

Public Health Emergency Preparedness

Terrorism, Pandemics, and Disasters

Everybody knows that pestilences have a way of recurring in the world, yet somehow we find it hard to believe in ones that crash down on our heads from a blue sky. There have been as many plagues as wars in history; yet always plagues and wars take people equally by surprise.

—Albert Camus, *The Plague*, 1948

Terrorist attacks, novel influenzas, emerging infectious diseases, and natural disasters have prompted a reexamination of the nation's public health system. The jetliner and anthrax attacks of 2001, the SARS outbreak of 2003, hurricanes Rita and Katrina in 2005, the 2009 H1N1 influenza pandemic, Hurricane Irene in 2011, Hurricane Sandy in 2012, the Texas fertilizer plant explosion in 2013, and the West African Ebola epidemic in 2014–15 have focused attention on public health preparedness. In the years following the 2001 attacks, “the conceptual framework of emergency preparedness and response subsume[d] ever larger segments of the field of public health.”¹ The outpouring of resources and attention to biosecurity has supported a public health law renaissance. Perceived government failures in response to public health emergencies continue to stoke public anxiety, adding political pressure for more effective preparedness planning.

All-hazards and *resilience* have become watchwords in preparedness.² Vertical strategies targeting specific threats (e.g., development of pathogen- or toxin-specific vaccines and treatments) remain a priority. But horizontal strategies (e.g., investment in public health infrastructure) are

needed to ensure preparedness for a broad range of emergencies while also enhancing capabilities to meet routine needs. At the federal level, the National Response Framework (NRF) integrates existing preparedness, response, and recovery programs to “align key roles and responsibilities, . . . guide how the Nation responds to all types of disasters and emergencies,” and ensure “security and resilience.”³ At a time when governments are investing significant resources in preparedness for rare events that may never occur, it is politically useful to frame these expenditures and legal reforms as supporting preparedness for more likely events such as natural disasters. And in practice, obvious benefits derive from expanding public health infrastructure’s capacity to handle routine needs.

Modern public health emergency preparedness strategies continue to draw on ancient public health law interventions such as isolation and quarantine while also adopting updated approaches to social distancing, development and rapid deployment of medical countermeasures, and allocation of scarce resources under exigent circumstances. Policies must delicately balance protecting individual rights with meeting collective needs, promoting cooperation and coordination across jurisdictions, and ensuring fairness in meeting the needs of particularly vulnerable populations. We begin by examining the federal-state balance in public health emergency preparedness. We then follow the emergency planning cycle (see figure 11.1 and table 11.1), discussing disaster and emergency declarations; evacuation and sheltering; development and rapid deployment of medical countermeasures; and isolation, quarantine, and social distancing.

THE FEDERAL-STATE BALANCE IN PUBLIC HEALTH PREPAREDNESS

Public health emergency preparedness addresses hazards and vulnerabilities whose scale, rapid onset, or unpredictability threatens to overwhelm routine capabilities.⁴ It encompasses chemical, biological, radiological, and nuclear exposures (CBRN) as well as natural, industrial, and technological disasters (e.g., hurricanes, floods, earthquakes, dam failures, and radiation leaks), all of which require advance planning, rapid detection, and effective response. Threats may be naturally occurring (e.g., emerging disease outbreaks), or they may originate from intentional acts (e.g., terrorism) or unintentional releases (e.g., chemical spills). *Biosecurity* refers to precautions against the spread of harmful microorganisms, but it is sometimes used more broadly to refer to all

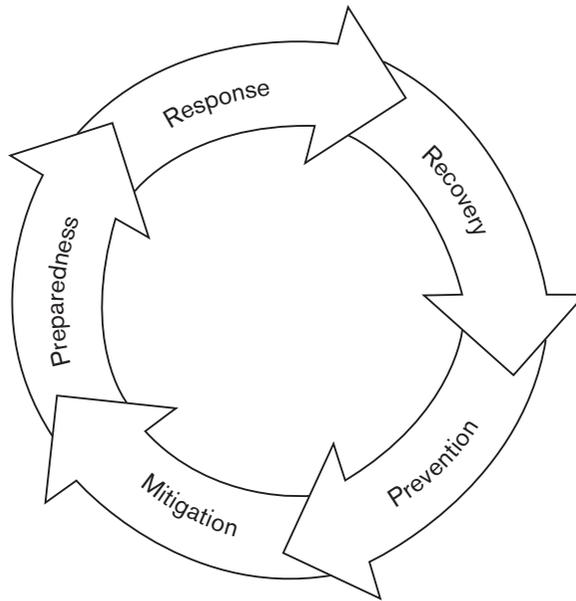


FIGURE 11.1. The emergency management cycle.

TABLE 11.1 KEY TERMS IN EMERGENCY MANAGEMENT

	Definition	Example
Prevention	Activities that prevent hazards	Tightly controlled access to hazardous biological agents prevents their inadvertent escape or use by terrorists.
Mitigation	Pre-event activities aimed at reducing the impacts of a hazard without preventing it from occurring	Wetland preservation to maintain a storm buffer reduces storm surge during future hurricanes.
Preparedness	The pre-event process of building capacity to respond to or recover from hazards	Training first responders (police, fire crews, and emergency medical services) improves emergency response.
Response	Postevent activities to ameliorate the immediate impacts of hazards to prevent mortality, morbidity, and property damage	Rapid deployment of medical supplies and personnel to areas of need and provision of safe and hygienic shelter conditions saves lives.
Recovery	Postevent activities that address the long-term impacts of a hazard to restore communities, including rebuilding	Rebuilding in the aftermath of a tornado according to stringent standards restores community life while also mitigating the effects of future events.

public health emergencies. *Biosafety* (a related concept) refers to the maintenance of safe conditions in biological research to prevent inadvertent escape of hazardous materials. Biological samples can create major hazards when researchers do not use rigorous containment procedures (see box 11.1).

Public health emergencies unite one of the most fundamental functions of the federal government—national security—with one of the most fundamental functions of the state governments—public health. Public health emergencies pose enormous challenges to American federalism, with myriad laws at the local, state, tribal, and federal level—many of which were developed “to address more mundane public health matters, or designed to respond to more traditional emergency situations.”⁵ This federalist structure has resulted in conflicting jurisdictional claims as well as confusion about, or even denials of, ultimate responsibility in times of disaster management.

The jetliner and anthrax attacks of 2001 launched more than a decade of capacity building, including reforms of long-standing federal disaster and emergency response laws and state public health laws. Many reforms were dramatic, including the largest restructuring of the federal administrative state since the New Deal with the newly created Department of Homeland Security (DHS) and the establishment of federal direct-response systems for medical resources and personnel. At the state level, the Model State Emergency Health Powers Act was adopted to some extent in thirty-nine states and the District of Columbia. The vast expansion of emergency preparedness laws has raised concerns about coordination among different levels of government, interagency coordination within each level of government, and protections for individual rights.

Since the mid-twentieth century, the federal government has assumed responsibility for financing disaster recovery efforts that overwhelm local resources, thus spreading the economic burden of disasters. Through health, safety, and environmental regulation and the administration’s national security and international development agendas, the federal government also plays a leadership role in prevention and mitigation. This is particularly true with regard to terror attacks and global pandemics, though climate-change mitigation efforts have been stymied by political gridlock.⁶ The federal government regulates biologic agents of public health concern (see box 11.2), conducts surveillance for emerging infectious diseases (see chapter 9), and provides financial support and guidance for state and local government preparedness efforts. In recent years, the federal government’s increasing role as a direct pro-

BOX 11.1
Biosafety

These events revealed totally unacceptable behavior. They should never have happened. I'm upset, I'm angry, I've lost sleep over this, and I'm working on it until the issue is resolved.

—Thomas Frieden, CDC Director, 2014

Biosafety refers to the maintenance of safe conditions in biological research to prevent the escape of hazardous materials that could harm workers, persons outside the laboratory, or the environment. Multiple incidents uncovered in 2014 publicly embarrassed prominent government agencies and raised grave concerns about laboratory containment procedures for dangerous pathogens.

In June 2014, more than seventy-five scientists and staff at the Centers for Disease Control and Prevention (CDC) were exposed to live anthrax spores as a result of a lapse in safety procedures at two of the agency's labs. Later investigation found that CDC laboratories did not follow proper procedures for destroying the spores: scientists mistakenly used the protocol for destroying a less robust bacterium, brucella. The CDC vaccinated exposed workers and gave them a preventive course of antibiotics; none developed symptoms.¹

The investigation also uncovered an even more dangerous lapse that had occurred earlier in the year. The U.S. Department of Agriculture (USDA) had asked the CDC to send them samples of H9N2 bird flu, a strain thus far not particularly transmissible to or virulent among humans. However, the CDC mistakenly shipped a sample contaminated with H5N1, a highly virulent strain of flu that kills around 60 percent of those infected. Worse still, after the USDA informed the CDC lab of the mistake, six weeks passed before CDC leadership was informed. The CDC then temporarily closed its flu and anthrax laboratories and placed a moratorium on shipment of biological materials from its high-security labs.²

Other serious incidents in 2014 also illustrate significant biosecurity lapses. In April 2014, the Institut Pasteur, a French research foundation, discovered that 2,300 vials of the virulent coronavirus that causes severe acute respiratory syndrome (SARS) had gone missing from its labs. In July, samples of smallpox (an eradicated pathogen thought to be confined to just two high-security repositories in the world) were discovered in an unused storage room at the National

1. Centers for Disease Control and Prevention, *Report on the Potential Exposure to Anthrax* (Atlanta, GA: Centers for Disease Control and Prevention, 2014). See also Donald G. McNeil Jr., "C.D.C. Closes Anthrax and Flu Labs after Accidents," *New York Times*, July 11, 2014.

2. Centers for Disease Control and Prevention, *Report on the Inadvertent Cross-Contamination and Shipment of a Laboratory Specimen with Influenza Virus H5N1* (Atlanta, GA: Centers for Disease Control and Prevention, 2014).

Institutes of Health (NIH). And in December, CDC researchers mistakenly allowed Ebola virus samples to be handled in a less secure laboratory than required by protocols. Fortunately, the mistake was discovered within twenty-four hours and immediately reported to agency leaders.

These breaches are particularly unsettling because the CDC, the NIH, and the Institut Pasteur host some of the world's preeminent research laboratories. Laboratories are indispensable for providing vital information about disease threats and developing effective countermeasures. However, these incidents show that without proper biosafety measures, labs themselves can threaten biosecurity.

vider of services—not merely a financier and adviser to state and local governments—represents a major expansion of its preparedness and response efforts.

The Legal Basis for Federal Preparedness, Response, and Recovery Efforts

The Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act)⁷ governs federal involvement in disaster relief and emergency preparedness and response, while Section 319 of the Public Health Service Act (PHSA) governs federal public health emergency declarations.⁸ The terrorist attacks of 2001, the SARS outbreak, and concerns about pandemic influenza prompted a series of reforms to expand federal capacity and support for state, local, and tribal efforts, including the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (Bioterrorism Act);⁹ the Project Bioshield Act of 2004;¹⁰ the Public Readiness and Emergency Preparedness Act of 2005 (PREP);¹¹ and the Pandemic and All-Hazards Preparedness Act of 2006 (PAHPA, reauthorized in 2013).¹² The Bush and Obama administrations also developed the National Response Framework and the National Strategy for Pandemic Influenza to coordinate federal efforts.¹³

EMERGENCY DECLARATIONS

Federal response and recovery assistance are often contingent on specific legal declarations. Emergency declarations at the federal and state level also trigger important changes to the legal frameworks in place to deal with routine needs. In some cases, these changes expand govern-

BOX 11.2

“Dual Use” Research of Concern

Multiple federal agencies (DHHS, the CDC, and the Department of Agriculture’s Animal and Plant Inspection Service) regulate the possession, use, and transfer of biological select agents and toxins (BSATs).¹ These agencies are working together to address dual-use research of concern (DURC): life sciences research intended for benefit, but which could be misapplied to do harm, such as through bioterrorism. For example, researchers may alter viruses to render them more virulent or transmissible from person to person. This research (called “gain of function”) can improve scientific understanding of pathogens, potentially facilitating surveillance and development of countermeasures. But dangerous pathogens also pose a risk of inadvertent or deliberate release from laboratories, posing risks to workers and the public at large.

In 2012, researchers modified strains of the H5N1 influenza virus to facilitate airborne transmission in mammals. Following a prepublication review process, the National Science Advisory Board for Biodefense (NSABB)—which provides advice, guidance, leadership, and oversight on the biosecurity aspects of DURC—recommended that details of the experimental methods and results be redacted from publications of the research in open forums because of the potential for this information to be used by terrorists.²

The NSABB’s advice provoked heated international debate in the academic and health communities. Some viewed the recommendations as an “assault on the openness and accessibility upon which the modern scientific endeavor relies.”³ Others argued that the even a small risk of pandemic caused by a highly transmissible, highly pathogenic influenza virus outweighed the benefits of disclosing the full details of the research.⁴ The NSABB ultimately revised its earlier decision, recommending full publication of one paper and partial publication of another.⁵

In 2013, DHHS released a framework to guide its funding of proposals for research anticipated to generate H5N1 viruses that are transmissible by respiratory droplets among mammals. In 2014, the White House Office of Science and Technology Policy released a DURC policy developed collaboratively by several federal agencies, setting forth review and oversight requirements for DURC conducted at universities and other institutes that receive federal funding.

1. *Report of the Working Group on Strengthening the Biosecurity of the United States* (Washington, DC: U.S. Department of Health and Human Services, 2009), 7.

2. John D. Kraemer and Lawrence O. Gostin, “The Limits of Government Regulation of Science,” *Science*, 335, no. 6072 (2012): 1047–49.

3. Nicole M. Bouvier, “The Science of Security versus the Security of Science,” *Journal of Infectious Diseases*, 205, no. 11 (2012): 1632–35, 33. See also Sander Herfst, Albert D.M.E. Osterhaus, and Ron A.M. Fouchier, “The Future of Research and Publication on Altered H5N1 Viruses,” *Journal of Infectious Diseases*, 205, no. 11 (2012): 1628–31.

4. Bouvier, “The Science of Security,” 1362–63.

5. Jon Cohen and David Malakoff, “On Second Thought, Flu Papers Get Go-Ahead,” *Science*, 336, no. 6077 (2012): 19–20.

ment authority; in others they are deregulatory. In some instances, restraints on government power derived from individual rights are relaxed or overridden because of extenuating circumstances.

Disaster and Emergency Declarations under the Stafford Act

The Stafford Act authorizes two types of presidential declarations that trigger federal relief: major disaster and emergency. The act defines *major disaster* as a “natural catastrophe (including any hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought).”¹⁴ This definition excludes pressing biosecurity threats such as bioterrorism and naturally occurring pandemics, which are thus ineligible for important forms of financial assistance.¹⁵ The act defines *emergency* more broadly, as “any occasion or instance for which, in the determination of the President, Federal assistance is needed to supplement State and local efforts and capabilities to save lives and to protect property and public health and safety, or to lessen or avert the threat of a catastrophe in any part of the United States.”¹⁶ An emergency declaration authorizes the president to direct any federal agency to use its existing authorities and resources to coordinate disaster relief and to assist state and local governments with health and safety measures, issue risk and hazard warnings and health information, control public health threats, and distribute medicines and food.¹⁷

Generally, the president’s declaration must be preceded by a state governor’s request.¹⁸ This traditional “pull” approach works most of the time, but it contributed to devastating failures in the aftermath of Hurricane Katrina. In the case of “catastrophic incidents,” the homeland security secretary (or his or her designee) can trigger expedited (and unrequested) federal assistance (a “push” approach), but this authority has not been exercised to date.¹⁹ Many were critical of the secretary’s failure to declare a catastrophic incident following Hurricane Katrina.²⁰ Instead, federal and state authorities engaged in days of negotiations while thousands of residents were struggling to survive in deplorable conditions.

Public Health Emergency Declarations under the Public Health Services Act

The PHS Act authorizes a third type of federal declaration. The secretary of the Department of Health and Human Services (DHHS) is author-

ized to declare a public health emergency on finding that “(1) a disease or disorder presents a public health emergency; or (2) a public health emergency, including significant outbreaks of infectious diseases or bioterrorist attacks, otherwise exists.”²¹ The president and HHS secretary may declare emergencies simultaneously. A public health emergency declaration is not contingent on a state request. It triggers the HHS secretary’s authority to make grants, finance expenses, enter into contracts, and conduct investigations, and to provide federal financial assistance from the Public Health Emergency Fund.

The declaration of a public health emergency also allows the HHS secretary to waive certain provisions of federal law that could impede emergency response.²² As the federal government has become increasingly involved in more mundane aspects of health care delivery (e.g., ensuring access to emergency medical treatment, health information privacy, and drug safety), the growing framework of federal health laws has become a potential impediment to preparedness, response, and recovery efforts. The HHS secretary may suspend provisions relating to health care providers’ conditions of participation in Medicare or Medicaid, provisions of the Food, Drug and Cosmetic Act,²³ and agency enforcement actions under the Emergency Medical Treatment and Active Labor Act (EMTALA)²⁴ and the Health Insurance Portability and Accountability Act of 1996 (HIPAA).²⁵

State Emergency Declarations

The first responders and the infrastructure for immediate response to a public health emergency are largely governed at the level of the city, municipality, or county. Thus a broad array of state and local laws—governing such matters as emergency declarations, school closure, quarantine and isolation, and professional licensing—comes into play. These provisions vary from state to state and even from locality to locality. State and local laws govern a vast range of minutiae, from licensing of emergency medical technicians to disposal of corpses.

In the aftermath of the 2001 attacks, policy makers and academics urged states to modernize their public health statutes to ensure legal preparedness for public health emergencies. As part of this effort, the CDC commissioned the Model State Emergency Health Powers Act (MSEHPA—see box 11.3), which defined a public health emergency as an imminent threat that “poses a high probability of . . . a large number of deaths in the affected population; a large number of serious or long

term disabilities in the affected population; or widespread exposure to an infectious or toxic agent that poses a significant risk of substantial future harm to a large number of people in the affected population.”²⁶ In the decade that followed the 2001 attacks, the majority of states incorporated public health emergency declarations into their public health or disaster preparedness laws, with declarations typically triggering special authorities, regulatory flexibilities, and financial assistance.²⁷

State public health emergency declarations have been used for a variety of purposes. During the 2009 H1N1 influenza pandemic, some governors declared public health emergencies, while others did not, feeling that existing authorities were sufficient to handle the situation. In 2014, the governor of Connecticut declared a public health emergency to enable rapid response to potential Ebola cases, and the governor of Massachusetts, Deval Patrick, declared a public health emergency on opioid abuse. The declaration enabled him to immediately remove regulatory barriers to naloxone access, which prevents overdose deaths (see chapter 6), ban high-risk, hydrocodone-only painkillers, and mandate that prescribers consult the state’s Prescription Drug Monitoring Program (PDMP) prior to every prescription for Schedule II and III substances.²⁸ These emergency measures were temporary, with the state health department working to make them permanent through a lengthier administrative process.

EVACUATION AND EMERGENCY SHELTERING: THE NEEDS OF VULNERABLE POPULATIONS

In addition to lives lost to injury during a disaster, mortality and morbidity can be attributed to unsanitary conditions in the aftermath. Concerns include increased exposure to infectious disease through contaminated floodwaters or unsanitary shelter conditions;²⁹ increased exposure to hazardous chemicals or radiological materials through unintentional releases; carbon monoxide poisoning due to the use of emergency generators;³⁰ disruption in medical care for those suffering from chronic conditions; and the mental health impact of devastating losses of life and property. These indirect effects are difficult to predict and quantify, but considering their magnitude is essential to effective preparedness and response. Climate change offers a pertinent illustration of ongoing efforts to adapt to anticipated impacts and save lives (see box 11.4).

BOX 11.3
The Model State Emergency
Health Powers Act

A week after the terrorist attacks of September 11, 2001, letters containing anthrax bacteria were mailed from Trenton, New Jersey, to the three major network news stations in New York City, and to two tabloid newspapers, sickening twenty-two people and killing five. In the midst of these events, the CDC asked the Centers for Law and the Public's Health at Georgetown and Johns Hopkins Universities to draft what became known as the Model State Emergency Health Powers Act (MSEHPA). The model statute was designed to provide state legislatures with a roadmap for updating their public health emergency laws. The MSEHPA addresses five key public health functions: preparedness and planning, surveillance, management of property, protection of persons, and communication and public information.¹ The model statute also provides clearer standards and stronger guarantees of due process than public health statutes that predate modern judicial conceptions of individual rights.²

Under the model statute, coercive public health powers can be exercised in response to a disease outbreak only after the governor has declared a state of emergency.³ A declaration gives public health officials the power to carry out examinations necessary for diagnosis and treatment. Authorities have the power to isolate and quarantine individuals when warranted to prevent a substantial risk of transmission of infection, but they must adhere to human rights principles: choosing the least restrictive alternative, providing safe and habitable environments, and fulfilling individual needs for medical treatment and necessities of life. Although the model statute was created with recognition that exigencies may preclude a predetention hearing, the government is required to petition for a court order within ten days of issuing a quarantine or isolation directive, and detainees have the right to counsel.

Nonetheless, some scholars criticized the MSEHPA for insufficient protection of civil liberties, particularly concerning quarantine.⁴ Other

1. Lawrence O. Gostin, "The Model State Emergency Health Powers Act," in *Terrorism and Public Health*, ed. Barry S. Levy and Victor W. Sidel (Oxford: Oxford University Press, 2003), 265–66.

2. Lawrence O. Gostin, "The Model State Emergency Health Powers Act: Public Health and Civil Liberties in a Time of Terrorism," *Health Matrix*, 13, no. 1 (2003): 3–32; Lawrence O. Gostin, "Public Health Law in an Age of Terrorism: Rethinking Individual Rights and Common Goods," *Health Affairs*, 21, no. 6 (2002): 79–93.

3. Model State Emergency Health Powers Act §§ 401–405 ("During a state of public health emergency, the public health authority shall use every available means to prevent the transmission of infectious disease").

4. George J. Annas, "Blinded by Bioterrorism: Public Health and Liberty in the 21st Century," *Health Matrix*, 13, no. 1 (2003): 33–70.

scholars argued that coercive powers are often ineffective and may cause health workers to underrely on medical countermeasures.⁵ Still others expressed concerns that extraordinary powers might be used in response to routine public health events.⁶ The MSEHPA, in an era of deep concern about terrorism and civil liberties, became a lightning rod for debates about public health preparedness and conformity with the rule of law.⁷

5. Wendy E. Parmet, "Quarantine Redux: Bioterrorism, AIDS, and the Curtailment of Individual Liberty in the Name of Public Health," *Health Matrix*, 13, no. 1 (2003): 85-115.

6. Wendy E. Parmet and Wendy K. Mariner, "A Health Act That Jeopardizes Public Health," *Boston Globe*, December 1, 2001.

7. Lawrence O. Gostin, "When Terrorism Threatens Health: How Far Are Limitations on Personal and Economic Liberties Justified?" *Florida Law Review*, 55 (2003): 1105-70.

Learning from Past Failures

Natural disasters like hurricanes Katrina and Sandy have overwhelmed emergency response systems. The slow, uncoordinated response from all levels of government left residents living on overpasses waiting to be rescued, trapped in their homes, or residing in shelters with insufficient food, water and medical supplies, where evacuees faced threats of violence.³¹ News reports exposed the horrific conditions endured by survivors, particularly the poor, older people, and persons with physical or mental disabilities. These events seared into the American consciousness the inequities that can ensue in a public health emergency and highlighted the imperative of special attention to the needs of the disadvantaged.

Emergency management plans are often inadequate to meet the needs of vulnerable people. The failure to provide accessible emergency information may mean that people with hearing disabilities remain unaware of imminent emergencies,³² while those with intellectual disabilities may have difficulty comprehending evacuation messages. Individuals with mobility impairments have been left behind in evacuation efforts because vehicles were not equipped with lifts or ramps—sometimes with fatal results. Over 40 percent of Katrina survivors not evacuated in a timely manner were either themselves physically unable to leave or were caring for others unable to leave. Hospitals and nursing homes were ill equipped and failed to evacuate in time. States failed to provide an adequate



PHOTO 11.2. Hurricane Katrina evacuees in the Astrodome shelter. In the days following the hurricane, approximately eighteen thousand survivors were sheltered in the Reliant Astrodome and nearby Reliant Center. Shelters were ill equipped to meet the needs of evacuees, particularly those with disabilities. Photograph by Andrea Booher for FEMA.

number of special-needs shelters, and persons with disabilities were turned away. Those who were admitted struggled to access basic services such as medical care, restrooms, food, water, and shuttle services.³³

These failures served as a catalyst for efforts to better integrate the needs of people with disabilities into emergency management planning.³⁴ Congress amended the Stafford Act to incorporate disability and special needs. The new law, called the Post-Katrina Emergency Management Reform Act of 2007 (the Post-Katrina Act),³⁵ required the inclusion of people with disabilities in every phase of planning and set out detailed guidance on the steps needed to protect persons with disabilities in case of disaster. PAHPA incorporated similar provisions for “at-risk” individuals into the PHS and established the public health and medical needs of at-risk individuals as a national preparedness objective.³⁶

Taken together, federal and state laws still fall short of ensuring comprehensive protection for individuals with special functional and access needs in emergencies. These limitations have come to the fore in a series

of lawsuits brought by disability advocacy groups against state and city governments. In 2013, for example, a federal district court found that New York City's emergency response plans had failed to accommodate the needs of people with disabilities.³⁷ The class action suit, originally filed in response to Hurricane Irene, went to trial shortly after Hurricane Sandy.³⁸ Witnesses with disabilities testified that they were trapped inside apartment buildings waiting for help.³⁹ Many residents in city housing projects were reduced to “an almost primal state of living”—trapped in upper-floor apartments without water, heat, or power.⁴⁰

DEVELOPMENT AND DISTRIBUTION OF MEDICAL COUNTERMEASURES

All stages of planning and implementation of disaster response should be guided by the universal ethical values of fairness, transparency, consistency, proportionality, and accountability. . . . Incorporating these principles ensures that in stewardship of available scarce resources, the best possible care is given to individuals and the population as a whole. Delivery of health care under crisis standards is ultimately about maximizing the care delivered to the population as a whole under austere circumstances that may limit treatment choices for both providers and patients.

—Institute of Medicine, *Crisis Standard of Care*, 2012

Federal programs accelerate the development of medical countermeasures and stockpile them for rapid deployment; enhance health care facilities' surge capacity in response to mass casualty events; increase health care workers' ability to identify and treat diseases resulting from bioterrorism; and facilitate work across jurisdictions and sectors. The federal government has made new forays into direct involvement via the Strategic National Stockpile (SNS)⁴¹ of essential pharmaceutical resources, the CDC's National Electronic Disease Surveillance System (NEDSS),⁴² the National Disaster Medical Service (NDMS),⁴³ and the Emergency System for Advance Registration of Volunteer Health Professionals (ESAR-VHP).⁴⁴

Development and Government Procurement of Medical Countermeasures

Therapeutic countermeasures are medical interventions to prevent and treat disease and other health hazards attributable to public health emergencies. Vaccines can prevent disease, with herd immunity afford-

BOX 11.4

Climate Change Adaptation

Climatic changes have affected and will continue to affect human health, water supply, agriculture, transportation, energy, coastal areas, and many other sectors of society, with increasingly adverse impacts on the American economy and quality of life. . . . Certain groups of people are more vulnerable to the range of climate change related health impacts, including the elderly, children, the poor, and the sick. Others are vulnerable because of where they live, including those in floodplains, coastal zones, and some urban areas. Improving and properly supporting the public health infrastructure will be critical to managing the potential health impacts of climate change.

—U.S. Global Change Research Program, *Climate Change Impacts in the United States*, 2014

Efforts to limit the severity of global climate change by reducing the concentration of greenhouse gases in the atmosphere (referred to as “mitigation”) have been largely unsuccessful. The findings presented in the report quoted above—that the health effects of climate change are already evident, and that those effects will intensify, significantly increasing mortality and morbidity—serve as a wake-up call. In addition to undertaking mitigation efforts, governments worldwide are engaged in scientific research and policy change aimed at reducing the impact of climate change on human health and well-being (called “adaptation”). Demands on the public health system as society adapts to the health consequences of climate change will be significant.

In the United States, climatic and environmental changes are altering public health needs both through the introduction of new threats and through the intensification and geographical shifting of current threats. One of the most evident and tangible threats of climate change is more extreme weather-related disasters. Although media coverage tends to focus on natural disasters like floods and hurricanes that provide captivating visual images, the leading cause of weather-related deaths in the United States is heat waves, which are becoming more frequent and more extreme.¹ Climate change is having more gradual effects on health as well. Rising temperatures and more frequent wildfires exacerbate poor air quality, contributing to respiratory and cardiovascular disease. Changing weather patterns may result in an increased incidence of zoonotic, vector-, food-, and waterborne diseases.²

1. *Examining the Human Health Impacts of Global Warming, Hearing Before the U.S. Senate Committee on Environment and Public Works*, 110th Cong. (October 23, 2007), statement of Michael McCally, executive director of Physicians for Social Responsibility.

2. Kathryn Senior, “Climate Change and Infectious Disease: A Dangerous Liaison?” *Lancet Infectious Diseases*, 8, no. 2 (2008): 92–93.

The health effects of climatic and environmental changes will challenge our nation's already overburdened public health infrastructure in new ways. Every public health function will be called on, but disaster preparedness and response, disease surveillance, infectious disease control, and vector control will be particularly salient. Whether or not they actually offer evidence of anthropogenic climate change, natural disasters like hurricanes Katrina, Irene, and Sandy, and the emergence of vector-borne diseases like West Nile virus and zoonotic diseases like hantavirus, provide a glimpse of the health hazards that global climate change will bring. The lessons learned are crucial to ongoing adaptation.

ing protection to populations; antimicrobial medications can ameliorate symptoms and reduce morbidity and mortality; and potassium iodide can protect the thyroid after radiation intake. Therapeutic countermeasures are crucial to an effective public health response to CBRN attacks and naturally occurring disease outbreaks.

Yet effective countermeasures are not available for many of the biological terrorism agents deemed most dangerous by the CDC, such as botulinum toxin, plague, tularemia, and viral hemorrhagic fevers.⁴⁵ For others, like smallpox and anthrax, countermeasures exist, but stockpiles are insufficient to respond to major outbreaks. The pharmaceutical industry, moreover, has few incentives to develop countermeasures for rare, unpredictable events, such as novel influenzas, biowarfare, or a terrorist attack. The infrequent natural occurrence of these events, the substantial expense of developing new products, the unpredictability of market demand, and an uncertain regulatory environment result in a dearth of effective countermeasures.⁴⁶

The Strategic National Stockpile

The HHS secretary, in conjunction with the CDC and DHS, maintains a strategic national stockpile of “drugs, vaccines and other biological products, medical devices and other supplies . . . to provide for the emergency health security of the United States . . . in the event of a bioterrorist attack or other public health emergency.”⁴⁷ The Project Bioshield Act of 2004 funded the procurement of medical countermeasures against a broad array of CBRN agents, with funding reauthorized

in 2013.⁴⁸ However, delays, bureaucracy, and lack of coordination with the private sector have plagued Bioshield.⁴⁹ The development of a safer, more effective anthrax vaccine—the government’s highest priority prior to the 2014–15 West African Ebola epidemic—has been mired in disputes. The cancellation of a large contract with VaxGen for the anthrax rPA vaccine sparked concerns about bureaucratic delays.⁵⁰ Congress has repeatedly reformed the program, most notably through PAHPA in 2006, which organized Bioshield activities under the Biodefense Advanced Research and Development Authority (BARDA). PAHPA provided crucial funding to bridge the “valley of death” between National Institutes of Health funding for early-stage basic research and SNS procurement for products in the late stages of development.⁵¹ Despite these reforms, concerns remain regarding transparency and the slow pace of development.⁵²

After a rocky start, Bioshield has added about a dozen new products to the SNS, with about eighty more in various stages of development.⁵³ In the aftermath of Katrina, many criticized the investment of resources in CBRN countermeasures when the intensification of more routine medical needs during a disaster was a more pressing concern (see box 11.5). In 2013, controversy over federal spending on two million doses of the smallpox medicine Arestvyr, at a cost of two hundred dollars per dose, indicated that political support might be waning for investments in CBRN countermeasures for agents that do not pose a routine threat. In 2014, media reports gave Bioshield credit for ensuring that Ebola vaccines and treatments were already in development when the West African epidemic struck,⁵⁴ but no proven medical countermeasures were in place during the crisis.

Safety Concerns about SNS Deployment

Critics have also expressed safety concerns about the SNS, noting that although procurement contracts specify that manufacturers must seek FDA approval for intended stockpile uses, crucial SNS products remain unapproved. It is difficult to ensure that newly developed and rapidly deployed medical countermeasures are safe and effective. Many diseases that spread during a public health emergency may not occur naturally or may occur only in such small numbers that it is not feasible to run clinical trials.⁵⁵ It would be unethical to deliberately infect human participants with potentially lethal agents to test the effectiveness of new

BOX 11.5
The Hurricane Katrina
“Push Pack” Story

Following the government’s failed response to Hurricane Katrina, one of the many factors that emerged as having contributed to the devastating impact of the disaster was the failure of the Strategic National Stockpile (SNS) to meet the needs of Hurricane Katrina survivors.¹ SNS supplies are stored in fifty-ton push packs designed to be delivered anywhere in the United States within twelve hours. The SNS is touted as being capable of responding to any public health emergency, regardless of its cause. As with many aspects of the National Response Framework, however, the emphasis on preparedness for terrorism in SNS development has detracted from its ability to meet the needs of the population following other types of disasters.

Many survivors of the initial impact of Hurricane Katrina lost their medications and had difficulty accessing and refilling prescriptions, sometimes with fatal consequences.² Individuals with diabetes, hypertension, HIV/AIDS, and other chronic conditions risk serious health complications or even death if their access to medications is disrupted. Even many months after the hurricane’s initial impact, vulnerable individuals were still unable to obtain the medicines they needed. Health care personnel working in New Orleans reported a rise in patients with untreated chronic illness. “These people come in with extremely severe problems. . . . Diabetics have been off their insulin for six months. They come to us in diabetic ketoacidosis.”³

After Hurricane Katrina, twelve-hour push packs were deployed from the SNS but did not arrive until three days after the storm hit.⁴ Local governments were responsible for managing the evacuation of individuals with special needs but failed to ensure adequate care for the chronically ill. Shelters could not provide insulin, dialysis, or food

1. See Leah J. Tulin, “Poverty and Chronic Conditions during Natural Disasters: A Glimpse at Health, Healing, and Hurricane Katrina,” *Georgetown Journal on Poverty Law and Policy*, 14, no. 1 (2007): 115–53, 31–32.

2. *Ibid.*

3. Alfred Abaunza, chief medical officer, West Jefferson Medical Center, quoted in Ruth E. Berggren and Tyler J. Curiel, “After the Storm: Health Care Infrastructure in Post-Katrina New Orleans,” *New England Journal of Medicine*, 354, no. 15 (2006): 1549–52, 49–50. See also Andrea J. Sharma, Edward C. Weiss, Stacy L. Young, Kevin Stephens, Raoult Ratard, Susanne Straif-Bourgeois, Theresa M. Sokol, Peter Vranken, and Carol H. Rubin, “Chronic Disease and Related Conditions at Emergency Treatment Facilities in the New Orleans Area after Hurricane Katrina,” *Disaster Medicine and Public Health Preparedness*, 2, no. 1 (2008): 27–32.

4. *A Failure of Initiative*, Select Bipartisan Committee to Investigate the Preparation for and Response to Hurricane Katrina, H.R. Rep. No. 109–396, 109th Cong. (2006), 35; *The Federal Response to Hurricane Katrina: Lessons Learned* (Washington, DC: The White House, 2006), 33.

appropriate for diabetics. State and local governments were heavily dependent on the SNS for medical supplies. When they did arrive, the push packs were full of items that were useless in the aftermath of a natural disaster.⁵ There were virtually no supplies for emergency management of chronic diseases. Congress's report on the factors contributing to the devastating effects of Katrina pointed to the poor selection of materials included in the push packs as a significant planning failure.

5. After Katrina, to prevent the waste of unsuitable and unnecessary supplies, the CDC permitted states to request supplies from the SNS without requesting a full push pack.

countermeasures.⁵⁶ The Presidential Commission for the Study of Bioethical Issues expressed particular concern about the use of medical countermeasures in pediatric populations, given that pre-event testing on children is even less feasible than testing on adults.⁵⁷

Seeking to balance the potential risks of clinical trials against the need for rigorous testing of novel vaccines and treatments, the FDA has adopted an unorthodox approach. The “Animal Rule” allows regulatory approval for new medical countermeasures on the basis of animal studies so long as (1) the mechanisms of toxicity of the product are well understood; (2) the effect is established in more than one species of animal expected to be predictive for humans; (3) the study's endpoint is clearly related to enhancing human survival or preventing major morbidity (or other benefits to humans); and (4) the workings of the drug are sufficiently well understood to allow for the selection of an effective dose in humans.⁵⁸ The fact that manufacturers have not yet taken advantage of this regulatory pathway suggests that either the requirements are too difficult to meet or the incentives to seek approval are too low.⁵⁹

Other, simpler mechanisms are also available. The FDA can grant emergency use authorization, approve investigational new drug applications, or exercise discretion in declining to pursue enforcement action on an emergency basis. Public health emergencies sometimes do warrant the deployment of unapproved drugs through expedited means, but balancing the risks and benefits under conditions of scientific uncertainty is challenging.⁶⁰ Infamous government missteps in the past caution against mass deployment of insufficiently tested countermeasures, which can cause serious harm and erode the public's trust (see box 11.6).

BOX 11.6

Mass Emergency Vaccination Programs:
From the 1976 Swine Flu to Smallpox

Just about everybody in public health knows something about 1976. . . . The swine flu program has become part of public health lore, with the moral of the tale depending on who is telling it and why it is being told. But the swine flu program is not the stuff of folklore. It is far too complex. There are no villains. It does not lend itself to easy analysis.

—Walter R. Dowdles, “The 1976 Experience,” 1997

After outbreaks of influenza among army recruits in 1976, the CDC identified the causative strain as swine flu, a virus transmitted easily through human-to-human contact.¹ Amid speculation that this epidemic would become as catastrophic as the 1918 swine flu pandemic (which killed more than 50 million people worldwide), President Gerald Ford announced an ambitious program to immunize the American population.² Massive logistical problems ensued. The insurance industry informed pharmaceutical companies that it would not provide liability insurance for the swine flu vaccine, posing a serious threat to supply. Congress acted quickly to underwrite liability costs. Despite waning support among top health officials, the program lurched forward. In October, ten days after the first vaccinations were given, three elderly people in Pittsburgh died shortly after receiving the vaccine. Despite health officials’ claims that the deaths were not related to the vaccine, the media adopted a body-count mentality. In November, a physician in Minnesota reported a case of ascending paralysis, called Guillian-Barré syndrome (GBS), that may have been related to the vaccine. After surveillance activities revealed an increased incidence of GBS, the swine flu immunization program was brought to an end in December.

The federal government launched another mass vaccination program in the wake of the 2001 terrorist attacks. Although the World Health Assembly announced the eradication of smallpox in 1980, CDC and Russian laboratories maintained repositories of the virus, and there was no assurance that it had not fallen into the hands of rogue nations or terrorist organizations.³ Heightened concern led to

1. The facts for this case study were obtained from Richard E. Neustadt and Harvey Fineberg, *The Epidemic That Never Was: Policy-Making and the Swine Flu Affair* (New York: Vintage Books, 1983); Walter R. Dowdle, “The 1976 Experience,” *Journal of Infectious Diseases*, 176, no. S1 (1997): S69–S72.

2. Louis Weinstein, “Influenza, 1918: A Revisit?” *New England Journal of Medicine*, 294, no. 19 (1976): 1058–60.

3. In May 2014, the World Health Assembly considered (not for the first time) whether the remaining stocks of smallpox should be destroyed but again failed to reach a consensus.

the extraordinary policy decision to undertake mass vaccination against an eradicated disease with a vaccine that had well-documented risks.⁴ Based on the assumption that the risk of serious adverse events in a general-population campaign outweighed the risk of a smallpox outbreak, the administration opted to begin with vaccination of selected groups.⁵ The plan had several phases: immediate and mandatory vaccination of half a million military personnel deployed in high-threat areas; voluntary vaccination of up to half a million health care workers and response teams within thirty days; vaccination of up to ten million additional health care personnel and other first responders, such as firefighters and police; followed by vaccination with a new, not yet approved vaccine for members of the public who insisted on access.⁶

The military program went essentially as planned; in less than six months the Department of Defense administered nearly 450,293 smallpox vaccinations.⁷ However, the plan to vaccinate civilian health care workers who would be responsible for vaccinating the public in the event of a smallpox attack faltered badly. The vaccine industry and hospitals that administered vaccinations had sought, and received, tort immunity in 2002.⁸ Health care workers requested compensation for injuries resulting from smallpox vaccination,⁹ but Congress did not enact a plan until April 2003, after highly publicized cases of serious adverse events. In the end, the government could not secure the needed buy-in and participation of public health and health care professionals. The program was officially “paused” in June 2003,

4. Declaration Regarding Administration of Smallpox Countermeasures, 68 Fed. Reg. 4,212 (January 28, 2003).

5. Public health and national defense officials in the Bush administration actively debated whether to vaccinate a core group of health care workers and other critical personnel—a control-and-containment strategy—or to initiate a program to vaccinate the general population. In 2002, the Advisory Committee on Immunization Practices finally decided that a focused immunization campaign would be more beneficial. Advisory Committee on Immunization Practices and the Healthcare Infection Control Practices Advisory Committee, “Recommendations for Using Smallpox Vaccine in a Pre-event Vaccination Program,” *Morbidity and Mortality Weekly Report*, 52, no. RR7 (2003): 1–16.

6. Edward P. Richards, Katharine C. Rathbun, and Jay Gold, “The Smallpox Vaccination Campaign of 2003: Why Did It Fail and What Are the Lessons for Bioterrorism Preparedness?” *Louisiana Law Review*, 64, no. 4 (2004): 851–904.

7. John D. Grabenstein and William Winkenwerder Jr., “US Military Smallpox Vaccination Program Experience,” *Journal of the American Medical Association*, 289, no. 24 (2003): 3278–82.

8. Homeland Security Act of 2002, Pub. L. No. 107–296, 116 Stat. 2135, §304 (stating that if the secretary of HHS declares smallpox vaccination to be a “countermeasure . . . to the chemical, biological, radiological, nuclear, and other emerging terrorist threats,” there shall be immunity from tort liability for “any person who is . . . a manufacturer, or distributor,” or is a “health care entity under whose auspices any qualified person administers the smallpox vaccine”).

9. Naomi Seiler, Holly Taylor, and Ruth Faden, “Legal and Ethical Considerations in Government Compensation Plans: A Case Study of Smallpox Immunization,” *Indiana Health Law Review*, 1, no. 1 (2004): 3–27.

with a response rate of less than 10 percent of eligible physicians and nurses.¹⁰

The swine flu and smallpox vaccination campaigns provide intriguing accounts of policy making under circumstances of uncertainty. Commentators held government scientists responsible for the swine flu program's failure.¹¹ A controversial report pointed to overconfidence among scientific experts spun from meager evidence, conviction fueled by personal agendas, and zeal by scientists to make their lay superiors do right.¹² The smallpox campaign was also intensely criticized.¹³ Institute of Medicine findings pointed to the White House's role in failing to communicate the policy's rationale and preventing the CDC from communicating with key constituencies.¹⁴ Lack of planning and collaboration with major stakeholders resulted in a loss of trust in government and ultimately in the plan's failure.

Although instructive, these cautionary tales still fail to answer the critical question of whether, in the face of scientific uncertainty, it is better to err on the side of excess caution or of aggressive intervention. Consider the appropriate response to suspected bioterrorism with a microbial agent such as anthrax or smallpox. In an emergency, to whom should vaccines be made available, and under what circumstances would the government be justified in mandating vaccination? The costs of inaction, if the risk materializes, are lost lives; but the costs of overreaction, if the risk is exaggerated, are wasted public funds and unnecessary burdens of vaccine-induced injury and diminished autonomy.

10. Donald G. McNeil Jr., "Two Programs to Vaccinate for Smallpox Are 'Paused,'" *New York Times*, June 19, 2003; Donald G. McNeil, "Threats and Responses: Bioterror Threat; Many Balking at Vaccination for Smallpox," *New York Times*, February 7, 2003.

11. Cyril H. Wecht, "The Swine Flu Immunization Program: Scientific Venture or Political Folly?" *American Journal of Law and Medicine*, 3, no. 4 (1977): 425-45; but see Nicholas Wade, "1976 Swine Flu Campaign Faulted, yet Principals Would Do It Again," *Science*, 202, no. 4370 (1978): 849, 851-52.

12. Richard E. Neustadt and Harvey V. Fineberg, *The Swine Flu Affair: Decision-Making on a Slippery Disease* (Washington, DC: U.S. Department of Health, Education, and Welfare, 1974).

13. Thomas May, Mark P. Aulisio, and Ross D. Silverman, "The Smallpox Vaccination of Health Care Workers: Professional Obligations and Defense against Bioterrorism," *Hastings Center Report*, 33, no. 5 (2003): 26-33, arguing that there is no professional moral obligation to receive smallpox vaccination as a matter of either public health or national security.

14. Institute of Medicine, *The Smallpox Vaccination Program: Public Health in an Age of Terrorism* (Washington, DC: National Academy Press, 2005); see also Thomas May and Ross D. Silverman, "Should Smallpox Vaccine Be Made Available to the General Public?" *Kennedy Institute of Ethics Journal*, 13, no. 2 (2003): 67-82.

Ensuring Adequate Medical Personnel and Facilities

Medical supplies are essential, but without adequate personnel and facilities, they are useless. In an emergency, local personnel can be rapidly overwhelmed because staffing levels are dictated by routine needs rather than surge capacity. Additionally, health care workers may be burdened by the event's impact on their own lives, preventing them from reporting for duty. Government programs seek to ensure adequate facilities and the deployment of personnel to areas of need while facilitating the cross-jurisdictional work of volunteers. A coordinated response, facilitated by integrated planning and preparedness, is essential to ensure that government, emergency medical services, and health care providers work together to protect the population's health.

The National Disaster Medical Service

The National Disaster Medical Service (NDMS) provides an “integrated national medical response capability”⁶¹ to assist state and local governments with “health services, health-related social services . . . and appropriate auxiliary services to respond to the needs of victims of a public health emergency.”⁶² The HHS secretary may activate the NDMS even if a public health emergency has not been declared under the PHSA.⁶³ Hospitals agreeing to join NDMS commit to providing a proportion of their acute-care beds for NDMS patients. More than one-third of all acute-care hospitals in the country are NDMS participants, and collectively they have committed more than one hundred thousand acute-care beds. Yet as one researcher notes, “Although at first glance, this sounds promising, even in a normal year flu patients occupy over 114,000 hospital beds. . . . Hospitals are not eagerly lining up to contribute beds to the NDMS in sufficient numbers to make a dent in the bed capacity that will be needed in the event of even a moderate influenza pandemic.”⁶⁴

Registration and Licensing of Volunteer Health Professionals

Health workers are licensed at the state level, but in an emergency they may volunteer in affected areas outside their jurisdictions without a license to do so. The Uniform Emergency Volunteer Health Practitioners Act, adopted in fourteen states and the District of Columbia, licenses of out-of-state practitioners seeking to provide care during a declared

emergency, provided the practitioners have registered in advance. At the federal level, ESAR-VHP establishes a national registration system to provide verifiable, up-to-date information regarding volunteers' identity and credentials.⁶⁵

Allocation of Scarce Resources

Even with modern efforts to ensure surge capacity for health workers, hospitals, and medical countermeasures, scarcity remains likely for many future emergencies. A crucial bioethical question is how to ration scarce, life-saving resources: who shall live when not all can live? Rationing medical countermeasures such as vaccines and antimicrobials, as well as medical equipment such as respirators, requires rational ethical guidelines. Policy makers may adopt varied priorities but generally take the following considerations into account.⁶⁶

Prevention and Public Health

The historic mission of public health is prevention, so deployment of countermeasures in ways that impede transmission is a high priority. Rapid deployment of vaccines or prophylaxis to groups at risk could contain localized outbreaks. For example, vaccination of the direct contacts of an infected person in a family, congregate setting, or local community could maximize the number of lives saved.

Scientific and Medical Functioning

If the first priority is public health, then it is vital to protect scientists and manufacturers engaged in vaccine or treatment discovery and production, as well as health workers. These are critical social missions necessary to save lives and provide care. Priority, for example, could be given to key personnel in developing countermeasures, delivering health care, and devising public health strategies.

Social Functioning and Critical Infrastructure

A large-scale pandemic could result in key sectors of society not being able to function. Many public and private actors are necessary to ensure the public's health and safety: first responders (ambulance and fire personnel and providers of humanitarian assistance), security (police, national

guard, and military personnel), providers of essential products and services (water, food, and medicines), critical infrastructure (transportation, utilities, and telecommunications), and sanitation (undertakers, garbage collectors, and infectious waste collectors). Continued functioning of governance structures, such as the executive, legislative, and judicial systems, would also be important.

Medical Need and Vulnerability

Medical need—a widely accepted rationing criterion—gives priority to those who most require medical services. It requires a careful epidemiological evaluation of differential risks. Seasonal influenza disproportionately burdens infants and the elderly, but highly pathogenic strains may disproportionately affect young adults. Priority could be given to those who are socially marginalized, whose living conditions may create heightened vulnerability due to overcrowding, homelessness, poor nutrition, or other chronic conditions.⁶⁷

Intergenerational Equity

The medical-need criterion often favors the elderly because they are typically most vulnerable. However, there may be reasons not to routinely favor this age group.⁶⁸ Interventions may be less beneficial to the elderly than to younger, healthier populations, because vaccines produce fewer antibodies in older people. Furthermore, while all human lives have equal worth, interventions targeted toward the young may save more years of life. Ethicists debate the so-called “fair innings” principle that each person should be given an equal chance of a reasonably long life, which would militate in favor of children, young adults, and pregnant women.⁶⁹

Social Justice and Nondiscrimination

The allocation of benefits according to the above criteria should not disproportionately favor the rich or politically connected. However, guidelines that are neutral on their face could produce unfair outcomes. For example, favoring scientists, health professionals, and employees of pharmaceutical companies could disproportionately benefit the well-off. Principles of social justice and nondiscrimination suggest that individuals whose needs have not been met by society may have the greatest claim on health resources.⁷⁰

QUARANTINE, ISOLATION, CONTROLLED
MOVEMENT, AND COMMUNITY
CONTAINMENT STRATEGIES

We would not be here today [had not nurse Kaci Hickox] generously, kindly and with compassion lent her skills to aid, comfort, and care for individuals stricken with a terrible disease. . . . The court is fully aware of the misconceptions, misinformation, bad science and bad information being spread from shore to shore in our country with respect to Ebola. The court is fully aware that people are acting out of fear and that this fear is not entirely rational. However, whether that fear is rational or not, it is present and it is real. [Hickox's] actions at this point, as a health care professional, need to demonstrate her full understanding of human nature and the real fear that exists. She should guide herself accordingly.

—Judge Charles C. LaVerdiere, *Mayhew v. Hickox*, 2014

Considerable resources are devoted to developing medical countermeasures. Despite their clinical effectiveness, however, medical interventions may be insufficient to impede the rapid spread of infection during an epidemic: vaccines and medical treatments may be unavailable or ineffective, and medical supplies may become scarce. Here, we explore age-old public health response strategies, which raise vital social, political and constitutional questions because they interfere with basic human freedoms: association, travel, and liberty.

Public health authorities possess a variety of powers to restrict the autonomy or liberty of persons who pose a public danger.⁷¹ They can direct individuals to discontinue risk behaviors (through cease-and-desist orders),⁷² compel them to submit to physical examination or treatment, and detain them temporarily or indefinitely. The exercise of these powers to address routine public health threats—especially tuberculosis and sexually transmitted infections—is discussed in chapter 10. This section discusses two related interventions that are particularly important in the response to infectious disease emergencies for which medical countermeasures are unavailable or inadequate: isolation of persons known to be infectious, and quarantine of asymptomatic persons who have been exposed (or potentially exposed) to prevent transmission during the incubation period of a disease. We also discuss modern approaches to separating the ill or exposed from society: travel restrictions and social distancing. These strategies raise social, cultural, political, and legal issues that are deeply complex and imbued with notions of community and the Other (see box 11.7).



PHOTO 11.3. Red Cross emergency ambulance station in Washington, DC during the 1918 influenza epidemic. National Photo Company photograph via Library of Congress.

The Many Faces of Isolation and Quarantine

Isolation and quarantine can take many forms. Critical evaluative criteria for civil confinement include the following: Is the risk of transmission significant? How onerous are the restrictions on movement? What are the levels of compulsion and intrusiveness of enforcement? How large a population is confined? What are the social, political, and economic effects? How can health officials monitor the health status of quarantined individuals and meet their basic needs? Are the benefits and burdens fairly distributed, particularly for the poor and racial and ethnic minorities?

Medical Isolation

Isolation of an infectious individual is widely accepted as a prudent and effective health measure. Medical isolation benefits the affected

BOX 11.7

The Sociopolitical Dimensions
of Epidemic Disease

It is difficult to exaggerate the dread caused by disease epidemics and their destabilizing effects on communities.¹ Throughout history, pestilence has been perceived as a scourge, decimating populations and presenting a threat to security as momentous as war.² Thus society, through its institutions, has felt justified in taking draconian measures to defend itself. Prior to the availability of effective medical countermeasures, the prevailing social response was to exclude the ill from the community to safeguard healthy members. Disease bred fear and provoked punitive actions. The community could justify this harsh treatment, in part, by blaming sufferers and branding them as the Other, deserving of ostracism.

Even in more enlightened times, personal control measures have been applied in ways that may be better explained by animus than by science. Campaigns of restraint in nineteenth- and twentieth-century America demonstrate the prejudice:³ isolation of persons with yellow fever, despite the fact that it is transmitted by mosquitoes, not from person to person;⁴ arrest of alcoholics, especially poor Irishmen, in the false belief that cholera arose from intemperance;⁵ mass confinement in state-run “reformatories” of prostitutes allegedly suspected of having syphilis;⁶ house-to-house searches and forced removal of children thought to have poliomyelitis;⁷ and quarantine

1. See generally, Irwin W. Sherman, *The Power of Plagues* (Washington, DC: American Society for Microbiology Press, 2006); William H. McNeill, *Plagues and Peoples*, 2nd ed. (New York: Anchor Books, 1977).

2. Jared M. Diamond, *Guns, Germs, and Steel*, rev. ed. (New York: Norton, 2005); Barry S. Levy and Victor W. Sidel, eds., *War and Public Health* (New York: Oxford University Press, 1997).

3. See generally, Howard Markel, *When Germs Travel: Six Major Epidemics That Have Invaded America and the Fears They Have Unleashed* (New York: Vintage Books, 2005); Thomas B. Stoddard and Walter Rieman, “AIDS and the Rights of the Individual: Toward a More Sophisticated Understanding of Discrimination,” *Milbank Quarterly*, 68, supp. 1 (1990): 143–74; Paul J. Edelson, “Quarantine and Social Inequity,” *Journal of the American Medical Association*, 290, no. 21 (2003): 2874.

4. David F. Musto, “Quarantine and the Problem of AIDS,” *Milbank Quarterly*, 64, supp. 1 (1986): 97–117.

5. Guenter B. Risse, “Epidemics and History: Ecological Perspectives and Social Responses,” in *AIDS: The Burdens of History*, ed. Elizabeth Fee and Daniel M. Fox (Berkeley: University of California Press, 1988): 33–66.

6. Philip K. Wilson, “Bad Habits and Bad Genes: Early 20th-Century Eugenic Attempts to Eliminate Syphilis and Associated ‘Defects’ from the United States,” *Canadian Bulletin of Medical History*, 20, no. 1 (2003): 11–41; Allan M. Brandt, *No Magic Bullet: A Social History of Venereal Disease in the United States since 1880* (New York: Oxford University Press, 1985).

7. Guenter B. Risse, “Revolt against Quarantine: Community Responses to the 1916 Polio Epidemic, Oyster Bay, New York,” *Transactions and Studies of the College of Physicians of Philadelphia*, 14, no. 1 (1992): 23–50.

of people of Chinese descent during an outbreak of plague in San Francisco.⁸

Recent disease outbreaks have similarly presented vexing problems of fear and misapprehension, blame and ostracism, and social controversy. In 2003, SARS fueled negative stereotypes, with suggestions that those of Asian descent were unclean and irresponsible. In 2014, fear of Ebola prompted similar overgeneralizations harmful to people of African descent and to travelers who had visited parts of Africa thousands of miles from the epidemic. In 2015, some policy makers suggested that a measles outbreak originating at Disneyland in southern California might have been caused by immigrants crossing the border illegally, in spite of the fact that measles vaccination rates in Mexico, El Salvador, Guatemala, and Honduras are higher than in the United States. The connection between disease and bias has long permeated debates about quarantine, travel restrictions, and immigration.⁹

8. Public health officials of San Francisco were convinced that Asian people were more susceptible to plagues as result of their dietary reliance on rice rather than animal protein. Edelson, “Quarantine and Social Inequity.”

9. Especially vigorous quarantine policies—and unfair stigma for diseases they were perceived to bring—were often levied against immigrants in the nineteenth and early twentieth centuries. Kathryn Stephenson, “The Quarantine War: The Burning of the New York Marine Hospital in 1858,” *Public Health Reports*, 119, no. 1 (2004): 79–92; Howard Markel, *Quarantine! East European Jewish Immigrants and the New York City Epidemics of 1892* (Baltimore, MD: Johns Hopkins University Press, 1997).

individual by providing for close monitoring and treatment of the patient. It also benefits society by preventing transmission. Medical isolation usually takes place in a hospital with trained personnel. In a health emergency, however, hospitals would have to cope with a surge in demand for medical care, requiring more staff, beds, and equipment.

As demonstrated by the case of two nurses in a Dallas community hospital who were infected with Ebola virus (see box 11.8), hospitals may be ill equipped to comply with best practices for isolation. Only a small number of state-of-the-art biocontainment units are available nationwide (at the National Institutes of Health in Bethesda, Maryland; Emory University Hospital in Atlanta; the University of Nebraska Medical Center in Omaha; and St. Patrick Hospital in Missoula, Montana). Such units provide negative airflow, observation windows with intercoms, staff workspaces with biosafety hoods, and dedicated laboratories. In the absence of these precautions, health care workers and laboratory technicians who are in close contact with infected patients and

BOX 11.8

The West Africa Ebola Epidemic: Lessons for Public Health Preparedness

In 2014–15, tens of thousands of individuals in West Africa became infected with Ebola virus disease, with high fatality rates—principally in Guinea, Liberia, and Sierra Leone. On August 8, 2014, the World Health Organization declared the West African epidemic a “public health emergency of international concern” under the International Health Regulations. Although West Africa was deeply affected, isolated cases of Ebola appeared in Europe and North America—mostly among travelers from the region, but also, in a few cases, among health workers caring for infected patients. The fatality rate among patients treated in well-resourced hospitals was much lower than in countries whose health systems were overwhelmed. Nonetheless, the handling of the domestically diagnosed Ebola cases revealed critical health system vulnerabilities.¹

Thomas E. Duncan, a forty-two-year-old Liberian man, was exposed to Ebola in Liberia before traveling to Dallas, Texas, via Brussels and Washington, DC, on September 19. He did not disclose his contact with Ebola on exit screening in Liberia. At the time, he was asymptomatic and not infectious. Ebola is transmitted through direct contact between the bodily fluids (including blood, sweat, and saliva) of an infected person and the eyes, nose, mouth, or wound of another person. The incubation period between exposure and disease is up to twenty-one days, and prior to the development of symptoms (e.g., fever and gastrointestinal distress), the infected individual does not pose a significant risk of transmission.

Five days after reaching Dallas, Duncan went to the emergency room at Texas Health Presbyterian Hospital with a fever and abdominal pain. He reported his travel from Liberia, but he was sent home. On September 28, he returned to the hospital by ambulance, his condition having significantly deteriorated. He was admitted and placed in isolation but died on October 8. In the days that followed, two nurses who treated Duncan, Nina Pham and Amber Vinson, became the first confirmed cases of Ebola contracted in the United States.

Duncan’s initial misdiagnosis began a cascade of public health missteps. Emergency medical service personnel transported him to the hospital without using appropriate personal protective equipment. The ambulance continued to transport other patients for forty-eight hours before it was decontaminated. The county health department issued a communicable disease control order requiring Duncan’s part-

1. Lawrence O. Gostin, James G. Hodge Jr., and Scott Burris, “Is the United States Prepared for Ebola?,” *Journal of the American Medical Association*, 312, no. 23 (2014): 2497–98.

ner and three of her children to remain quarantined in the apartment they had shared with Duncan, but there were delays in decontaminating the apartment because the health department had difficulty obtaining a permit to transport the hazardous waste. The residents were eventually moved to another location. Health officials traced Duncan's contacts, identifying nearly fifty individuals, including his partner's five school-aged children, who were told to remain at home for the remainder of the twenty-one-day incubation period.

When Pham and Vinson were diagnosed, following a similar case in Spain, the CDC reconsidered the ability of hospitals to safely treat Ebola patients without specialized facilities and training, and the infected nurses were transported to biocontainment units at NIH and Emory University Hospital, where they were successfully treated without further transmission. Upon Pham's diagnosis, surveillance extended to about fifty health workers with exposure to Duncan. Immediately prior to Vinson's diagnosis, she traveled by plane to Ohio and back, prompting concerns about potential exposure.

The handling of U.S. Ebola cases offers important lessons for health system preparedness in a globalized world. PAHPA and other federal initiatives resulted in significant investments in training, planning, interagency coordination, and legal reform, but significant vulnerabilities remain. Investment in crucial health infrastructure has declined: the CDC's budget was cut by 10 percent in 2013. Between 2008 and 2014, state and local public health agencies nationwide lost almost 20 percent of their workforce. Many emergency medical services agencies and hospitals are also financially strained, leading the Institute of Medicine to warn in 2012 of an "enormous potential for confusion, chaos, and flawed decision-making" in a public health emergency. In the aftermath of the U.S. Ebola cases, President Obama proposed an emergency appropriation to strengthen preparedness, which Congress enacted in late 2014.²

The media criticized the CDC for not exercising stronger leadership in isolation and quarantine decisions, but these functions are primarily state and local responsibilities. The CDC's authority is limited to preventing international or interstate transmission, a task that it implements largely through twenty federal quarantine stations.

The case of Craig Spencer, a physician who had been working with Doctors without Borders treating Ebola patients in Guinea, sparked political controversy concerning quarantine policy. On returning to New York City, Dr. Spencer exhibited Ebola symptoms on October 23 and was isolated at Bellevue Hospital Center. His Ebola diagnosis prompted the governors of New York and New Jersey to impose a mandatory twenty-one-day quarantine for medical workers returning from any of the three most severely affected countries. Under this

2. Lawrence O. Gostin, Henry A. Waxman, and William Foege, "The President's National Security Agenda: Curtailing Ebola, Safeguarding the Future," *Journal of the American Medical Association*, 313, no. 1 (2014): 27–28.

policy, Kaci Hickox was initially subjected to compulsory quarantine in a hospital tent in New Jersey upon her return from treating Ebola patients in Sierra Leone. Governor Chris Christie then reversed course, releasing her so that she could be transported to her partner's residence in Maine. Upon her arrival there, Governor Paul LePage subjected her to compulsory home quarantine, with police officers stationed outside the residence. Because these events transpired in the days leading up to an election, commentators questioned whether state officials were influenced by political considerations. Eventually, a Maine judge overturned the state's quarantine order.

Commentators also questioned the reluctance of state and federal officials to declare a public health emergency. Connecticut was the only state to declare a public health emergency in response to Ebola; other states, including those where Ebola patients were present, declined to do so, determining that their powers to control routine infectious disease threats (such as tuberculosis; see chapter 10) were sufficient.

On October 8, the CDC announced enhanced screening at five U.S. airports that receive 94 percent of arrivals originating from Sierra Leone, Liberia, and Guinea, including temperature measurement, observation for symptoms, and questioning regarding health and Ebola exposure history. These procedures, later extended to airports nationwide, authorized CDC officers to evaluate passengers identified through the initial screening as high-risk, with follow-up evaluation referred to state and local health authorities. Low-risk travelers without symptoms or history of exposure were given instructions for self-monitoring and were asked to provide information about their movements in the United States. These steps provided some measure of reassurance to the public but did not significantly increase protection, since passengers exhibiting no Ebola symptoms at departure airports (where exit screening was already in place) were unlikely to develop symptoms prior to arrival.

Preventing and controlling outbreaks at an early stage within the source countries remain the surest ways to stem international outbreaks. Proactive efforts to ensure global health security save countless lives and minimize the risk of international spread.³

3. Lawrence O. Gostin and Eric A. Friedman, "Ebola: A Crisis in Global Health Leadership," *Lancet*, 384, no. 9951 (2014): 1323–25.

their bodily fluids could be put at risk from highly infectious agents. But this specialized level of containment is simply not scalable. Can health care workers be asked (or potentially even coerced, under the threat of employment termination or revocation of licensure) to work with infectious patients under less than ideal conditions?⁷³

Home Quarantine

In response to SARS and Ebola, and in current pandemic influenza planning, policy makers stressed home or self-quarantine, sometimes called “sheltering in place.” Home quarantine is less onerous, more socially acceptable, and logistically simpler. Most people do not mind staying at home for short periods. However, incubation periods can extend for weeks (twenty-one days in the case of Ebola), and home quarantine is difficult to monitor, as individuals may feel impelled to go to work, shop for necessities, or meet family members. Home quarantine also can place household members at risk.⁷⁴ A home quarantine implies an ethical obligation to ensure that those who are quarantined have access to adequate care, clothing, heating, food, and water. Legal obligations to provide for those under quarantine may be found in state statutes and may also be derived from federal or state constitutional guarantees, as discussed below in the section on legal authority.

Home quarantines are ostensibly voluntary, but the state may compel individuals who are noncompliant. In response to SARS and Ebola, enforcement took several forms: self-monitoring; active monitoring (daily communication with authorities to assess symptoms and fever); direct active monitoring (daily direct observation by authorities plus discussion of plans to work, travel, take public conveyances, or be present in congregate locations, which may or may not be permitted); controlled movement (also known as modified home quarantine—prohibition on travel by long-distance commercial conveyances, and travel by local public transportation only with specific approval); and full home quarantine—on a voluntary basis or pursuant to court order.⁷⁵ The degree of restriction must be commensurate with an individualized risk assessment. Individuals subject to public health orders should be supported and compensated; provided with shelter, food, and lost wage compensation; and treated with respect and dignity.⁷⁶ Legal protections from employment discrimination (similar to those applicable to National Guard duty or jury service) and other forms of mistreatment can also be considered, to reflect the sacrifice of individual liberty for the common good.⁷⁷

Work Quarantine

During the SARS outbreak, health officials employed work quarantines, restricting asymptomatic health workers exposed to SARS patients to their homes and workplaces. When individuals were not at work, they

were required to follow home quarantine rules. Work quarantine kept essential employees at their jobs while being closely monitored.

Travelers' Quarantine

Travelers can pose special risks: they may originate from areas with endemic disease; they often travel together in closed conditions; and they disperse to and interact with people in multiple locations. During the SARS outbreak, North American officials quarantined airplanes and cruise ships if passengers had suspicious symptoms until the threat level could be determined. In response to Ebola, provisions were made for the detention of travelers from countries affected by the epidemic if they showed fever or other symptoms. These programs are imperfect, however, as travelers may be infectious without being symptomatic or may trigger thermal sensors without being infectious. Travelers may also be interviewed to assess their potential exposure to infection, with potentially exposed travelers required to provide contact information and submit to active monitoring.

Institutional Quarantine

While medical isolation and limited forms of quarantine are primarily applicable to individuals or small groups, health officials have also discussed mass quarantines in institutions or geographic areas. In China, Hong Kong, and Singapore, apartment complexes were quarantined during the SARS outbreak. Other potential mass-quarantine venues include military bases, gymnasiums, stadiums, hotels, and dormitories. Historically, residents of congregate institutions such as prisons, mental hospitals, and nursing homes were not permitted to leave during epidemics. They suffered badly, as infection spread rapidly in closed, overcrowded conditions.⁷⁸

Geographic Quarantine

The *cordon sanitaire* is a historic form of quarantine—literally a guarded line between infected and uninfected districts to prevent intercommunication and spread of a disease or pestilence. Sometimes also called “perimeter” or “geographic” quarantine, a sanitary cordon restricts travel into or out of an area circumscribed by a real or virtual barrier.

Mass quarantines are unlikely to be effective or politically acceptable because they are personally intrusive and socially disruptive. Congregating healthy and infected individuals together can rapidly spread infection. Mass quarantines can also be unfair, as the quarantine of Chinese Americans in San Francisco at the turn of the twentieth century illustrated.⁷⁹ Beyond justice concerns are the logistics of mass quarantines. During federal “tabletop” exercises, officials have predicted numerous deaths from confining large numbers of people together. The logistics of determining who should be quarantined, monitoring and enforcing the quarantine, and ensuring sanitary conditions and meeting basic needs would be daunting.⁸⁰ Providing due process for a large confined population would also be overwhelming.

Above all, quarantine is politically charged. A panic-stricken public may demand overreaching quarantines that affect isolated individuals (e.g., travelers from affected countries or potentially exposed health care workers) but may strongly resist the possibility of more broadly applicable quarantine. Compliance with public health advice requires public acceptability and trust in government. Some forms of quarantine may be worth the costs if they are truly needed to impede the spread of infection, but the evidence of effectiveness, particularly for mass quarantines, is limited.⁸¹

Legal Authority for Isolation and Quarantine

Overlapping state and federal governance leads to inevitable problems of federalism—which government may act, which set of legal rules applies, and in what circumstances? In theory, the WHO’s international health regulations (IHR) cover regional or global health hazards; federal law applies to controlling disease transmission from foreign countries and between states; and state or local law deals with health threats in a single state, city, or county. But behind this relatively simple-sounding scheme lie complex problems regarding which level of government leads the response. Public health preparedness requires clear lines of authority in an emergency, but these are rarely evident in practice. When Ebola cases were diagnosed in the United States, the CDC was criticized for issuing evolving, nonbinding guidelines for infection control, quarantine, and isolation while repeatedly deferring to state and local authority.

A state’s authority for isolation and quarantine within its borders is derived from the police power.⁸² Although all states authorize quarantine

and isolation, laws vary significantly. Typically, powers are found in laws governing sexually transmitted infections,⁸³ tuberculosis,⁸⁴ and communicable diseases (a residual class ranging from measles to malaria).⁸⁵ States whose statutes provide exhaustive lists of specific infectious diseases to which public health powers are applicable may lack the power to act in the face of a novel infectious disease. Fortunately, most states have moved away from this approach, instead broadly authorizing action where necessary to protect others from infection.⁸⁶ Cooperation among state and national authorities is essential but can be undermined by disparate legal structures and political factors.

Federal Regulations

The PHS Act governs national quarantine authority. In 2012, long-anticipated federal communicable disease control regulations were finalized.⁸⁷ The regulations expand the scope of federal authority, including quarantine, surveillance, and sanitary measures. Federal quarantine power is limited, however, to prevention of the introduction, transmission, and spread of communicable diseases from foreign countries into the United States (e.g., at international ports of arrival) and from one state or territory into another. Even when interstate transmission was threatened during the 2014 Ebola crisis (as when a Dallas nurse, Amber Vinson, requested and was granted permission to travel to Ohio by commercial airliner), federal officials continued to defer to state authority while recommending more conservative (and, most would argue, evidence-based) quarantine guidelines than some state and local authorities were recommending.

The PHS Act authorizes the “apprehension, detention, or conditional release” of individuals for a small number of diseases listed by executive order.⁸⁸ As of 2014, the president had specified cholera, diphtheria, infectious TB, plague, smallpox, yellow fever, viral hemorrhagic fevers (Lassa, Marburg, Ebola, Crimean-Congo, and South American), SARS-like coronaviruses (e.g., Middle Eastern Respiratory Syndrome [MERS]), and pandemic influenza. Federal regulations finalized in 2012 expand the scope of federal power by defining *ill person* to include individuals exhibiting signs or symptoms commonly associated with quarantinable diseases, such as fever, rash, glandular swelling, jaundice, or diarrhea.⁸⁹ This inclusive approach embodies an important conceptual shift, affording federal officials greater adaptability.

The 2012 regulations empower CDC officials to provisionally quarantine travelers for as long as they consider necessary.⁹⁰ Thereafter,

officers can order full quarantine on grounds of a reasonable belief that a person or group is in the qualifying stage of a quarantinable disease. The length of quarantine may not exceed the period of incubation and communicability of the disease, which can range from several days (for MERS coronavirus infection) to several months (for TB). During periods of quarantine, officers may offer individuals vaccination, prophylaxis, or treatment, and refusal may result in continued deprivation of liberty. DHHS is authorized to pay for necessary medical and other services, but it is not bound to do so.

The CDC does not intend to provide individuals with hearings during provisional quarantine, but individuals can contest a full quarantine order through an administrative hearing comporting with basic due process: notice, a neutral officer to oversee the hearing, and communication with counsel. Still, there are notable deficiencies in the procedures with respect to protecting individuals' rights: individuals must affirmatively request a hearing, which may delay or prevent independent review for those who do not understand or take the initiative; the proceedings can be informal, even permitting hearings exclusively based on written documents are permitted; and the hearing officer may be a CDC employee who makes a recommendation to the CDC director. The European Court found a similar scheme in the United Kingdom to violate Article 5 of the European Convention on Human Rights, which requires a hearing by a court.⁹¹

The 2012 regulations impose duties on airports and airlines to screen passengers at borders (by such means as visual inspection and electronic temperature monitors); to report cases of illness or death to the CDC; to distribute health alert notices to crew and passengers; to collect and transmit personal information about passengers; to order physical examination of exposed persons; and to require passengers to disclose information about their contacts, travel itinerary, and medical history. The travel industry criticized the requirement to collect passenger data based on cost, while privacy advocates expressed concern about the disclosure of sensitive personal information.

The PHSA empowers the CDC to provide for inspection, fumigation, disinfection, sanitation, pest extermination, and destruction of contaminated animals or goods.⁹² The rules specify that the CDC shall not bear the expense of sanitary measures; property owners incur the costs. Requiring agencies to compensate property owners would chill health regulation and place the cost of private health hazards on the public. This is particularly true for screenings at ports and borders, where individuals may be transporting infected or contaminated animals or goods that

pose a risk to the public's health. Pursuant to long-standing precedent, these provisions are not understood to require "just compensation" under the Takings Clause of the Fifth Amendment (see chapter 6).

*Constitutionality of Quarantine, Isolation,
and Controlled Movement*

The Constitution does not explicitly mention quarantine. However, in discussing imports and exports, it recognizes states' powers to execute inspection laws, which are incident to quarantines.⁹³ Although there are multiple judicial opinions upholding the constitutionality of quarantine, they predate the Supreme Court's adoption of modern Fourteenth Amendment jurisprudence in a series of cases spanning the mid-twentieth century (the Civil Rights Era). The validity of these precedents is thus in question. Because these pre-Civil Rights Era cases are the most well-developed precedents available on the question of quarantine's constitutionality we present them in detail here. As described below, however, a modern court addressing the constitutionality of quarantine, isolation, or controlled movement would apply strict scrutiny and would likely find considerable government action to be justified by the government's compelling need to avert or control an infectious disease outbreak (see chapter 4).

As early as 1824, Chief Justice John Marshall suggested that states have the inherent authority to quarantine under their police powers.⁹⁴ From Marshall's time through the early twentieth century, numerous courts upheld detention powers. The major impetuses for judicial activity were sporadic outbreaks and epidemics of venereal disease,⁹⁵ smallpox,⁹⁶ scarlet fever,⁹⁷ leprosy,⁹⁸ cholera,⁹⁹ typhoid,¹⁰⁰ diphtheria,¹⁰¹ and bubonic plague.¹⁰² In these contexts, private rights were subordinated to the public interest, and individuals were deemed bound to conform.¹⁰³ As one court put it, quarantine does not frustrate constitutional rights because there is no liberty to harm others.¹⁰⁴ Even when courts recognized that containment cuts deeply into private rights, they still upheld public policy.¹⁰⁵

The judiciary, however, did assert some control over isolation and quarantine. Following a "rule of reasonableness" established in *Jacobson*, courts insisted that detention be justified by "public necessity"¹⁰⁶ and that states may not act "arbitrarily" or "unreasonably."¹⁰⁷ Even though their decisions were not always clear or consistent, the courts

generally set three limits on civil confinement in the pre-civil rights era. First, health authorities had to demonstrate that individuals had, in fact, been exposed to disease and posed a public risk.¹⁰⁸ Second, the courts periodically insisted on safe and healthful environments for quarantine because public health powers are designed to promote well-being, not to punish.¹⁰⁹ Finally, courts struck down interventions that were discriminatory. In *Jew Ho v. Williamson*, a federal circuit court struck down an invidious quarantine measure.¹¹⁰ Public health officials had quarantined an entire district of San Francisco, containing a population of more than fifteen thousand, ostensibly to contain bubonic plague. The quarantine applied exclusively to the Chinese community. The court held the quarantine unconstitutional on grounds that it was unfair: health authorities had acted with an “evil eye and an unequal hand.”¹¹¹ *Jew Ho* serves as a reminder that quarantine can be used as an instrument of prejudice and subjugation of marginalized populations.¹¹²

Although these early cases still have influence, constitutional doctrine has changed markedly since the civil rights era of the mid-twentieth century. As explained in chapter 4, the Supreme Court has devised a tiered approach to constitutional adjudication, which requires heightened scrutiny of state action that invades an important sphere of liberty, such as the right to travel.¹¹³ In cases concerning mental illness, the Court has described civil commitment as a uniquely serious form of restraint, constituting a “massive curtailment of liberty.”¹¹⁴ Under the Supreme Court’s strict scrutiny analysis, the state must have a compelling interest that is substantially furthered by the detention.¹¹⁵

Risk of Transmission

Under a strict scrutiny standard, only persons who pose a significant risk of transmission can be confined. Lower courts have gone further by requiring actual danger as a condition of civil confinement in cases involving both mental health¹¹⁶ and infectious disease.¹¹⁷ Mass confinement (e.g., geographic or institutional quarantine) raises constitutional questions. If some members of the group do not pose a risk of transmission, the state action may be deemed overly broad. The Supreme Court finds overinclusive restraints constitutionally problematic because they deprive some individuals of liberty without justification. Consequently, health officials should, to the extent feasible, order quarantine only for those who demonstrably pose a risk to the public.

Least Restrictive Alternative

Given a strict standard of review, the courts could require the state to demonstrate that confinement is the least restrictive alternative to achieve its stated objective.¹¹⁸ Thus the state might have to offer directly observed therapy, direct active monitoring, controlled movement, or home quarantine as a less restrictive alternative to full confinement. However, the state probably does not have to go to extreme or unduly expensive means to avoid confinement.¹¹⁹

Procedural Due Process

Persons subject to detention are entitled to procedural due process. As the Supreme Court recognized, “There can be no doubt that involuntary commitment to a mental hospital, like involuntary confinement of an individual for any reason, is a deprivation of liberty which the State cannot accomplish without due process of law.”¹²⁰ The procedures required depend on the nature and duration of the restraint.¹²¹ Certainly the state must provide due process for long-term, nonemergency detention.¹²² Noting that “civil commitment for any purpose constitutes a significant deprivation of liberty,” and that commitment “can engender adverse social consequences,” the Court has held that, in a civil commitment hearing, the government has the burden of proof by “clear and convincing evidence.”¹²³

In *Greene v. Edwards* (1980), the West Virginia Supreme Court held that persons with infectious disease are entitled to similar procedural protections as persons with mental illness facing civil commitment.¹²⁴ Procedural safeguards include the right to counsel, a hearing, and an appeal. Rigorous procedural protections are justified by the fundamental invasion of liberty occasioned by long-term detention,¹²⁵ the serious implications of erroneously finding a person dangerous, and the value of procedures in accurately determining complex facts. Where necessary, temporary orders may be permissible with postdetention review.

Community Containment Strategies

Isolation and quarantine are the most widely discussed, and most controversial, public health strategies, but a variety of other strategies are available for stemming infectious diseases. Community containment strategies include personal hygiene, social distancing, and border controls. Several empirical and policy evaluations of community contain-

ment have been published as part of strategic planning for highly pathogenic influenza.¹²⁶

Community Hygiene

Hygienic measures to prevent the spread of respiratory infections are broadly accepted and widely used for influenza and other infectious diseases with epidemic potential.¹²⁷ Infection control includes hand washing, disinfection, respiratory hygiene (etiquette for coughing, sneezing, and spitting), and personal protective equipment (PPE—masks, gloves, gowns, and eye protection) for health care workers. Evidence of effectiveness varies and depends on the setting—community or congregate facility (hospital, school, nursing home, or prison). Evidence supports hand hygiene in all settings.¹²⁸ PPE and disinfection are standard hospital practices.¹²⁹ However, the effectiveness of these measures in other settings is unclear, and further research is needed to understand its appropriate role. For example, mask use was common, and even legally required, in the 1918 influenza pandemic and was adopted by many individuals during the SARS and Ebola outbreaks. Contrary to popular belief, however, masks primarily provide protection for others when worn by an infectious person. Although they may block large aerosolized droplets and discourage the wearer from contacting her mouth with her own hand, thereby reducing transmission from fomites, paper surgical masks may not fit tightly enough to block the smaller droplets that may play an important role in transmission of airborne pathogens.¹³⁰

Even if hygienic measures are effective, professionals and the public must use them properly and sustainably. Infection control precautions (e.g., tight-fitting N95 respirators) must be used reliably until the risk subsides, but their use may be burdensome, leading to low compliance. Studies demonstrate inconsistent infection control in hospitals, and the general public has not uniformly adopted even basic hygiene practices such as hand washing.

Decreased Social Mixing and Increased Social Distance

Past experience shows that social separation and community restrictions are important responses to epidemics. It is assumed that decreased social mixing slows transmission of airborne pathogens, and avoidance of high-risk settings (e.g., swimming pools) may slow indirect fecal-oral transmission. Thus, governments have closed public places (malls,

workplaces, mass transit, and swimming pools) and canceled public events (sports events, performances, and conferences) during infectious disease outbreaks. During the SARS outbreak, for example, health officials ordered widespread closures of schools, day care facilities, hospitals, factories, and hotels. During the 2009 H1N1 epidemic, schools were closed in some districts. As fear rises, people may shun social gatherings of their own accord. Predicting the effect of policies to increase social distancing, however, is difficult.

Policy makers are particularly interested in school closures as a disease mitigation strategy. Modeling studies suggest that, since children are efficient transmitters of infection, school closures would impede the spread of epidemics.¹³¹ The key question, of course, is whether students stay at home or disperse to malls, movie theaters, and other crowded spaces. Closing schools for short periods does not have major social ramifications, but pandemics can endure for many months. During such extended school closures, children and adolescents would miss learning, social development, and in-school meals. Additionally, parents would have to stay home to care for young children, which would affect public services and productivity.

Social distancing, particularly for long durations, can severely disrupt the economy and cause loneliness and depression. Community restrictions raise profound questions regarding culture, faith, and family. Coming together with fellow human beings in civic or spiritual settings affords comfort in a time of crisis. When loved ones are ill, there is a strong need to comfort them with physical contact. People who lose loved ones to a dreaded disease yearn to express their grief in churches, social groups, and funeral services. But even these assemblies could be discouraged or disallowed, as they were during the 2014–15 Ebola epidemic in West Africa. As with many disease mitigation strategies, the vulnerable would suffer most from social distancing, particularly those who cannot stock up on food, water, and clothing, and those who need assistance, such as disabled persons. Assuring the conditions for health is a government responsibility, but the community also plays a vital role.

The constitutional questions are equally complex, as the Supreme Court finds travel and free association to be fundamental rights.¹³² Undoubtedly the courts would uphold reasonable community restrictions, but legal and logistical questions loom: who has the power to order closure, by what criteria, and for what period of time?

The exercise of public health powers requires rigorous safeguards: scientific risk assessments, the provision of safe and habitable environ-

ments, procedural due process, use of the least restrictive alternative, and attention to social justice. Public health emergencies are deeply divisive. The government must earn the public's trust by acting transparently, fairly, and effectively. The way we respond to a health crisis—whether we choose to exercise authoritarian powers, whether we protect the vulnerable—reflects on the kind of society we aspire to be.

Ideally, a resilient society can withstand and recover from a disaster with minimal disruption.¹³³ Resilience encompasses the principles of equity and social justice, recognizing that the social, political, and cultural contexts of emergencies produce an inequitable distribution of critical resources, and that fair and effective planning should seek to address these inequities. It entails building core capabilities and public services in vulnerable communities to prepare them for emergencies while also serving routine public health needs.¹³⁴ Toxin- and pathogen-specific emergency planning activities “cannot be a substitute for a broad, progressive effort to improve services for those who are vulnerable or who have been pushed to the margins of society because of ethnic and racial discrimination, poverty, or the fact of living with chronic illness and disability or being in need of long-term care.”¹³⁵ A commitment to building community resilience also implies that vulnerable populations should not be viewed as a liability but can serve as a critical resource in preparedness, response, and recovery efforts if policy makers engage them in the planning stage.