potentially die from false negative results at the detection level. It is unlikely that samples will be forwarded for confirmatory analysis if results are negative at the detection level, so these systems should be judged more on their potential to prevent false negatives than false positives. These systems are value added if they are not over interpreted before confirmatory analysis. Claims of false positives have been characterized as unsubstantiated, with more than 7 million tests performed by public health laboratories and no false positives.[14]

DHHS convenes a meeting of ESF #8 partners, after notification of a credible threat or disease outbreak, to assess the situation and determine appropriate public health and medical actions.[13] If the threat or disease outbreak is suspected to be tied to a criminal or terrorist act, the Federal Bureau of Investigation will lead a concurrent criminal investigation and possibly establish a joint operations center.[13] Joint operations centers are valuable to establishing unity of effort. Agencies with disparate primary objectives will be working simultaneously toward a common outcome, but do not always fully understand each other's mission priorities; synchronization of efforts is critical to mission success.

It is important for first responders to understand that they may be working within a crime scene and that all materials may have evidentiary value, but this fact cannot compromise mitigating the immediate threats to life and health. If a criminal or terrorist incident initially presents as disease in humans or animals, criminal intent may not be apparent for some time and evidence may already be compromised. The Laboratory Response Network is used to test samples whenever a credible threat of a biological crime or act of terrorism exists.[13] If contamination of food is suspected the Food Emergency Response Network, a complementary system to the Laboratory Response Network, may be used for food sample analysis.[13]

Other federal agencies will support DHHS during a biological incident response. The DHS will serve as the incident coordinator. The Environmental Protection Agency will develop and implement sampling strategies when a potential for environmental contamination exists. The Department of Agriculture will provide support for an outbreak of an agriculturally significant zoonotic disease or human foodborne pathogen. Federal public announcements, statements, or press releases will be coordinated with the DHS Office of Public Affairs, consistent with ESF #15.[13]

An epidemic resulting from the introduction of a contagious biological agent into a population is one of the most significant—and likely the most dangerous—potential consequences of a biological incident. Effectively managing this potential consequence relies on the following:

- rapid detection, and identification and confirmation of the biological agent;
- identification of the population at risk;
- determination of how the agent is transmitted;
- determination of appropriate medical countermeasures;
- administration of countermeasures;
- rapid dissemination of safety information to the public; and
- control and containment strategies.

Planning must include worst-case scenario branches for mass casualties if early control measures are not effective and containment is not achieved, requiring augmentation and surging of health and medical resources in order to track and prevent additional disease outbreaks.

DHHS assists partner public health and medical authorities with epidemic surveillance and coordination, and it will assess the need for increased surveillance. DHS, with partner organizations, coordinates timely,

consistent, accurate, and actionable information dissemination. The public health system, starting at the local level, initiates appropriate protective measures for the affected population, including all workers involved in incident response. DHHS, with partner organizations involved, evaluates the need for isolation, quarantine, or shelter-in-place measures to prevent spread of disease. If isolation and/or social distancing are recommended, the affected state's governor may implement these measures under state or local legal authorities. Tribal leaders also possess this authority under tribal legal authority.

DHHS may take appropriate federal actions to prevent the import or interstate spread of disease. If the source of the disease outbreak is identified as originating outside the United States, DHHS works with DHS and other agencies to identify and isolate persons, cargo, mail, or conveyances that may be contaminated. If it is determined that food, animals, and other agricultural products need to be quarantined, livestock or poultry need to be vaccinated or depopulated, and/or movement of animals and equipment need to be restricted, DHHS will work with the Department of Agriculture and other partner organizations. DHHS works through the Department of State to notify affected foreign governments if foreign nationals are subjected to isolation and/or quarantine.[13]

The ability to care for sick and/or potentially exposed people is one of the most critical response requirements that must be incorporated into pre-disaster response planning. The Strategic National Stockpile is a national repository of medical countermeasures, vaccines, and medical supplies stored in strategic locations.[15] Division of Strategic National Stockpile personnel, from the Centers for Disease Control and Prevention's Office of Public Health Preparedness and Response, will assist as local and state health departments prepare for receipt, distribution, and dispensing of medical countermeasures from the Strategic National Stockpile.[15] These medical countermeasures, vaccines, and medical supplies are free to the public, and states have plans to receive and distribute them once federal and local authorities agree that they are needed.[16] Strategic National Stockpile supplies include 12-hour push packages, CHEMPACKs (program that provides antidotes to nerve agents [three countermeasures used concomitantly] for prepositioning by state, local, and tribal officials), and federal medical stations. The 12-hour push packages contain 50 tons of a broad spectrum of medical assets and can be delivered to any state in the continental United States within 12 hours from the decision to deploy; if the incident requires additional or different supplies, they can be delivered within 24 to 36 hours.[15] Federal medical stations are rapidly deployable and modular, stocked with beds and supplies to care for up to 250 patients for up to 3 days.[15]

As with other aspects of the integrated local, state, and federal response effort, local technical expertise and local planning will be critical to efficient and successful delivery of medical care to those who need it. Centers for Disease Control and Prevention developed the public health preparedness capabilities/national standards for state and local planning that can assist state and local public health officials with planning for this and other critical public health planning considerations. It identifies 15 public health preparedness capabilities under six domains[17]:

1. biosurveillance;
2. community resilience;
3. countermeasures and mitigation;
4. incident management;
5. information management; and
6. surge management.

This downloadable document is an excellent planning guide that links planning and execution activities back to NRF emergency support functions and provides links to additional resources.

Beyond the challenge of medical countermeasure availability and distribution, a biological incident may challenge the ability of healthcare systems to adequately care for large numbers of patients that exceed local capabilities and capacities, and it will likely affect their ability to continue providing a standard of care to the local community for routine health issues. Maintaining medical system resiliency may require regional, state, or federal coordination and medical surge capacity and capability. The medical surge capacity and capability management system was developed to provide a systems-based approach for managing the complexity of mass casualty or complex incidents.[18] Surge capacity is the ability to respond to a markedly increased number of patients. Surge capability is the ability to address unusual or very specialized medical needs. The medical surge capacity and capability management system is consistent with the National Incident Management System and guides public health and medical response through a six-tier approach, escalating from management of individual healthcare assets to federal support to state, tribal, and jurisdictional management.

RECOVERY

Recovery operations focus on returning the affected region or entity, as closely as possible, to predisaster conditions. Initiation of recovery efforts does not require full completion of response operations, but the transition process must be well synchronized with any continuing response efforts. Many components of the response effort will also influence recovery activities.

As healthcare transitions from emergent and temporary medical care, activities must ensure continuity of care and reestablishment of any disrupted healthcare capabilities. Continuity of care may need to be established through temporary facilities until services are fully restored; candidate facilities should be identified during consequence management planning activities. Surveillance should be initiated during response, as discussed in the previous section, and continued through recovery until health officials determine that the discovery of new cases has met criteria for discontinuation.

Effective messaging by public health professionals can serve to mitigate public fear and prevent panic. Several people will be identified, throughout response and recovery, who may benefit from counseling and behavioral health services. These services should be restored or made available as soon as possible. Lessons learned from previous disasters suggest that during the transition and recovery period, public fear can increase. During this period people will have gained awareness of the morbidity and mortality associated with the infectious agent or toxin and will have continued—possibly escalating—fear about exposure to this invisible threat.

Ineffective messaging may have contributed to public fear and panic during the 2001 Amerithrax incident. Many people thought anthrax was a contagious disease, and because the infectious agent was delivered in a powdered form there was widespread fear of powders in general. People were more aware of powders and powder-appearing residues after the incident. Powders associated with many normal activities that went unnoticed or created no concern before the incident suddenly created concern, fear, and panic. The US Army Medical Research Institute of Infectious Diseases and many other laboratories involved in the recovery effort received thousands of samples for analysis that normally have an innocuous powder associated with them. Effective accurate communications may have mitigated some of these concerns and will remain important throughout any recovery.

Exposed populations and contaminated buildings, equipment, and environments will likely be identified during the response effort, but continued surveillance will remain important to identify additional cases of human or animal disease and potential contamination spread that will need to be included in decontamination efforts. Decontamination can and will likely be challenging. Its effectiveness will depend on accurate identification of the contaminating infectious agent or toxin; assessment of primary and secondary areas of contamination; and selection of suitable decontamination reagents, equipment, and methods that factor in effectiveness for the contaminating agent and the environment. Appropriate subject matter experts should be included in planning and executing decontamination.

Personnel involved in recovery operations will not have the benefit of established clearance strategies for reoccupation of contaminated facilities or resumed use of contaminated equipment for all potential biological agents. Members of the Environmental Protection Agency and the Centers for Disease Control and Prevention published an interim clearance strategy for a building or an outdoor environment after an incident involving *Bacillus anthracis* in July 2012. It was determined that no detection of viable spores is the best practicable clearance goal,[19] which is a sound goal for *B anthracis* as well as many other potential biological agents. It infers that the agent identification technology used will identify viability as well as continued presence of the pathogen on or in the sampled item.

Some of the more sensitive agent identification technologies (nucleic acid amplification and antigen detection) will not demonstrate agent viability. Agents killed or neutralized during decontamination may still be detected by these technologies and not properly inform clearance decisions. Cleanup procedures could be unnecessarily prolonged with no added benefit if decisions are being made based on technologies that do not aid the risk assessment procedure by demonstrating agent viability. Local or state public health officials or property owners will likely make the final decision on clearance.[19] However, the lack of established standards and complexity of this decision process will likely necessitate the support of external subject matter experts.

Establishing transportation routes becomes critical during both response and recovery to facilitate response and recovery mitigation activities as well as continue providing critical services and support inside the contaminated area. Once a biological incident has occurred, containment becomes important

to all aspects of the management strategy. Factoring containment considerations into all subsequent planning will prevent the incident from growing in scale and magnitude, minimizing impact on human health, infrastructure, and economy. Strategies will vary depending on the situation and conditions, but some basic principles can be applied to all. Whenever one is dealing with biological contamination, it is beneficial to establish at least three zones:

1. known or high probability to be contaminated (hot zone);
2. not expected or low probability to be contaminated (warm zone); and
3. expected to be clean (cold zone).

Operational procedures should be established for each zone that facilitate the movement of necessary supplies, personnel, and equipment to sustain operations and facilitate recovery without spreading contamination. If a clean corridor cannot be established through the warm zone to the hot zone, handoff procedures will need to be established for cross-zone movement. Decontamination procedures at each handoff point will need to be established for any movement from hot zone to warm zone and from the warm zone to the cold zone. One strategy may be to have dedicated equipment in each zone that will facilitate the movement of personnel and supplies from the cold zone to the hot zone and sustain operations in the warm zone and hot zone. Personal protective equipment requirements must also be established for each zone to prevent secondary contamination to workers.

The NDRF promotes nine core principles for recovery success:

1. individual and family empowerment;
2. leadership and local primacy;
3. predisaster recovery planning;
4. partnerships and inclusiveness;
5. public information;
6. unity of effort;
7. timeliness and flexibility;
8. resilience and sustainability; and
9. psychological and emotional recovery.[2]

It promotes a concept of all-community involvement in recovery efforts to ensure that no groups of people and their unique interests are excluded during the recovery effort and that services are made equally available to everyone as all affected members of a community attempt to rebound from their losses. It affirms that local leaders and local governments maintain a primary role even when their response capabilities have been overwhelmed and state or federal assistance is required. It recognizes that partnerships and collaborations with unity of effort are essential to successful recovery and emphasizes that compliance with the principles of equal opportunity and civil rights must be upheld. It further emphasizes the importance of clear, consistent, culturally appropriate, and frequent communications to the affected public. Timeliness and flexibility are emphasized to minimize missed opportunities and foster the ability to adapt to changing conditions. It recognizes that recovery can be negatively affected by cascading effects and additional hazards, emphasizing the significance of risk management to enhance resilience and sustainability practices to reconstruct the environment and revitalize the economic, social, and natural environments. Psychological and emotional recovery is recognized as vital to individuals, families, and communities.

Local governments are responsible for planning and managing a community's recovery from all disasters.[2] They shoulder the burden of preparing hazard mitigation and recovery plans, raising hazard awareness, and educating their people on resources available to enhance resilience. Even though state and federal standards exist, the local government decides whether to adopt, codify, and enforce mitigation measures. Individuals, families, and businesses will look to local leaders for support during disasters, and local governments should establish continuity of government and continuity of operations plans. They are at risk of becoming overwhelmed and will likely need assistance from state and federal offices for critical staffing and recovery expertise. A critical local asset during any biological incident is the local or county public health agency, which will have established contingency plans and can assist with coordinating medical surge when needed.

States lead, manage, and drive the overall recovery process; they coordinate recovery activities that include providing financial and technical support.[2] They serve as a conduit to local and tribal governments for federal recovery assistance programs, and they may develop programs or secure funding to finance or implement recovery projects. States can also reassign existing resources to facilitate recovery, and they play a critical role in strategic messaging to enhance public awareness. The state public health agency will play a critical role in messaging and coordinating medical assistance to the affected community. It is critical that state offices remain mission capable during a disaster, and they should also develop and maintain continuity of government and continuity of operations plans.

The federal government may use the NDRF to engage necessary and available department and agency capabilities to support local recovery efforts when a disaster exceeds the capacity of the state and tribal resources or affects federal property or national security interests.[2] Federal support is important when local and state resources are overwhelmed, especially during the early weeks following a large-scale disaster or catastrophic incident; the duration and extent of federal support will be partially determined by scale and enduring impact of the disaster. The federal government also plays a critical role in messaging to enhance public awareness about the threat and to inform stakeholders about federal grants and loans that can assist recovery efforts. The lead federal agency for coordination of health and social services during recovery is the DHHS.

Similar to ESFs in the NRF outlining federal assistance for disaster response, the NDRF identifies multiagency coordinated recovery support functions in the following areas:

- community planning and capacity building;
- economics;
- health and social services;
- housing;
- infrastructure systems; and
- natural and cultural resources.

Each annex outlines pre- and postdisaster activities as well as a list of objectives. The recovery support functions develop guidance and standard operating procedures for rapid activation to support community recovery.[2]

SUMMARY

Consequence management has historically received the least amount of planning emphasis and has not been adequately tested through robust exercises. By the nature of the problem it is complex, involves multiple agencies, and spans a considerable amount of time to exercise through response and recovery operations. The national framework documents offer a template for core capability development that can lead to readiness across a broad spectrum of potential disasters, and they can facilitate robust planning at the local level. These documents are already being used to develop plans at the state and federal levels. Unity of effort, which is critical to both effective response and recovery, can be developed through multiagency exercises. Historically, response without continuation through full recovery has been exercised. Emergency response exercises can be time compressed, but should span the full spectrum of response and recovery, so agencies will be prepared to work together when a disaster strikes.

Biological incidents are unique challenges. It is unlikely to know when a biological agent is dispersed or when the index case of a pandemic crosses a nation's border. Buildings will not be flattened, but they may be unsuitable for human occupation for an extended time, compromising critical services to the community, state, or nation. Economic impact could be significant and devastating to individuals and industries. A small focal dispersion of a biological agent could lead to broad impact with significant morbidity, mortality, and public fear if response and recovery efforts are not efficiently implemented to identify, contain, treat, protect, and clean.

Consequence management is critical to mitigating the magnitude of impact a disaster has on a community, state, and nation. History has proven that all disasters or terrorist acts cannot be prevented, but through effective consequence management the impact of both can be minimized and the terrorist's aim of maximal disruption can be defeated. Most importantly, lives can be saved.

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