2 The Generic Biological Threat

In early 1976, federal health officials warned the Ford administration that a virulent new strain of influenza had appeared in the United States and threatened to become a deadly pandemic. A soldier had died at Fort Dix in New Jersey, and others at the base were infected with the virus. Infectious disease experts gathered and quickly recommended a plan of action to the president: an urgent, intensive program to immunize the entire U.S. population before the next flu season, at an estimated cost of $135 million. Such a program had never been tried before—indeed, it had only recently become technically feasible. But given the perceived scale of the swine flu threat and the new possibility of intervention, public health experts were nearly unanimous about the most responsible course of action: mass vaccination. "If we believe in preventive medicine," as one well-regarded expert said, "we have no choice."[1]

Three decades later, in the fall of 2005, the U.S. government again focused its attention on the threat of pandemic influenza. This time the threat had not arrived suddenly—public health officials had been warning of the danger of an avian influenza pandemic with increasing urgency since the appearance of a highly pathogenic strain of the virus in Hong Kong in 1997. But it seemed that now a major initiative was possible—in

part because of an increasing perception among health authorities of the seriousness of the threat, as the virus spread globally through poultry stocks and migratory birds, and in part as a result of fallout from the administration's widely perceived failure to respond adequately to Hurricane Katrina. President George W. Bush described the combination of urgency and uncertainty posed by threat of pandemic influenza: "Scientists and doctors cannot tell us where or when the next pandemic will strike, or how severe it will be, but most agree: at some point, we are likely to face another pandemic."[2] Or, as a concerned U.S. senator put it, echoing the admonitions of health officials: "Experts no longer ask if such a pandemic could occur, rather they question when it will occur."[3]

In November 2005, the Bush administration unveiled a $7.1 billion pandemic preparedness strategy described by the Secretary of Health and Human Services as "the most robust proposal ever made for public health at one time."[4] The plan included funds for disease surveillance, stockpiling antiviral medication, and research into new methods of vaccine production. It was initially criticized in the public health world for focusing too much on pharmaceutical intervention and not enough on the needs of state and local health agencies. But among various commentators, there was impressive agreement on several points. First, that pandemic planning was a matter of urgent and immediate concern; second, that the nation was currently far from adequately prepared for a pandemic; and third, that whether or not a pandemic in fact occurred, the process of preparing for it would strengthen readiness for other potential threats. As the senator put it, "Even if we are spared from a flu pandemic, the work that we do today will serve us all well in the event of any national emergency."[5]

Governmental anticipation of a pandemic had become a vehicle for a more general form of planning, one oriented to a range of potential threats. In testimony before Congress, the Assistant Secretary of Health argued, "preparedness for a pandemic makes us a nation better prepared for any and all hazards, manmade or natural."[6] But, he warned, such a condition would not arrive quickly or easily: "Preparedness is a journey, not a destination. It's a journey that must be nationwide, involve federal, state and local leaders in partnership, and include every sector of society." The condition of national preparedness could be improved upon but never perfected, as the secretary of health testified: "We're overdue and we're not

as well prepared as we need to be. We're better prepared than we were yesterday. We'll be better prepared tomorrow than we are today. It's a continuum of preparedness."[7] A leading state health official echoed this sense of a journey without end: "Are we fully prepared? Absolutely not. We are more prepared than we were several years ago but not prepared enough."[8]

In juxtaposing the 1976 and 2005 cases, we can see that over the course of three decades, a new way of thinking about and acting on disease threat had taken hold: it was no longer only a question of prevention, but also—and perhaps even more—one of preparedness. How did this shift happen? How did the U.S. public health and national security establishments come to see the nation as unprepared for a future disease emergency? And what programs did they advocate to improve national preparedness? The story is a complex one, involving the migration of techniques initially developed in the military and civil defense to other areas of governmental intervention.

The analysis in this chapter focuses not on widespread public discussion of disease threats but rather on particular sites of expertise where a novel way of understanding and intervening in potential future events was developed and deployed. In particular it focuses on the role of scenario-based exercises in constituting infectious disease as a problem of preparedness. This technique served two important functions: first, to provoke an affect of urgency among health and security officials in the absence of the event itself; and second, to generate knowledge about vulnerabilities in the government's response capacity that could then guide anticipatory intervention.

NATIONAL SECURITY AND PUBLIC HEALTH

In his spring 2006 congressional testimony on avian flu preparedness, former White House Homeland Security Advisor Richard Falkenrath declared: "When viewed in comparison to all other conceivable threats to U.S. national security, the catastrophic disease threat is and for the foreseeable future will remain the greatest danger we face."[9] Given Falkenrath's background as an expert in nuclear proliferation and counter-terrorism, this was a striking statement, a clear affirmation that national security strategists must now turn their attention to a subject that had, until recently, remained mainly under the purview of public health.

This claim was by no means the first time that national security had been linked to public health.[10] Early Cold War concerns about the threat of biological warfare led to the establishment of the Epidemic Intelligence Service in the U.S. Communicable Disease Center (the forerunner to the Centers for Disease Control and Prevention [CDC]).[11] And infectious disease specialists have regularly been involved in the U.S. military's foreign interventions, from the Spanish American war to the Vietnam War. To understand the significance of Falkenrath's statement—and its difference from prior such conjunctures—it will be useful to develop a schematic distinction among forms of collective security.

The first two forms are familiar: national security refers to practices oriented to the defense of state sovereignty against foreign and domestic enemies using military or diplomatic means. Population security involves measures to protect the national population against regularly occurring internal threats, such as illness, industrial accidents, or infirmity. Into the late twentieth century, these two formations—warfare and welfare— were the predominant governmental means of addressing collective security problems in the United States. However, a number of current security-related initiatives, such as pandemic preparedness or critical infrastructure protection, do not fit neatly into either of these familiar security frameworks. In recent years, a third form, which we can term "vital systems security," has become increasingly central to the government of security threats (see Table 2.1).

Vital systems security targets a distinctive type of threat: the event whose probability cannot be calculated but whose consequences are potentially catastrophic. Its object of protection is not the sovereignty of the nation-state or the health of the national population but rather the critical systems that underpin social and economic life. Vital systems security measures do not seek information about a foreign enemy or about regularly occurring events but, rather, use techniques of imaginative enactment to generate knowledge about internal system vulnerabilities. The interventions of this form of security do not focus on defending against foreign enemies or modulating the living conditions of the population; instead, they seek to ensure the continuous functioning of critical systems in the event of disaster.

Vital systems security did not appear whole cloth but emerged out of one arena of national security—civilian and defense mobilization for

Table 2.1. Forms of Collective Security

	Sovereign State Security	*Population Security*	*Vital Systems Security*
Moment of articulation	Seventeenth-century territorial monarchies	Nineteenth-century urban hygiene	Mid-twentieth-century civil defense
Normative rationality	Interdiction	Risk assessment	Preparedness
Types of threat	Adversaries	Regularly occurring hazards	Unpredictable, potentially catastrophic events
Exemplary form of knowledge	Strategy	Statistics	Imaginative enactment
Operation	Deter or defend against enemy	Distribute risk	Mitigate vulnerabilities

war—beginning in the mid-twentieth century. Many of its techniques were initially developed to manage the threat of nuclear attack during the Cold War but were gradually extended to approach other potential catastrophes, ranging from natural disasters to terrorism to epidemics. These different forms of collective security imply different ways of reasoning about disease. As we will see, when infectious disease is approached as a problem of population security, interventions are structured by a logic of prevention, whereas when it is taken up from the perspective of vital systems security, the guiding logic is one of preparedness.[12]

Swine Flu and the Limits of Population Security

The object of knowledge and intervention for classical public health is the population, understood as a "global mass" affected by processes characteristic of life, such as birth, sickness, and death.[13] Expert knowledge about the well-being of the population, as generated in fields like demography, epidemiology, and economics, tracks regularities in the occurrence of these events. Experiences such as the onset of disease "are aleatory and unpredictable

when taken in themselves or individually," as Michel Foucault put it in his lectures on biopolitics, but "at the collective level, display constants that are easy, or at least possible, to establish."[14] Gathering statistical knowledge of the rate of occurrence of disease or death within a population makes such collective regularities visible. In turn, public health interventions seek to know and manage these regularities, to decrease mortality and increase longevity, to "optimize a state of life."

Modern public health measures have historically been justified based on the statistical analysis of patterns of disease incidence in a population. The case of nineteenth-century Britain is instructive. Beginning in the middle decades of the century, British public health reformers carefully tracked the collective incidence of disease to make the argument that, as historian George Rosen writes, "health was affected for better or worse by the state of the physical or social environment."[15] Such knowledge of disease incidence was cumulative and calculative. Advocates for health reform gathered and analyzed vital statistics—rates of birth, death, and disease as they varied among social classes—to demonstrate the economic rationality of hygienic measures such as the provision of clean water to urban slums or the removal of waste from streets. The argument was that the benefits of measures to increase the living standards of the poor would outweigh their cost. As social reformer Edwin Chadwick put it in his famous 1842 report, *An Inquiry into the Sanitary Conditions of the Labouring Population of Great Britain*, "The expenditures necessary to the adoption and maintenance of measures of prevention would ultimately amount to less than the cost of disease now constantly expanded."[16]

If this initial mode of population security emphasized improvements in living conditions such as sanitation infrastructure and urban housing, a next iteration intervened more directly in human biological life. The rise of bacteriology in the late nineteenth century helped lead to the systematic practice of immunization against a growing number of infectious diseases. Until the early twentieth century, smallpox was the only disease for which immunization was widely practiced. Beginning in the 1920s, it became possible to immunize populations against an increasing number of scourges, including diphtheria, tetanus, and whooping cough. But again, health policy decisions were in principle based on knowledge of the historical incidence of disease in a given population. For instance, as Rosen explains, in

designing New York City's childhood vaccination campaign against diphtheria in the 1920s, it was "necessary to know the natural history of diphtheria within the community: How many children of different ages had already acquired immunity, how many were well carriers, and what children were highly susceptible?"[17] Such knowledge about comparative rates of incidence among specific subpopulations would, it was hoped, make it possible to efficiently target interventions at the most at-risk children.

Given public health authorities' reliance on statistical knowledge of risk to design and justify measures to prevent infectious disease, they tend to have difficulty approaching events whose likelihood is difficult or impossible to calculate. How, then, do health officials take responsible action when faced with the prospect of a rare or unprecedented disease outbreak—one for which the probable course is not yet known but which could have catastrophic consequences? Let us return to the situation with which the chapter began: the apparent outbreak of swine flu in 1976. As we will see, the guiding logic of classical public health structured the way that the threat was taken up by government officials—and helped lead to an eventual "fiasco."

In January 1976, federal health officials learned that a soldier at Fort Dix had died of an unfamiliar strain of swine flu, a type of influenza virus that typically infects pigs but that can cross the species barrier to cause disease in humans. Moreover, the Army reported several other cases of the same type of flu at Fort Dix, and so the virus appeared to be both virulent and capable of human-to-human transmission. But there was no way of knowing, at this early stage, whether the cases were a sign of an impending pandemic. Some influenza virologists hypothesized that molecular transformations in the influenza virus leading to human pandemics happened approximately once per decade. The previous one had occurred in 1968. In the worst case, these experts believed, the damage wrought by the new subtype could be comparable to that of the 1918 influenza pandemic, which had killed an estimated fifty million people around the world.

There were no government plans in place for response to a potential flu pandemic. For this reason, it was not immediately clear what options were available to health authorities. A catastrophe on the scale of the 1918 pandemic was by no means predictable, but it was possible. Edwin Kilbourne, a leading influenza virologist, warned public health officials to plan without delay for an imminent disaster. Given the nature of the threat and

the response measures available, there seemed to be only one possible course of action: an urgent program to immunize the entire U.S. population in advance of the next flu season. Such an option was both expensive and practically daunting. It would require producing and distributing enough vaccine to immunize more than two hundred million people within a matter of months. This was a new technical possibility: only recently could enough vaccine be rapidly produced to envision mass immunization. But given the time constraints, to successfully implement the program a decision would have to be made immediately.

Government health officials were thus faced, for the first time, with the opportunity to intervene in advance of a possible influenza pandemic. This situation presented a conceptual and practical challenge for public health expertise. As noted earlier, modern public health institutions were set up to monitor and respond to actual, rather than potential, disease incidence. Health authorities rely on epidemiological data about the timing, location and severity of outbreaks to design effective interventions and justify the allocation of resources. For this reason, in the wake of the initial swine flu reports, authorities had difficulty in approaching a foreseeable, but not statistically calculable, event. A later report described the situation in which they found themselves: "With a pandemic possible and time to do something about it, and lacking the time to disprove it, then *something* would have to be done."[18]

On March 10, CDC officials met in Atlanta with members of the Advisory Committee on Immunization Practices (ACIP). Each year, ACIP uses updated virological and epidemiological data to generate recommendations for the CDC on which strains of influenza to vaccinate against and which at-risk subpopulations to target in vaccination campaigns. In the case of swine flu, ACIP found that because the general population did not have any immunity to this subtype, a vaccination program could not be limited to high-risk groups. One of the committee members summed up the situation: first, there was evidence of a new strain of flu that could be transmitted among humans; second, all previous new strains had been followed by pandemics; and third, for the first time ever, there was both the knowledge and the time to provide for mass immunization.

One question was raised during the meeting, but not pursued further: epidemiologist Russell Alexander asked whether it might make sense to

mass produce the vaccine and then stockpile it rather than moving directly to vaccination of the entire population. CDC director David Sencer argued that the virus would spread too quickly and that distribution logistics were too complex to consider waiting for convincing evidence of an emerging pandemic before beginning vaccination. CDC staff members were also concerned about future blame: if the Committee chose not to recommend vaccination and then a deadly pandemic followed, they would face biting criticism, argued one. It would be said that "they had the opportunity to save life," but "they did nothing."[19]

Following the ACIP meeting, Sencer composed a strongly worded memorandum to his superiors at the Department of Health, summarizing the advisory committee's recommendations. Given what he called a "strong possibility" of widespread swine influenza that could be highly virulent, the committee recommended a plan to immunize 213 million people in three months, at a cost of $134 million. The tone of Sencer's memo was urgent: "The situation is one of 'go or no go' . . . there is barely enough time. . . . A decision must be made now."[20] In turn, the Secretary of Health wrote a note to President Gerald Ford, shifting Sencer's conditional into the future tense, from possibility into apparent certainty: "There is evidence there will be a major epidemic this coming fall." The secretary's note alluded in particular to the return of the virus responsible for the 1918 pandemic: "The indication is that we will see a return of 1918 flu virus that is the most virulent form of flu." In such a case, the forecast was dire: "In 1918 a half a million people died" in the United States. "The projections are that this virus will kill one million Americans in 1976."[21]

With these grim numbers in hand, President Ford consulted with a number of leading authorities in virology and public health, including polio vaccine pioneers Jonas Salk and Alfred Sabin. The experts urged him to follow the CDC recommendation for a mass vaccination campaign. The president publicly announced the adoption of the National Influenza Immunization Program on March 24, using precautionary terms: "No one knows exactly how serious this threat could be. Nevertheless we cannot afford to take a chance with the health of the nation."[22] The projections of a potentially catastrophic event, based on the uncertain analogy to the 1918 pandemic, had placed responsibility for implementing prevention measures squarely on the president's shoulders.

Outside of the administration and its circle of public health advisors, there was sharp criticism of the immunization program. The New Jersey state epidemiologist warned of the possibility of dangerous side effects from the vaccine. Editorials from the *New York Times* were repeatedly skeptical of the program and accused the administration of engaging in politics at the expense of science. In advance of a major meeting of program participants in Atlanta, Alexander wrote to Sencer to again recommend the alternative of stockpiling vaccines "along the lines of military defense," and at the same time developing "well worked-out contingency plans" so that immunization could be rapidly carried out if the pandemic struck.[23] His suggestion, in other words, was to use military logistics methods to carve out an intermediary period of potential intervention in anticipation of the onset of the actual event. CDC officials did not consider the proposal seriously—such preparedness measures were not yet part of the shared toolkit of public health.

The goal of the immunization program was to begin vaccinations in August and finish before the end of winter. Field trials of the vaccine launched in April. By June, the epidemic had not yet appeared. At an ACIP meeting in Bethesda that month, virologist Alfred Sabin seconded Alexander's suggestion to stockpile supplies of vaccine rather than going forward with mass vaccination. Sencer countered that there was "no rational basis for a general 'stockpiling' concept." Because of "jet spread," he argued, the flu would move too fast. An unexpected blow to the program came in the summer: vaccine manufacturers announced that they would not bottle the vaccine without liability insurance. Insurers, in turn, were unwilling to offer such coverage given uncertainties about the health risks of the vaccine itself. "These questions defied actuaries," as the later report on the program put it. "There was no experience" on which to base a policy. "They were in the business to spread risk, not take it."[24] Once the issue of liability was addressed through Congressional passage of legislation to indemnify vaccine manufacturers and the immunization program began, further problems arose. The federal government had difficulty with the logistics of vaccine distribution, and there was also wide variation in state governments' capacity to implement the program.

It then became clear that CDC had not seriously considered how to manage the risk of severe side effects from the vaccine. When several

elderly vaccine recipients died shortly after receiving their shot, the agency announced that a certain number of such deaths were to be "expected."[25] Despite these various setbacks, by December 1976, forty million people had been immunized, although these vaccinations were oddly distributed given the variation in individual states' execution of the plan. Then, in the middle of the month, Minnesota health officials reported multiple cases of Guillain-Barré syndrome, a severe neurological condition, among vaccine recipients. Although there was no definitive link between the vaccine and the syndrome, by this point it was clear that the anticipated epidemic was not coming, and the program was suspended.[26] The *New York Times* editorialized: "Swine Flu Fiasco."

A later report commissioned by the National Research Council did not fault the administration's decision to go ahead with the program: after all, public health experts had been nearly unanimous in their recommendations. But the report did suggest that one source of the program's failure was its administrators' lack of foresight. Federal health officials did not have contingency plans in place and so reacted in an ad hoc manner as unexpected events occurred. Moreover, officials had not envisioned and planned for potential problems such as manufacturers' liability protection, variations in state distribution capacities, and side effects of the vaccine. Given the public health rationality of prevention and the classical tools of population security, there had been "no choice" but to go forward with mass vaccination. Health officials did not have a mechanism with which to engage in responsible, but provisional, action under conditions of urgency and uncertainty.

EMERGENCY PREPAREDNESS AND THE VULNERABLE SYSTEM

During this period, but still outside of the world of public health, a method was being developed for dealing flexibly with potential crisis situations. Over the prior two decades, the field of civil defense and defense mobilization had expanded its purview from an initial focus on planning for nuclear war to a more general form of emergency preparedness. Although in its inception, emergency preparedness was not institutionally linked to

public health, the field would eventually add to its portfolio the threat of catastrophic disease.

Much of this process initially took place in government agencies devoted to preparing for an enemy nuclear attack. Beginning in the 1950s, civil defense and mobilization planners developed techniques of nuclear preparedness such as computer-based simulations of attack patterns, urban vulnerability mapping, and the administrative coordination of emergency response across multiple jurisdictions.[27] Over the course of the 1960s and early 1970s, such techniques were applied to a range of other potential emergencies, including natural disasters, economic crises, and terrorist attacks.

One of the defense mobilization specialists who followed this trajectory was the applied mathematician Robert H. Kupperman. Kupperman served as Assistant Director of the Office of Emergency Preparedness (OEP), a successor agency to the Office of Defense Mobilization, in the late 1960s and early 1970s. Mobilization planners had long been concerned with the vulnerability of vital industrial production systems to enemy attack.[28] At OEP, Kupperman's task was to bring sophisticated modeling techniques to bear on problems of emergency planning and system vulnerability. For example, he developed network vulnerability models to improve the postattack survivability of critical systems such as oil pipelines, railways, and telecommunications networks.

Kupperman's intellectual background was in operations research, a technical field dating from World War II efforts to introduce quantitative analysis to military practice. Operations research developed mathematical tools for analyzing and optimizing complex systems. This meant seeing multiple, heterogeneous elements as part of a coherent system whose behavior was, as one of the field's pioneers, Jay Forrester, put it, "a consequence of the interaction of its parts."[29] For instance, in studying the efficiency of allied bombing campaigns during World War II, operations researchers assembled data on specific bombing runs, looking at the interaction of multiple variables such as altitude, speed, number and formation of bombings, weather, and light. "In general," as historian Thomas Hughes observes, "advocates of the systems approach perceived, conceived of, or created a world made up of systems." The systems view gained prominence in the 1950s in settings including the RAND Corporation and the Defense Department under Robert McNamara. Less visibly, systems

thinking shaped the reflections of postwar mobilization planners on how to ramp up industrial production in the lead up to a future total war. Beginning with the economic analysis of enemy industrial production systems during World War II as part of air targeting efforts, one branch of systems thinking focused on the vulnerability of vital systems to catastrophic interruption. Similarly, Kupperman's experiences in the Office of Emergency Preparedness directed his attention to the vulnerability of critical systems to sudden and unexpected events.

Based in the Systems Evaluation Division of OEP, Kupperman participated in governmental response to a number of domestic emergencies in the early 1970s, including the wage-price freeze of 1970, the devastation caused by Hurricane Agnes in 1972, a rash of domestic and international terrorist incidents, and the 1973 energy crisis. In this context, he developed an interest in the common structure of crisis situations and in the introduction of tools that could be used to prepare for them in advance. Kupperman argued that the numerous crises faced by government officials, however diverse, shared a number of common traits: a paucity of accurate information as the crisis unfolded, the difficulty of communication among decision-makers, and a confusing array of authorities seeking to take charge. Such situations involved uncertainty about what was unfolding coupled with an urgent demand for immediate intervention to alleviate the crisis. Flexibility for government decision-makers depended on the extent to which the emergency manager had envisioned the crisis situation in advance and had invested in preparation for it. The apparent recent upsurge in emergencies demonstrated the contemporary importance of such foresight. "As we begin to recognize the complex problems that threaten every nation with disaster," he and two of his OEP colleagues asked in a 1975 article in the journal *Science*, "can we continue to trust the ad hoc processes of instant reaction to muddle through?"[30]

After leaving OEP, Kupperman continued to reflect on how to improve governmental readiness for future crises, especially through his work at a Washington, D.C., think tank, the Center for Strategic and International Studies (CSIS), beginning in the late 1970s. There he was the coauthor, with national security expert James Woolsey, of a 1984 CSIS report on "crisis management in a society of networks," entitled *America's Hidden Vulnerabilities*. The report pointed to the nation's dependence on a

sophisticated and intricate set of systems, or networks, for energy distribution, communication, and transportation. It noted recent disruptions of these systems, and warned: "A serious potential exists . . . for much more serious disabling of networks crucial to life support, economic stability, and national defense."[31] Kupperman and Woolsey recommended a number of measures that could help ensure the continued functioning of vital systems in the event of emergency, including improving system resilience, building in redundancy, stockpiling spare parts, performing risk analysis as a means of prioritizing resource allocation, and running scenario-based exercises to test the system. A final key element of crisis management, according to the report, was the specification in advance of the distribution of management responsibilities during the crisis situation itself.[32]

At CSIS, Kupperman and his colleagues sought to persuade national security officials of the problem of system vulnerability and of the urgent need to have in place a portfolio of techniques for managing potential future crises. One of their approaches was to invite government officials to participate in training simulations. As Woolsey and Kupperman wrote, crisis planning should involve the operating teams and managers so that "these critical personnel gain an increased understanding of how the system works, and, particularly valuable, how it is likely to behave under abnormal conditions." Simulations were a useful technique for transmitting such an understanding: "Training with crisis games and emergency exercises will augment this benefit significantly."[33]

Writing in the early 1980s about the vulnerability of collective life to catastrophic disruption, Kupperman again emphasized the role of simulation exercises in training for crisis management: "Ideally, when a real crisis hits, no difference should exist, either operationally or emotionally, between the current reality and the previous training simulations."[34] To design an effective training exercise required detailed information about the imagined future situation to be planned for: the speed of a toxic cloud under given weather conditions, the pattern of outbreak of an epidemic, the scale of impact of a large earthquake in a specific urban setting. Successful simulations not only exercised the system of emergency response and produced knowledge about needed capabilities but also generated a sense of urgency among participants.

At CSIS, Kupperman and a group of colleagues promoted the use of a specific technique they called the "crisis simulation," which was based on the RAND political exercises of the 1960s described in Chapter 1. The CSIS group's objective in developing these simulations was not to prevent future crises but rather to improve leaders' decision-making processes once such an event was under way. Simulations achieved this by exposing current gaps in readiness—thus generating awareness of what had to be considered before a crisis unfolded for future response to its occurrence to be adequate. In a 1987 interview, Kupperman explained that a well-designed crisis simulation had four key elements: first, a plausible scenario; second, a rapid sequence of events, leading to a feeling of intense pressure; third, experienced participants; and fourth, a "control staff" whose task was to simulate the real world.[35]

Like his predecessors at RAND, Kupperman noted that participants' absorption in the exercise, and therefore the capacity of the exercise to generate useful insights, depended upon its realism: "We try to make the players feel personally responsible," he said. "We create a twilight zone, they know it's not real, but they're not quite sure." The CSIS exercise designers emphasized the central role of the "control strategy" in creating a realistic feeling of crisis in which unpredictable events unfolded in real time and required immediate response. The reality effect of the exercise depended on the interventions, during the event, of the control group—the behind-the-scenes figures who supplied the real-world results of the participants' interventions. It was the control group that decided how the external world would respond, and so structured the experience of contingency that fostered participants' felt sense of reality. Such outside forces demonstrated to players their inability to fully control the outcome of the crisis situation, generating the anxiety and sense of responsibility crucial to an effective exercise.

There is a long history of reflection on how to govern certain kinds of crisis situations, extending from early modern quarantine plans to Cold War civil defense exercises. What was perhaps distinctive to the CSIS simulation was the application of the method of imaginative enactment to the generic crisis situation in order to generate knowledge about internal system-vulnerabilities. As we will see, this technique would eventually help convince national security officials to think seriously about biological

threats. It would also help to make visible the elements of a new object of knowledge and intervention: the public health infrastructure.

DISEASE AS A NATIONAL SECURITY THREAT

In the mid-1990s, a group of advocates for renewed biodefense measures began to argue that the United States was dangerously vulnerable to a biological attack. They hypothesized an association among rogue states, terrorist organizations, and the global proliferation of biological weapons. Reports during the 1990s about secret Soviet and Iraqi bioweapons programs, along with the Aum Shinrikyo subway attack in 1995, lent credibility to calls for new biodefense measures focused on the threat of bioterrorism. On the one hand, according to biodefense advocates, the increasing accessibility of biological knowledge and the proliferation of biological weapons made an attack highly plausible. On the other hand, a lack of investment in biodefense measures and the disrepair of the nation's public health system meant that the United States was woefully unprepared for such an attack.

Prominent among the early biodefense advocates were scientists such as the epidemiologist Donald A. Henderson, who had directed the World Health Organization's successful smallpox eradication program, as well as national security specialists such as Richard A. Clarke, counter-terrorism adviser under Presidents George H.W. Bush and Bill Clinton. These experts argued that adequate preparation for a biological attack would require a massive infusion of resources into both biomedical research and public health response capacity.[36] More broadly, they maintained, it would be necessary to incorporate the agencies and institutions of the life sciences and public health into the national security establishment. In 1998, Henderson founded the Johns Hopkins Center for Civilian Biodefense Studies, which became a leading center of knowledge production around the new biological threat.

The chief concern among biodefense experts at this point was the possibility of a bioterrorist attack using smallpox virus. On the one hand, recent revelations from Soviet defector Ken Alibek about a vast Soviet bioweapons program raised the question of whether rogue states or terrorist groups might have smallpox stocks in hand. On the other hand, the U.S.

population was highly susceptible to a smallpox attack because routine vaccination had ended in 1972 and existing vaccine supplies were limited. Nobel prize–winning biologist Joshua Lederberg, a prominent advocate for greater attention to biodefense, argued that "the most likely source of supply for possible bioterrorists" came from the "laboratories of a hundred countries from the time that smallpox was a common disease."[37] At a 1999 meeting of government biodefense experts, participants were unanimous that smallpox was the primary biological threat to address—not because of the probability of an attack but because of the virulence and transmissibility of the virus alongside the vulnerability of the population. "The likelihood of an attack is small," commented Henderson, "but were it to occur it would be a real catastrophe."[38]

The CDC initiated several programs in response to the perceived threat of a biological attack. Among these was the establishment of the Office of Bioterrorism Preparedness and Response, which provided $40 million per year in bioterrorism preparedness grants to local public health departments. However, critics argued that these measures were not nearly enough. For instance, Tara O'Toole of the Hopkins Biodefense Center pointed to numerous vulnerabilities within the public health and medical response systems, to the absence of essential medical counter-measures to treat select pathogens, and to political decision-makers' unfamiliarity with infectious disease control and public health practices.[39]

Because they were describing an unprecedented event, biodefense advocates' claims about the characteristics of the biological threat typically took the form of the conditional—of what *would* happen in the event of an attack.[40] Henderson described the scenario of an aerosol release of a biological agent such as anthrax as follows: "No one would know until days or weeks later that anyone had been infected (depending on the microbe). Then patients would begin appearing in emergency rooms and physicians' offices with symptoms of a strange disease that few physicians had ever seen."[41] But such imaginative projections did not by themselves transmit to government officials the sense of urgency felt by figures such as Henderson and O'Toole to actually implement policies to mitigate what they saw as the nation's vulnerability to a biological attack.

The threat of bioterrorism had to compete in a crowded terrain of emerging security concerns, each vying to fill in what Senator Sam Nunn

called the "threat blank" left by the end of the Cold War. Prospective national security threats in the late 1990s included nuclear proliferation, asymmetric warfare, "netwar," the Y2K bug, and rising economic powers such as China. There were at least two impediments to convincing policymakers of the urgency and severity of the biological threat. First, defense strategists were not accustomed to thinking about disease in terms of national security. "We are used to thinking about health problems as naturally occurring problems outside the framework of a malicious actor," as James Woolsey put it. With disease as a tool of attack, "we are in a world we haven't ever really been in before."[42] And second, many security officials were not yet convinced that the threat was credible: a mass biological attack was an event that had never occurred, and its future likelihood was difficult if not impossible to assess.

A major task for biodefense advocates in this period was, then, to convince government officials of the seriousness of the security threat posed by a bioweapons attack. As part of this effort, advocates developed a scenario-based exercise that could serve as a pedagogical tool for public officials charged with thinking about and anticipating security threats. On June 22–23, 2001, the Hopkins Center for Biodefense, in collaboration with Kupperman's former think tank, the Center for Strategic and International Studies (CSIS), and the ANSER Institute for Homeland Security, held an exercise called "Dark Winter," which simulated a large-scale smallpox attack on the United States. According to its designers, the aim of the exercise was "to increase awareness of the scope and character of the threat posed by biological weapons among senior national security experts and to catalyze actions that would improve prevention and response strategies."[43] In other words, the exercise sought to constitute the possibility of a biological attack as a significant national security threat.

Although the Dark Winter exercise inherited much of its structure from its Cold War era precursors, there was at least one significant difference. As opposed to the RAND political exercises of the 1960s, in Dark Winter there was no red team against which the U.S. leaders played: in the case of a bioterrorist attack, there was no rational adversary whose actions would have to be understood and managed in a crisis situation. Whereas the strategizing enemy had been a central actor in the RAND exercises as well as the CSIS crisis simulations of the 1980s, "Nature" was

now the only opponent. The central problem for exercise participants had shifted: from anticipating and managing enemy motivations and intentions in a diplomatic crisis to understanding the nation's internal vulnerabilities to an undeterrable external threat.

The organizers recruited twelve prominent public figures to serve as role players. These were all "accomplished individual(s) who serve or have served in high level government or military positions," and included eminent national security authority Sam Nunn, former chairman of the Senate Committee on Armed Services and chairman of the Board of Trustees of CSIS, as the president; former presidential adviser David Gergen as national security adviser; and CSIS veteran James Woolsey as director of the CIA. These individuals were chosen both because of their firsthand knowledge of how officials would likely react to the events in question and because their analyses of the lessons of the experience would likely be credible to a wide range of current officials.

The exercise took place in three segments over two days, depicting a time span of two weeks after the initial biological attack. It was held before an audience of more than a hundred observers, including national security analysts and members of the press. Although the scenario's designers used historical data on the transmission patterns of actual past smallpox outbreaks to structure the exercise, the point of using such data was not so much to accurately model how such an event would unfold as to create a plausible scenario—and specifically, one that had a poor outcome. A critical question in designing the exercise, for example, was the rate of disease transmission assumed. Historically, the rate of smallpox transmission fluctuates widely in relation to multiple contextual factors. To determine the rate to be assumed in the scenario, the exercise designers analyzed thirty-four European outbreaks of smallpox between 1958 and 1973, choosing the case of a 1972 outbreak in Yugoslavia as their model not because its transmission rate was the most likely but because this rate would yield a cascading crisis.[44]

The designers structured the exercise to direct participants' attention to certain key issues that had been identified by biodefense specialists in advance: the limited number of vaccine doses that would be available in the wake an attack, the need for information systems to track the spread of the disease, and the lack of existing plans for coordinating emergency response

among federal and state officials. To shape how events unfolded over the course of the simulation, as in the RAND political exercises, "controllers played the roles of deputies or special assistants, providing briefings of facts and policy options to participants throughout the meeting as needed."[45]

The first meeting of the National Security Council laid out the situation for participants. There were reports of an outbreak of smallpox in Oklahoma City, assumed to be the result of a terrorist attack. Initial questions for the council were technical: "With only twelve million doses of vaccine available, what is the best strategy to contain the outbreak? Should there be a national or a state vaccination policy? Is ring vaccination or mass immunization the best policy?" The participants found that they did not have enough information about the scale of the attack to come up with a solution, especially given limited vaccine stocks. This sense of uncertainty about appropriate action had been built into the assumptions of the exercise: there was in fact no possible decision that could avert disaster.

By the second meeting of the National Security Council, the situation looked increasingly grim. "Only 1.25 million doses of vaccine remain, and public unrest grows as the vaccine supply dwindles," participants were informed. "Vaccine distribution efforts vary from state to state, are often chaotic, and lead to violence in some areas" read the transcript. International borders were closed, leading to trade disruption and food shortages. Simulated twenty-four-hour news coverage, periodically shown as video clips to participants, sharply criticized the government's response to the outbreak. The news clips included graphic images of dying American smallpox victims.

As vaccine stocks were depleted and crowds fought over remaining doses, advisers broached the prospect of using the National Guard to enforce quarantine. But who had the authority to make such a decision? In one exchange among participants, a National Security Council member argued that the president should federalize the National Guard, as states had begun to seal their borders. "That's not your function," objected a governor, defending states' rights. The attorney general responded, "Mr. President, this question got settled at Appomattox. You need to federalize the National Guard." The president then interjected: "We're going to have absolute chaos if we start having war between the federal government and the state government." Thus, the structured improvisation built into the

exercise guided participants to formulate the vulnerabilities presented by the threat of a biological attack.

Meanwhile, civil unrest intensified. "With vaccine in short supply, increasingly anxious crowds mob vaccination clinics," reported the simulated news program. "Riots around a vaccination site in Philadelphia left two dead. At another vaccination site, angry citizens overwhelmed vaccinators."[46] By the third meeting, there had been hundreds of smallpox deaths, and the situation was growing still worse as the disease continued to spread. The exercise ended as the disaster escalated: there were no doses of smallpox vaccine remaining, and none were expected for at least four weeks. The Director of CSIS, John Hamre, later narrated the final stage of the exercise: "In the last 48 hours there were 14,000 cases. We now have over 1,000 dead, another 5,000 that we expect to be dead within weeks. There are 200 people who died from the vaccination, because there is a small percentage [of risk], and we have administered 12 million doses. . . . At this stage the medical system is overwhelmed completely."[47]

REALISM AND AFFECT

One of the objectives of the exercise was to give political leaders a *feeling* of how a biological attack would likely play out and how little prepared they were for such an event. Its circle of influence extended outward through a series of briefings that included a "documentary" video portraying the simulated outbreak as it unfolded. Vice President Dick Cheney, Homeland Security Secretary Tom Ridge, and key congressional leaders were among those briefed. At a congressional hearing where the video was to be shown, Hamre warned the committee chairman: "It is not pleasant. Let me also emphasize, sir, this is a simulation. This had frightening qualities of being real, as a matter of fact too real."[48] After watching the video, the chairman described his reaction: "I felt like I've been in the middle of a movie, and maybe that's why I was anxious. I wanted to know how it turned out. And so I asked my staff how did we finally get a handle on it, you know, 12 million vaccines out, the disease spreading? And the response was we did not get a handle on it."[49] Again, the dire outcome was built into the exercise design, given the designers' assumptions about the scale of

the attack, the disease transmission rate, and the lack of available vaccine stocks.

In their congressional testimony on the need for improved bioterrorism preparedness, Dark Winter participants reported on their own experience of the exercise. Sam Nunn reflected on the problem of how to enforce quarantine given the absence of effective treatments: "It is a terrible dilemma. Because you know that your vaccine is going to give out, and you know the only other strategy is isolation, but you don't know who to isolate. That is the horror of this situation."[50] The event also revealed critical political vulnerabilities. As Hamre testified, "We thought that we were going to be spending our time with the mechanisms of government. We ended up spending our time saying, how do we save democracy in America? Because it is that serious, and it is that big."[51] Governor Frank Keating of Oklahoma was stunned at the lack of preparedness demonstrated by the exercise: "We think an enemy of the United States could attack us with smallpox or with anthrax . . . and we really don't prepare for it, we have no vaccines for it—that's astonishing."[52] Dark Winter was successful in that it convinced participants and later briefing audiences of the urgent need for advanced planning to be able to effectively govern in the event of a biological emergency.

The exercise imparted detailed knowledge about existing vulnerabilities in response capacity. First, officials did not have real-time "situational awareness" of the various aspects of the crisis while it unfolded: as the exercise designers wrote, "few systems exist that can provide a rapid flow of the medical and public health information needed in a public health emergency."[53] Second, without available stockpiles of medical countermeasures, emergency responders could not properly manage the crisis. And third, the exercise demonstrated the wide gulf between public health and national security expertise: "It isn't just [a matter of] buying more vaccine," said Woolsey. "It's a question of how we integrate these public health and national security communities in ways that allow us to deal with various facets of the problem."[54]

In their testimony, participants pointed toward policy measures that would address these lacunae. Nunn argued that first responders must be vaccinated against smallpox well in advance of an attack: "Every one of those people you are trying to mobilize is going to have to be vaccinated.

You can't expect them to go in there and expose themselves and their family to smallpox or any other deadly disease without vaccinations."[55] Hauer, a former New York City emergency manager, spoke of the need to address the problem of rapid vaccine distribution in an urban context: "The logistical infrastructure necessary to vaccinate the people of New York City, Los Angeles, Chicago is just—would be mind-boggling."[56]

But the broader lesson of Dark Winter was the need to imaginatively enact a future biological attack to be able to adequately plan for it in the present. As Hamre said, "We didn't have the strategy at the table on how to deal with this, because we have never thought our way through it before, and systematically thinking our way through this kind of a crisis is now going to become a key imperative. It clearly is going to require many more exercises."[57] And indeed, among the initiatives funded during the rapid increase in federal support for civilian biodefense of the early 2000s was a nationwide program of public health preparedness exercises, designed and run by the RAND Corporation under contract from the CDC.[58]

TOWARD PUBLIC HEALTH PREPAREDNESS

Just before the Dark Winter exercise, in June 2001, the CDC's ACIP had addressed the question of whether to implement a "pre-event vaccination" program for first responders in preparation for a potential smallpox attack. As background to its consideration, the committee cited heightened growing international concern "regarding the potential use of smallpox (variola) virus as a bioterrorism agent." However, the question of whether to recommend pre-event vaccination did not easily lend itself to resolution through the committee's standard method of evaluation, risk-benefit analysis. On the one hand, it was known that receiving the vaccine carried a risk of serious, even life-threatening, adverse effects. But it was not possible to quantitatively weigh that risk against the possible benefits of vaccination. There was no data available on which to make a calculation of the benefits of such a program in the absence of any actual incidence of the disease. As the committee reported, "The risk of smallpox occurring as a result of a deliberate release by terrorists is considered low, and the population at

risk for such an exposure cannot be determined."[59] Given the difficulty of making a credible risk assessment, the committee declined to recommend a pre-event vaccination program.

Less than a year later, this issue returned to the committee. After the events of fall 2001—the attacks of September 11, followed by a series of anthrax attacks delivered through the mail—the Bush administration became urgently focused on bioterrorism preparedness. The lessons learned from the Dark Winter exercise helped direct this sense of urgency. Recall the argument by former senator Sam Nunn that first responders must be vaccinated against smallpox in advance of a potential attack. In early 2002, the White House asked CDC to develop such a plan for smallpox vaccination. In turn, CDC requested that its expert committee once again take up the question of pre-event vaccination. The committee's deliberations show how the newly articulated demand for bioterrorism preparedness came into tension with the traditional rationality of public health. The transcript of the June 2002 ACIP meeting indicates that the committee's infectious disease specialists were not accustomed to thinking in terms of worst-case scenarios; rather, they wanted statistical data that could be taken up as part of a technical risk assessment. "To make . . . decisions, the ACIP needs data," read the meeting's minutes. "Those on vaccine efficacy and safety are in hand, but not for the risk of disease. Does anyone have more information on this that they can share? Without it, should the ACIP even make this decision?"[60]

The committee was faced with the prospect of a future event that was conceivable but that had never occurred. Without data on its probability, its members again complained that they did not have the means to make a risk assessment. Nonetheless, given pressures from the Bush administration in the context of the lead-up to the Iraq War, the CDC emerged with a plan for the voluntary immunization of an estimated one million emergency responders and health care workers, known as the Smallpox Vaccination Program. However, the program lacked credibility for the targeted population, the vast majority of whom failed to volunteer for vaccination once the program began. For emergency responders and health care workers, the threat of a smallpox attack was not credible enough to make it worthwhile to take the risk of receiving the vaccine, given its known side effects. The program was suspended in 2003 after having

immunized just thirty thousand health and emergency workers—roughly 3 percent of its initial target.[61]

More generally, in the period after the September 11 attacks and the anthrax letters, government support for bioterrorism preparedness increased markedly.[62] Hundreds of millions of federal dollars were sent to states to build local public health infrastructure, and the National Institutes of Health received substantial funds for basic research on select pathogens. In late 2001, Donald A. Henderson of the Hopkins Center for Biodefense was appointed to direct the newly established Office of Public Health Preparedness within the U.S. Department of Health and Human Services (HHS). In the following years, as HHS official Stewart Simonson later recalled, Henderson "became the architect of the post-9/11 HHS public health preparedness program," which sought to address both the threat of a biological attack and the threat of an emerging disease pandemic.[63]

Although federal public health preparedness efforts initially focused primarily on bioterrorist threats such as smallpox and anthrax, their emphasis gradually shifted to include dangers posed by "nature" as well—in particular, the threat of pandemic influenza. HHS had begun to develop pandemic preparedness plans in 1999, soon after the initial appearance of H5N1 avian influenza in Hong Kong in 1997. In the early 2000s, Simonson took an active interest in drawing the attention of government officials to the pandemic threat. In 2002, he invited the historian Alfred Crosby, author of *America's Forgotten Pandemic: The Influenza of 1918*, to brief HHS staff on the potential impact of a future pandemic. "What became clear to everyone present," Simonson later recalled, "was that we were not ready for a 1918-like event, not even close."[64] The 1918 influenza pandemic became a template for the scenario of a future influenza pandemic. To plan for the possibility of such an event, HHS decided to focus on two dimensions of public health preparedness: first, early warning—specifically, closing gaps in global influenza surveillance by forging partnerships with transnational institutions such as the Pasteur Institute; second, medical countermeasures—improving influenza vaccine production capacity and adding millions of doses of antiviral drugs to the Strategic National Stockpile, which had been established in 1999 to store drugs and vaccines for select bioweapons agents such as anthrax and smallpox. The National Institutes of Health also added funding for basic virology research on influenza transmission and

virulence to the agency's biodefense research portfolio—a program whose significance we turn to in Chapter 5.

With an eye toward the transnational dimension of the problem of early warning, in late 2001, HHS Secretary Tommy Thompson established a group for the international coordination of public health preparedness. Under the rubric of the "Global Health Security Initiative" (GHSI), the group brought together health ministers from advanced industrial countries in Europe, North America, and Asia who initially pledged to strengthen preparedness and response policies for chemical, biological, and nuclear emergencies.[65] Late in 2002, at the time of Simonson's efforts to galvanize attention to the pandemic threat, the GHSI mandate was broadened to include pandemic influenza preparedness as well. Also around this time, HHS representatives began to regularly participate in World Health Organization meetings on influenza surveillance and preparedness. In May 2005, a staff member from the HHS Office of Public Health Preparedness led an effort to gain adoption of a resolution at the World Health Assembly supporting expedited pandemic influenza planning.[66] We return to the story of the global extension of pandemic preparedness efforts in Chapter 3.

In the U.S. political context, pandemic preparedness gained initial momentum as a priority for legislative support in 2004, due to two events: first, the reemergence and spread of highly pathogenic avian influenza (H5N1) over the prior year in East Asia; second, a highly publicized failure in the production of seasonal flu vaccine in the United States. At this point, Simonson later recalled, "it became a political liability to ignore influenza preparedness." As a result, Congress agreed to the HHS budget request for $100 million in 2005 to support development of a cell culture technique to enhance the efficiency of vaccine production and to purchase stocks of the antiviral drug Tamiflu as part of the Strategic National Stockpile (SNS).

Meanwhile, the Public Health Preparedness office continued its effort to spark concern about the issue among key congressional leaders. Soon after its release in 2005, HHS staff distributed highlighted copies of journalist John Barry's book on the 1918 pandemic, *The Great Influenza*, to members of major congressional committees and held a series of briefings on the pandemic threat. In June 2005, two members of the Senate Foreign Relations Committee, Barack Obama and Richard Lugar, coauthored an opinion piece in the *New York Times* advocating for attention to the

specter of avian influenza. In addition to major national security threats such as "nuclear proliferation, rogue states and global terrorism," they wrote, "another kind of threat lurks beyond our shores, one from nature, not humans—an avian flu pandemic."

Senators Obama and Lugar argued that to adequately address the pandemic threat it was necessary to develop a "permanent framework for curtailing the spread of future infectious diseases." They laid out the elements of a public health preparedness system: it would require coordination among multiple actors including public health officials, the pharmaceutical industry, foreign governments, and international organizations. Its features would include increased disease surveillance and response capacity around the world, stockpiling of antiviral drug doses, domestic emergency planning to protect the population as well as "core public functions" in the case of a pandemic, investments in influenza vaccine and antiviral drug research, and incentives for nations to report outbreaks quickly.

Meanwhile, Simonson later recalled, the Bush administration was "focused like a laser on pandemic preparedness" due to the strong advocacy of HHS officials. In 2005, the White House Homeland Security Council led an interagency effort to develop a national pandemic plan, "which covered all departments and sections of critical infrastructure."[67] In a closed-door briefing for members of Congress in September, Secretary of Health Mike Leavitt warned that an influenza pandemic could cause up to two million deaths and ten million hospitalizations in the United States. Senate Minority Leader Harry Reid reported that Levitt's scenario had "scared the hell out of me."[68] The following day, the Senate voted to provide a $3.9 billion appropriation for federal influenza preparedness planning.

Such congressional attention to preparedness was further galvanized by the failed governmental response to Hurricane Katrina in August. As health preparedness expert Irwin Redlener explained in the aftermath of the hurricane, the government could not "tolerate another tragically inadequate response to a major disaster." An influenza pandemic, he continued, was the "next big catastrophe that we can reasonably expect, and the country is phenomenally not prepared for this."[69] For critics of the administration's emergency response, Hurricane Katrina served as a real-life exercise demonstrating gaps in the system of national preparedness. The failed response to the hurricane also indicated that while security planners had

been focused on the threat of terrorism, the problem of how to govern emergencies was much broader: the rubric of "all-hazards" planning that had initially structured federal emergency management returned to the fore.

In congressional hearings over the following months, the problem of avian influenza was cast in terms of the vulnerability of the nation's public health infrastructure. According to Sen. Richard Burr, Chairman of the Subcommittee on Public Health Preparedness, Katrina "exposed an unstable public health infrastructure at all levels of government during an emergency event."[70] The challenge at hand, argued Burr, was akin to the project of constructing the national highway infrastructure in the 1950s. "For the purpose of a national public health and defense we need a national standardized public health system," he said. Such a system would have to do more than prepare for known threats: "The question is, are we smart enough to design a template that enables us to address the threats that we don't know about for tomorrow?"

What were the necessary elements of such a system for anticipating the unexpected? These elements could be made visible through an analysis of current gaps in response capability. "There are multiple holes in our capacity to respond," said Rep. Henry Waxman. "We need to increase our vaccine production capacity, strengthen our public health infrastructure, create adequate hospital surge capacity and draft contingency plans that will ensure the continued operation of important government functions."[71] The task was to constitute an effective public health preparedness system, based on knowledge of current vulnerabilities.

According to many officials, the most serious vulnerability Hurricane Katrina had exposed was that of the locus of government authority in an emergency situation. For some, the main problem was the incompetence of federal leadership, as exemplified by the infamous director of the Federal Emergency Management Agency, Mike Brown. For others, the problem was that local authorities were not up to the task of coordinating government response. Former Homeland Security Advisor Richard Falkenrath argued that government health authorities would be incapable of adequately responding to a catastrophic disease event. The U.S. Health Department, he said, "is simply not going to be able to meet the American people's expectation of the federal government in a truly catastrophic

disease contingency such as a high lethal pandemic or major bioterrorist attack."[72] Falkenrath was especially concerned about the scenario of civil unrest resulting from "shortages in vital, life-saving counter-measures to the disease in question"—precisely the premise of Dark Winter. He focused on the logistics of medication distribution from existing stocks as the critical challenge: "I mean something very, very specific, which is to prepare to distribute life-saving medications to extremely large populations, very, very quickly, when they are afraid, because there is a communicable disease out there that they do not know how to deal with."

Falkenrath cited evidence from scenario-based exercises to validate his claim that government health agencies did not have the operational capabilities to distribute essential medical supplies in a crisis situation: "This extraordinary national deficiency was first revealed during the first TOPOFF exercise in May 2000 at which I was an observer," and "in a wide variety of smaller scale table top exercises and simulations." He continued: "The implication is inescapable: the plans, if put to the severe test of a catastrophic disease scenario in the near future, will fail." There was a clear policy implication, according to Falkenrath: the National Response Plan should be amended to assign Emergency Support Function #8, the mechanism for coordinating government response to a public health emergency, to the military in a catastrophic disease incident, at the order of the president: "Only the Department of Defense has the planning, logistics, and personnel resources needed to conduct nationwide medical relief operations in a full-scale catastrophic disease scenario." In the absence of an actual health emergency, the results of scenario-based exercises were used to authorize claims about what was likely to happen if the anticipated event did occur, and what policy changes were therefore needed in advance.

But such claims did not go uncontested. Tara O'Toole of the Center for Biosecurity drew a very different lesson from Hurricane Katrina: "What we have to do, and what the main point of planning is, as we have learned in all of the emergency preparedness done so far, is that we have to start talking with each other."[73] She disagreed with Falkenrath about the role of the military in a health emergency: "I think it would be a big mistake to . . . plan to put DOD in charge whenever we have a big bad thing happening." While acknowledging the need to "rethink federalism," O'Toole argued that

the federal role should be one of creating infrastructure to enable local response: "What the feds have to do is create the capacity to plug in and that's where they ought to be focusing on. But I don't think we want the DOD to suddenly become everybody's responder in cases of dire need."[74] The debate recapitulated long-standing discussions of the appropriate organization for emergency management—centralized versus distributed, military versus civilian—going back to the Cold War civil defense era.[75] In the end, the HHS emerged victorious in the struggle, as it was officially assigned Emergency Support Function #8 in the summer of 2007.[76]

One thing that all parties could agree on was that public health and emergency management agencies must engage in more training exercises. In a congressional hearing on pandemic preparedness, a representative of the American College of Emergency Physicians testified: "We need to train the hospital and health care workers to more long-term pandemic scenarios. And then we need to take these lessons learned, the best practices and lessons learned, and disseminate."[77] The Health Commissioner of Duchess County New York concurred: "I think over the last five years we've built the framework of a system that we can carry forward . . . but we need to strengthen that and continue to have strategic exercises community wide, not just public health departments, but every single community drill to include as many partners as possible so that we can learn from each other."[78] And an emergency health official from Virginia explained, "We have been working very closely with DHS in terms of developing metrics as well as with the CDC and DHHS, but we need to assure that we have the exercises and events to test our plans and that's really the test of preparedness."[79]

By the end of 2006, Congress had moved to address the problem of public health preparedness in a more sustained and comprehensive way, with the passage of the Pandemic and All-Hazards Preparedness Act. Health security experts hailed the bill's passage as a "milestone" piece of public health legislation.[80] The bill included a range of measures, from the reorganization of federal health administration, to funding for local and state health agencies, the training of epidemiological investigators, and a novel biomedical research initiative. A key issue the bill sought to address was how to create an integrated system of public health preparedness, one that extended from disease detection to vaccine production to the relations among the various government agencies that would be charged with

response. This system was focused not specifically on pandemic flu but on a generic form of biological threat: the unpredictable, but potentially catastrophic, disease event.

There was general agreement among preparedness advocates that addressing this threat was not simply a matter of public health but also one of national security. Although the link between national security and public health was not in itself new, what was distinctive about these measures was the attempt to integrate the institutions, forms of knowledge, and techniques of intervention developed in the period of modern public health into a system of national preparedness.

In closing, let us return briefly to the 1976 swine flu vaccination campaign described at the outset of the chapter, comparing it to the pandemic preparedness measures enacted three decades later. Along with the contrast in their scale, the two technical and political responses differed in their approach to disease threat. First, in the way of conceptualizing the threat to be managed: the 2005–2006 measures targeted not only the specific threat of a new and virulent strain of influenza but also the generic "catastrophic disease threat." Second, the site of intervention was distinct: whereas the 1976 campaign was aimed at the national population using classical methods of public health, the later plans targeted multiple elements of the "public health infrastructure," both within the United States and globally, including disease surveillance capacity, the ability to produce and distribute medical countermeasures, and the administrative organization of emergency response. And third, the prominent form of knowledge used to authorize expert claims about needed interventions had changed: rather than the statistical calculation of risk based on historical patterns of disease incidence, the emphasis of experts was on knowledge of system-vulnerabilities gathered through the imaginative enactment of singular events.

The first two chapters of this book have focused on developments in the United States: the extension of a style of reasoning and set of techniques from nuclear preparedness to a broad range potential threats ranging from natural disasters, to terrorism, to pandemics. But the specter of emerging disease, initially articulated in the late 1980s and then becoming highly visible by the early 2000s, pointed to the need for a different scale of preparedness efforts. Emerging disease specialists warned that

mitigating vulnerabilities in the United States was not only a matter of investing in national pandemic preparedness measures such as maintaining antiviral stockpiles, managing hospital surge capacity, and training health officials in risk communication. In addition, given the potential for the rapid spread of a new disease across national borders, the detection and containment of a future outbreak at its site of emergence might prove crucial to averting a catastrophe in the United States. This was the background to the U.S. Department of Health and Human Services' investment in the Global Health Security Initiative in the early 2000s. Such efforts bore fruit at the international level with the official adoption of the strategy of "global public health security" by WHO member nations in 2007. In the next chapter, we turn to some of the tensions that soon arose around this new conceptualization of the problem of global health.