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Training and preparedness in the age of bioterrorism

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TRAINING AND PREPAREDNESS IN THE AGE OF BIOTERRORISM

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ABSTRACT

The Amerithrax attack was the first wide-scale bioterrorism attack in the United States. Prior to the attack, two federal-level exercises were run to determine to what extent federal policy-makers and public health officials were prepared to work together to handle a bioterrorism attack that involved local, state, and federal officials. The purpose of this study was to analyze the outcomes of these two exercises with the response of those involved in containing the Amerithrax Outbreak and determine the relationship between interdisciplinary training exercise outcomes and bioterrorism preparedness.

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CHAPTER ONE

INTRODUCTION

The idea of using disease as a weapon is not new or innovative. From the earliest recorded history, we find accounts of ancient civilizations attempting to use biological agents and their toxic by-products as weapons of war. Deliberate attempts to kill and incapacitate enemy armies by contaminating drinking water with dead animals, smearing arrow and spear points with human and animal waste, and leaving dead, disease-ridden bodies in cities were all early methods of biological warfare.

The 20th and 21st centuries gave rise to technological innovations that aided scientists in creating more deadly biological agents that were stronger, more resistant to treatment, more pernicious and virulent, and delivered more killing power per gram. Yet, the primary goal of biological warfare remained unchanged-to kill or incapacitate the enemy by using disease as a weapon. During the 1960's, the United States was one of many states that explored the use of biological agents as weapons of war. During the Nixon Administration, the United States offensive biological weapon program ended, and the programs were redirected to research programs aimed at defense against biological weapons. As the tension of the Cold War grew, national

security became more fixated on nuclear weapons and the nuclear arms race. The threat of a biological attack paled in comparison to the threat of a nuclear winter. Nuclear weapons were a tangible symbol of a state's power, as opposed to biological weapons, whose killing power was more nebulous concept.

The collapse of the Soviet Union and the discovery of an offensive biological weapon program by the American scientific and intelligence communities once again raised the issue of infectious disease as a weapon. However, politicians remained unconvinced that bioterrorism was as large a threat as the public health community believed it to be. The idea that a small test tube could hold as much, if not more, killing power as a nuclear ICBM was a difficult concept for military planners and policymakers to grasp. Fueled by debate between civilian epidemiologists and infectious disease specialists about how likely a large-scale bioterrorism attack was, and what type of epidemiological and infectious disease implications such a scenario might have, politicians seized upon it as a partisan issue, cataloging it with other liberal, international health concerns like the AIDS epidemic in South Africa and a national health care system. Only those who had clearance to see the reports on Biopreparat

understood how large a crisis a full-scale strategic biological attack could be and how under prepared the United States was to respond to a biological attack.

The purpose of the TOPOFF and Dark Winter exercises was to simulate, based on intelligence and scientific reports, the effects of a stealth biological attack on a major metropolitan center in the United States and measure the implications of such an attack. What the exercises ended up measuring in addition to the implications of the attack was the large hole in America's preparedness in dealing with biological weapons, the lack of basic knowledge about the nature of biological weapons and their epidemiological consequences, and the lack of coherent working policy with regards to local, state, and federal needs following a large-scale biological attack.

This study took an in-depth look at the issue of bioterrorism preparedness as it was presented in two bioterrorism exercises and how it compared with the preparedness level as the Amerithrax incident unfolded. The purpose was to draw parallels among the three cases and develop working models and ideas for creating other exercises aimed at improving preparedness and facilitating the creation of policies related to bioterrorism incidents.

Background

At the end of World War I, the League of Nations drafted the Geneva Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare. The protocol banned the use of chemical and biological weapons in warfare, and limited the development of biological or chemical agents for the purposes of defensive research and testing. Many countries signed the treaty, while at the same time developing bioweapon programs[1]. The United States became a signatory to the Protocol in 1975 after President Nixon issued his Executive Order banning the United States from continuing its development of an offensive weapon program and redirecting the focus of its bioweapon research toward prevention and defense[2]. For the last 27 years, the United States has focused on bioterrorism prevention and the development of drugs and vaccines to be used against diseases that have been identified as potential biological agents.

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[1]LTC George W. Christopher, USAF, MC et al., "Biological Warfare: A Historical Perspective," *Journal of the American Medical Association* 278, no. 5 (1997): 416.

[2]Robert A. Wampler, MD, ed., *Biowar: The Nixon Administration's Decision to End U.S. Biological Warfare Program*, vol. III, *The September 11th Sourcebooks* (Washington D.C.: George Washington University, 2001), 2.

As the offensive program in the United States was ending, the Soviet Union bioweapon research program was reaching its height. Following a suspicious anthrax outbreak in the Russian city of Sverdlovsk (modern day Ekaterinburg), the United States intelligence community was convinced that the Soviet Union was running an offensive bioweapon development program, despite being a signatory to the 1972 Biological Warfare Convention[3]. Soviet officials denied the charges, blaming the disease outbreaks and death on an outbreak of food poisoning in the city. They claimed that people had become ill from eating "tainted meat."[4] Satellite images and signal intelligence supported the suspicion of intelligence analysts that a research facility in the city had released some type of biological agent in the area, after a Russian newspaper in Germany published a story about "a major germ accident."[5]

The defection of Kanatjan Alibekov (hereafter referred to as Ken Alibek), a Deputy Director of Biopreparat-the Soviet biological warfare program-gave the U.S. intelligence community more information about the incident in Sverdlovsk.

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[3]Christopher et al., "Biological Warfare," 416.

[4]Robert A. Wampler and Thomas S. Blanton, *The September 11th Sourcebooks Volume V: Anthrax at Sverdlovsk, 1979* [Internet] (George Washington University, 2001 [cited 2003]); available from www.gwu.edu/~nsarchiv/NSAEBB/NSAEBB61/index2.html.

[5]Ibid.([cited).

Alibek gave Congress extensive information on the Soviet bioweapon program, including the details of the accident at the bioweapon research facility in Sverdlovsk, in which aerosolized anthrax spores had been released, infecting residents of the nearby city, as well as livestock pastured in the fields surrounding the facility.[6]

Further confirmation of the accident came when Boris Yeltsin came to power in 1991. Yeltsin had served as the Communist Party chief in the Sverdlovsk region during the time that the outbreak occurred. It was his belief that the KGB and military had lied about the source of the anthrax infection at the time of the outbreak.

> At a summit meeting with President George Bush in February 1992, Yeltsin told Bush that he agreed with U.S. accusations regarding Soviet violation of the 1972 biological weapons convention, that the Sverdlovsk incident was the result of an accident at a Soviet biological warfare installation, and promised to clean up this problem.[7]

In an interview with the Russian newspaper Pravda following the summit, Yeltsin told reporters what he had told President Bush. In the interview he stated that the KGB was continuing to experiment with biological agents, saying:

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[6]Joint Economic Committee, 20 March 1998.

[7]Wampler and Blanton, *The September 11th Sourcebooks Volume V: Anthrax at Sverdlovsk, 1979* ([cited).

"They [the KGB] are inoculating tracts of land with anthrax, allowing wild animals to go there and observing them."[8]

Despite Yeltsin's public statements regarding the outbreak at Sverdlovsk and the continuing biological weapons program, the Russian Ministry of Defense still claimed that the deaths were caused by anthrax-contaminated meat. In a 1998 interview, Lieutenant General Valentin Yevstigneyev, the Deputy Director of the directorate for nuclear, biological and chemical weapons, countered Yeltsin's statement with one of his own:

> International experts found four different strains . . . of anthrax. Four different bacteria! . . .If a bomb exploded, would there really be four strains?. . .Believe me, if this was a single military release, two or three days and everyone would be finished![9]

Following a Presidential directive, in January of 2000, the National Intelligence Council (NIC) released a National Intelligence Estimate (NIE), aimed at assessing the threat of bioterrorism and emerging infectious diseases to national security. The NIE classified bioterrorism, emerging, and reemerging infectious diseases as potential threats to national security

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[8]V. Umnov, "After Twenty Years of Silence the Soviet Microbes Are Talking," in *Biological Weapons Program, Violations Viewed* (FBIS-SOV-92-087, 1992), 5.

[9]Wampler and Blanton, *The September 11th Sourcebooks Volume V: Anthrax at Sverdlovsk, 1979* ([cited).

> The relationship between disease and political instability is indirect but real....The severe social and economic impact of infectious diseases is likely to intensify the struggle for political power to control scarce state resources....As a major hub of global travel, immigration, and commerce, along with having a large civilian and military presence and wide-ranging interests overseas, the United States will remain at risk from global infectious disease outbreaks, or even a bioterrorist incident using infectious-disease microbes.[10]

In response to the NIE, the Clinton Administration made studying bioterrorism and infectious diseases a top national priority.

> Clinton had long been fascinated by the promise and peril of the new biology. His concern arose in part from the collapse of the Soviet Union, which had put tens of thousands of scientists privy to the technological secrets of mass destruction on the job market. The threat, Clinton would tell his aides, was obvious. He had also come to see the danger of germ weapons in the context of terrorist incidents that had marked his presidency.[11]

At the time the estimate was published, the administration was formulating a policy stance regarding the AIDS crisis in South Africa. After close study of the issue, President Clinton declared it a national security threat having "the potential to destabilize governments, such as

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[10]David F. Gordon, MD, Don Noah, Lt. Col., and George F., "The Global Infectious Disease Threat and Its Implications for the United States," (Washington D.C.: National Intelligence Council, 2000).

[11]Judith Miller, Stephen Engelberg, and William Broad, *Germs Biological Weapons and America's Secret War* (New York: Simon and Schuster, 2001), 224.

African or Asian nations, which makes it an international security issue."[12]

The Clinton Administration's classification of infectious disease and bioterrorism as important national security issues met with strong opposition. Prior to the September 11, 2001 terrorist attacks, a large-scale deliberately malicious biological attack against the United States seemed to be a subject more appropriate to a Tom Clancy or Robin Cook political thriller as opposed to a serious subject for study and debate. Congressional leaders saw it as a highly partisan issue, particularly since the Clinton Administration strongly encouraged the funding of research aimed at defining and preparing for a bioterrorism event in the United States. Two large scale bioterrorism exercises, TOPOFF and *Dark Winter*, were designed to give both the public health and the national security community the opportunity to role-play the events and learn from each other what coordination between the two communities would be needed should a real attack occur.

TOPOFF and *Dark Winter* were among the first to study the interdisciplinary effect of a bioterrorist attack. *Dark Winter* was the first to study bioterrorism preparedness at

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[12]Major Garrett, "Clinton Administration Declares Aids a Security Threat," (Atlanta: CNN News, 2000), 1.

the federal level[13]. Despite the concerns that participants in the exercises expressed at the difficulties in coordinating responses and actions on the part of the two communities, neither the public health community or the national security community felt the need to conduct further joint exercises. Both exercises were deemed a "success" and no further exercises were held before President Bush took office in January of 2001.

Public health officials felt that the risk of a large scale biological attack in the United States was very low. Skepticism still remained among many civilian epidemiologists and infectious disease specialists, particularly on the efficacy of Anthrax as a biological weapon. They argued that Anthrax did not have the stability in spore form to withstand the engineering it would require to manufacture it into a weapon. A great deal of the information regarding biological weapon research in the United States and intelligence concerning the Soviet biological weapon program, *Biopreparat*, was classified and not available to the public health community. As a result, most public health administrators, including those employed by the Centers for Disease Control (CDC), were not aware

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[13]Tara O'Toole, Michael Mair, and Thomas V. Inglesby, "Shining Light on Dark Winter," *Clinical Infectious Diseases* 34 (2002): 972.

that the United States and the Soviet Union had managed to "harden" and "weaponize" many biological agents through complex bioengineering. This lead to a false sense of security with regards to the potential for a bioterrorism attack on the United States.

Attitudes among the civilian epidemiologists and infectious diease specialists changed following the Amerithrax outbreak in October of 2001. At the October 2001 meeting of the Infectious Disease Society of America, civilian infectious disease specialists, epidemiologists, and public health officials were stunned to hear that Anthrax had been expertly engineered as a weapon of mass destruction by both the United States and the Soviet Union during the early years of the Cold War when the United States was still pursuing an offensive biological warfare program. Through research and testing, the United States and the Soviet Union had developed methods of dehydrating and preparing Anthrax spores so that they could be spread as a powdered aerosol by means as simple as loading a crop duster with the powder and releasing it over a populated area. This information, which had been classified and available only to select individuals, was now a matter of public record. The anthrax used in the Amerithrax outbreak is believed to have been engineered in the United States. Top federal officials

and scientists involved in tracing where the anthrax used in the attacks originated from note differences in it and the anthrax that has been engineered in Russia and Iraq. The anthrax used in the Amerithrax attacks originated in Texas. It came from a strain of anthrax known as the Ames strain, which had been used for research purposes at USAMRIID.

Statement of the Problem

Following the successful anthrax attack in the United States, there was a feeling on the part of both public health officials and federal decision-makers that bioterrorism is a growing threat, and the United States must be prepared at all levels to deal with an attack.[14] It was also the feeling on the part of federal decision-makers that they did not have a strong enough grasp of the medical component of the situation to make long-term policies that would help combat terrorism at both the local and national levels.[15]

These observations were also observed during the two bioterrorism exercises conducted during the Clinton

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[14]House Committee on Governmental Reform Subcommittee on Governmental Efficiency, Financial Management, and Intergovernmental Relations, *The Silent War: Are Federal, State, and Local Governments Prepared for Biological and Chemical Attacks*, 5 October 2001.

[15]O'Toole, Mair, and Inglesby, "Shining Light on Dark Winter," 980.

Administration. During the *Dark Winter* exercise, federal decision-makers found themselves in the position of needing to make overarching public-health policy decisions that dovetailed with national security policy without having the knowledge or the background to formulate coherent policies.[16] During the TOPOFF exercise, public health officials and hospital personnel found themselves needing to formulate crisis management policies that extended up to the state and federal level, but often did not know the chain of command or the procedures that needed to be followed, and as a result lacked sufficient communication with decision-makers to implement national emergency disaster plans.[17]

Dark Winter was designed to assess the connections between federal, state, and local disaster-response policies, chains of command, decision-making, and the connection between public health and national security in the area of bioterrorism. Previous studies and exercises had focused on just one aspect of the problem or one discipline. There had been no published interdisciplinary projects or exercises aimed at identifying and addressing the connections between public health and national security, and

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[16]Ibid.: 981.

[17]Thomas V. Inglesby, Rita Grossman, and Tara O'Toole, "A Plague on Your City: Observations from TOPOFF," *Clinical Infectious Diseases*, 1 February 2001 2001.

how the two communities interact with one another during times of national crisis. Until the *Dark Winter* exercise, federal, state and local agencies had trained separately and in small groups with the roles of the local and federal policymakers handled through intermediaries or not portrayed at all. *Dark Winter* included the roles of the policymakers and attempted to instill some potentially true-to-life complications into the training exercise to see how the two sides would interact. At the end of the exercise, congressional and cabinet-level policymakers who participated in the exercise admitted that they did not have nearly enough information to make informed decisions on what policy issues would need to be addressed and what order they should be handled in. Many of them also said that they did not know how to ask the right questions because they didn't understand the information they were being given and found it difficult to formulate questions that would clarify the information they had already been given and elicit the information they still needed. The Honorable John White, who role-played the Secretary of Defense during the Dark Winter exercise, expressed it by saying:

> My feeling here was the biggest deficiency was, how do I think about this? This is not a standard problem that I'm presented in the national security arena. I know how to think about that, I've been trained to think about that. . .a certain amount of what I think

> went [on] around this table was, "I don't get it. I'm not in gear in terms of how to think about this problem as a decision maker" So then I get very tentative in terms of what to do.[18]

During the Amerithrax outbreak, similar situations appeared. During the Amerithrax outbreak, it became apparent that the national security community, the public health community, and the clinical medical community did not have a great deal of experience in working with one another, and that spoke different languages and had different goals and objectives. Concerns that had been discussed and debated in the public health community suddenly became national security concerns as well. It became apparent that there were significant gaps where public health policy ended and national security policy began.

There was concern in both camps over the spread of the disease. There was misinformation on both the levels of exposure, who had been exposed, and what the actual public health threat was. Public health officials were working closely with the CDC and local hospitals to determine levels of exposure, which people were potentially exposed, and trace the vector of the disease. The bioterrorism precautions and directives put into place were activated at

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[18]O'Toole, Mair, and Inglesby, "Shining Light on Dark Winter," 981.

local, state, and national levels. The public health sector, assisted by the CDC and DHHS, immediately began working to trace and neutralize the origins of the disease. Emergency physicians and primary care physicians (who might have only encountered the disease during a class on infectious diseases or a continuing medical education seminar on emerging infectious diseases or bioterrorism) attended short seminars and workshops on how to recognize early forms of the cutaneous and inhalational forms of the disease. The CDC issued advisories regarding the handling of suspicious mail, and public health officials responded to numerous threats of contaminated mail.

On Capitol Hill, it was a different story. Congressional leaders, cabinet members, and advisors to the executive branch did not have the information necessary to determine what the next step in the crisis should be. Despite the high level of alert that the United States had been under since the September 11, 2001 attacks on the World Trade Center and the Pentagon, congressional leaders were unprepared for the policy and decision-making challenges that a bioterrorist attack on the United States precipitated. There were concerns about the stockpiling of Cipro® (ciprofloxician) and concerns that the stockpiling of the drug by concerned citizens would cause a drug shortage.

There were also concerns that the maker of Cipro®, Bayer Pharmaceuticals, would not be able to increase production of the drug in time to respond to the needs of the public. There was also concern that the company would engage in price gouging and price fixing in response to the crisis. There was talk about lifting the patent restraints so that other drug companies might be allowed to manufacture generic forms of Cipro® to augment the national stockpile. Controlled chaos reigned.

Purpose of the Study

The purpose of this project was to examine the relationship between observed strengths and problems in two previous bioterrorism exercises and correlate them to strengths and problems observed during the Amerithrax Outbreak in the fall of 2001. The focus of the project was to identify parallels between the Amerithrax Outbreak and the tabletop exercises. The overarching question driving the project was: "What is the correlation between training and preparedness? First of all, is there a correlation, and if there is a correlation, then what observable strengths and weaknesses are common to both the exercises and the actual event?" Questions aimed at clarifying the predominant question were: "What training is currently in place at the

federal level? What is the level of threat as perceived by the federal decision-makers? How many of them have a sufficient background in bioterrorism and/or public health issues to make judgements and decisions on information as it is being presented in an actual situation? Are federal decision-makers prepared to give leadership and guidance in matters of bioterrorism? Do public health officials and agencies have a clear understanding of the chains of leadership and command that drive federal and state decision-making structures to use them effectively? What is the flow of communication between the two groups, and is the communication effective? What mistakes are occurring during training exercises that are also happening in the field?"

Questions aimed at clarifying the public health preparedness of a bioterrorism attack addressed chain of command issues from a bottom-up perspective. These questions included: how do public health officials determine whether an infectious disease that is on the watch list is a naturally-occurring outbreak or was it deliberate and malicious? Do public health officials know whom to get in touch with at the state or local level if there is the suspicion that the outbreak appears to be deliberate and malicious? Do public health officials know what diseases are on the bioterrorism watch list as opposed to the

epidemiological watch list, and what diseases overlap? Do public health officials understand the national security implications of a deliberate and malicious attack, and are they able to supply the needed epidemiological and laboratory support to aid federal and local law enforcement agencies in a criminal investigation? Are they able to supply the various members of the national security community with the needed information so that they are able to adequately brief and advise the president? Do local level trainings even address national security aspects and implications of a bioterrorism attack?"

The primary hypothesis was that there was a correlation between training and preparedness, and that observed strengths and weaknesses during training would also be observed in the field. The goal of the primary hypothesis was to confirm the feelings on both the part of federal decision-makers and public health officials, who participated in the two exercises and the Amerithrax Outbreak, that bioterrorism preparedness at both the federal and local levels is lower than it should be and there is a need to improve training. The secondary hypothesis was that critical components of training were lacking at both the federal level and at the local public health level, which was contributing to the lack of preparedness. The goal of

the secondary hypothesis was to determine if there were critical pieces missing from the training exercises, and if the hypothesis was proven to be true, what those critical pieces were to improve future training, and thereby improve overall preparedness.

The purpose of this paper was to present the whole picture and examine it from a national security/national health policy perspective. It examines the bioterrorism containment issue from a holistic perspective, with the idea that bioterrorism is both a public health issue as well as a national security issue and must be examined from an interdisciplinary perspective. The study is significant, because (to the best of my knowledge) it is the first formal study to examine how both federal decision-makers and local public health officials are trained to confront the problem of bioterrorism and manage a bioterrorist attack. It is different from other evaluations of bioterrorist and WMD training, because it looks at the whole picture of bioterrorism containment from both the public health perspective and the national security perspective. Previous studies have focused on either one aspect or the other. The research adds to current knowledge by adding this interdisciplinary component and examining the interconnection between the two groups. It also addresses

the problem that because training is not being conducted from an interdisciplinary perspective, both public health and national security officials are lacking critical knowledge and information that is vital to successful management of a bioterrorist attack.

Theoretical Basis/Organization

Again, this was the first organized study to examine bioterrorism training from an interdisciplinary perspective. The theoretical basis for the study draws on both social science and public health methodologies. The hypothesis states that there is a correlation between training and preparedness. Examination of the current training methods through this research showed that bioterrorism training done within the context of specific disciplines was not sufficient to address the complexity of issues and problems that must be resolved during a bioterrorism incident. The free-form debriefing statements made by participants in both TOPOFF and *Dark Winter* indicate that there were many areas of interdisciplinary cooperation and decision-making that participants were not familiar with, and were unclear as to who had the authority to make decisions and carry them out. The outcomes of the research suggest that training must be done within an interdisciplinary context for the training to

be truly effective, and that subsequent training must incorporate scenarios that address earlier areas of weakness to determine if effective solutions and policies have been developed.

The concept of the interdisciplinary model is familiar within public health and social work professions, but is not as commonly used in public policy and national security settings, and within the national security context its function is different. An example of an interdisciplinary team functioning at the federal level is the executive cabinet, made up of individuals who advise the President on various foreign and domestic issues. Similar examples at the federal level include congressional advisors and staff. These individuals are trained to provide information to individuals in charge of making decisions, but are not responsible for making decisions.

By contrast, interdisciplinary teams at the local level are teams of people who work together to solve problems and care for individuals. At the local level, particularly in the public health and social work settings, you will have social workers, case managers, doctors, nurses, and other support personnel who come together and talk about what the aspects of the problems are, who is responsible for what and what each member of the team will do to facilitate the best

possible outcomes. Interdisciplinary teams at the local level tend to be high-functioning because each team member is well-educated in their field and has a "toolbox" of skills designed to complement their area of expertise. However, particularly in the medical and public health fields, the "toolbox" may not include skills on dealing with the media, briefing state and federal policymakers who have extensive knowledge of national security and military policy, but are probably at a loss when it comes to incorporating this policy into the broader scope of dealing with civilian agencies and civilian victims of a bioterrorist attack, and whose professional language does not include medical terminology and concepts.

Because of the difference in the two models, standards for training must be designed that complement the strengths and styles of each discipline, yet address the need for interdisciplinary cooperation. The current methods of training rely on each model to develop their own training standards and processes without the interdisciplinary component. This creates teams that function well individually at the local level and at the federal level, but are unable to effectively function as a whole. The project examined the bioterrorism issue from an interdisciplinary perspective with the goal of identifying

the gaps in training and preparedness that stemmed from this interdisciplinary component and make suggestions for improvement.

Limitations of the Study

The greatest limitation to this study was the lack of published studies and materials that addressed how bioterrorism preparedness was trained for at the federal level. Close study of the final *Dark Winter* article "Shining Light on Dark Winter," indicated that it was the only one that had addressed this particular problem at the national level.

> The first such exercise of its kind, Dark Winter was undertaken to examine the challenges that senior-level policy makers would face if confronted with a bioterrorist attack that initiated outbreaks of highly contagious disease. The exercise was intended 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.[19]

The *Dark Winter* exercise was a highly-controlled, time-compressed exercise. It was divided into three distinct segments representing a total time-period of approximately

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[19]O'Toole, Mair, and Inglesby, "Shining Light on Dark Winter," 972.

two weeks in length. The exercise simulated three National Security Council (NSC) meetings, each representing three different days-December 9, 15, and 22.[20] Following the exercise, participants took part in a debriefing session. The results of the session were later presented during a series of congressional testimonies and follow-up articles.

The other exercise included in this study was the portion of the TOPOFF exercise dealing with a mock biological attack on Denver, Colorado. Although the complete TOPOFF exercise was commissioned by the Department of Justice under the direction of Congress and included officials at the federal, state, and local levels, the primary focus of the bioweapon portion of the exercise was to study the reactions of local and state public health organizations, and offices of emergency management and "test the medical and public health system and infrastructure that would be called upon in the event of a bioterrorist action."[21] Participants and observers in TOPOFF were debriefed off-the-record "with the understanding that

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[20]"Dark Winter," (Andrews Air Force Base Johns Hopkins Center for Civilian Biodefense Center for Strategic and International Studies ANSER Memorial Institute for the Prevention of Terrorism, 2001).

[21]Inglesby, Grossman, and O'Toole, "A Plague on Your City," 436-37.

information that was provided...would not be attributed to its source."[22]

The exercise was a loosely-controlled, loosely-scripted, "player-driven" scenario with participants making decisions as they received information during the course of the exercise. Exercise controllers maintained the boundaries of the exercise and directed the flow of the action. The exercise was a construct of real-time, real-life events, and events and information that was simulated through a combination of role-playing and pencil and paper constructs. The exercise scenario spanned seven days, May 17 - May 23, with actual game play occurring on May 20 - May 24. The exercise was intended to simulate a stealth attack with a biological weapon against a civilian target.[23]

The third incident examined was the anthrax outbreak occurring in October of 2001 (later named the Amerithrax Outbreak). The outbreak occurred after several anthrax-infected letters were mailed to intended victims. Because the attack was only the second bioterrorism attack in the United States, and the first using Anthrax, the CDC and other members of the public health and clinical medical community are still studying the outcomes and comparing the

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[22]Ibid., 436.

[23]Ibid., 437.

number of casualties and exposure levels to the incomplete data derived from studying reports of the outbreak in Sverdlovsk and medical models obtained through human and animal studies on Anthrax exposure and infection.

The lack of formalized research on bioterrorism training outcomes incorporating local, state, and federal resources required that I create my own foundation and framework for analysis not only for examining bioterrorism training from an interdisciplinary perspective, but also for examining and evaluating bioterrorism training outcomes. This necessitated study and research in other disciplines, primarily social work and urban geography, to find and develop the tools for evaluating the current research. Borrowing techniques from Social Work and Urban Geography, I created a theoretical framework of what the exercises were attempting to measure and accomplish, using debriefing statements, interviews, and congressional testimony.

The lack of published materials and research also meant that the project had to be reworked from a full-scale archival research project to a pilot study. A sample size of three (two training exercises and a "live-fire" situation) and the lack of parametric data made it impossible to run a Multiple Analysis of Variance (MANOVA) to determine similarities and differences between the three events and

required some re-evaluation of how to analyze the data to show similarities and differences. The lack of an internal rating system for the two exercises also made parametrical statistical analysis involving correlation and regression statistics for the individual situations impossible. This required that I do an extensive qualitative analysis using published debriefing materials.

The exercises themselves also posed unique problems and differences that hampered a comprehensive comparative study. One complication was in the discrepancy between the TOPOFF exercise and the *Dark Winter* exercise. The *Dark Winter* exercise was heavily scripted and time-compressed to allow complete participation by all invited members and allow for a complete free-form debriefing at the end of the exercise[24]. TOPOFF was a loosely scripted scenario with points of information inserted at key intersections during the exercise. The exercise was scheduled to run for one week, during which time participants would act as they would if the outbreak were happening in real life. After four days, the exercise ended, with many participants feeling overwhelmed by the exercise.[25]

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[24]"Dark Winter."

[25]Inglesby, Grossman, and O'Toole, "A Plague on Your City," 441.

Free form debriefing revealed that participants in both exercises were quickly overwhelmed by the magnitude and scope of the problems that a full-blown bioweapon attack manifested. They did not feel that they had adequate medical or public health resources to deal with the outbreak, that CDC involvement-while helpful-only addressed one aspect of the problem, and was only able to help with problems under the direct authority of their agency. There was the indirectly expressed mutual feeling that the people in government in charge of deciding how to handle this type of a crisis were out of touch with what a crisis like this would truly entail.

The Amerithrax event contained its own set of problems and issues. Predominately was the "stealth" aspect of the attack. While the two exercises had set up their scripts as an attack with no warning, the Amerithrax attack was hardly a "bolt from the black." Following the September 11 bombings of the World Trade Center and the Pentagon, the United States was on high alert. The threat level was considered "high," and military personnel, emergency personnel, and disaster workers were responding with increased vigilance. This increase in awareness, along with the public health community's encouragement that doctors and hospitals report suspicious combinations of symptoms, or

clusters of people being admitted to emergency rooms with similar symptoms, rather than waiting for a confirmed diagnosis, made the difference in several of the early Anthrax cases.

> A fortuitous decision made by the emergency physician was to admit the patient with the presumptive diagnosis of meningitis. . . .When asked why he admitted this patient when other patients with similar findings may have been sent home, he responded, "Sometimes you have that little voice that says, 'Why don't you admit this patient for observation'. . . another significant factor. . .was that the same on-call infectious disease specialist Dr. Susan Bersoff-Matcha, was consulted for both patients. She was the one to ask "Where does he work?"[26]

In stark contrast to the exercises, the early period of the attack was not spent in attempting to determine what the biological agent was or what its point of origin was, but in ramping up detection and containment measures to limit further spread of the agent, which gave doctors and other medical personnel time to familiarize themselves with the disease and prepare contingency plans for how they would deal with an Anthrax epidemic in their community-advantages that were not mirrored in the two bioterrorism exercises.

In this biological attack, there was no question that an attack had been made, or what biological agent was used.

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[26]Katherine M.D. Uraneck, "When the Hoof Beats Brought Zebras: An Emergency Department's Successful Identification of Two Inhalation Anthrax Cases," *American College of Emergency Physicians* (3 January 2002): 3.

A more concerning question to federal public health and national security officials was: was anthrax the only agent used, or were there other agents that might have also been used?[27] When the first death from inhalational anthrax occurred in Florida, public health and medical personnel were immediately suspicious that this was not a "natural" occurrence of anthrax, but a deliberate infection. The CDC immediately sent a team down to Florida, and put the rest of the country's public health system on alert. Within days of the first casualty, several "Anthrax Letters" appeared, and were found to be carrying a powder containing the Anthrax bacteria and a warning for the recipients. These letters tipped off the public health and CDC officials that the Anthrax case in Florida was just the first of the deliberate attacks, and not an isolated incident as had first been reported. Immediately, the CDC published a warning regarding the Anthrax-tainted mail, along with public health recommendations and posted it on their website with a large link on the CDC main page pointing to the special information. The information was mirrored on the United States Post Office website, along with special instructions for mail handlers who thought they might have come in

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[27]Richard Preston, *The Demon in the Freezer* (New York: Random House, 2002), 164.

contact with the tainted mail. The CDC also published special guidelines for medical personnel on prophylactic treatment with ciprofloxician and provided extra anthrax reagent to state and local labs to aid in the mass anthrax testing taking place. They made communicating with doctors and the media a priority, setting up a 24-hr anthrax hotline and holding daily conference calls with the local media.[28]

Another confounding variable was in the type of biological agent used. The two simulation exercises utilized an agent that could be spread from person to person (TOPOFF used Smallpox, *Dark Winter* used the pneumonic form of plague) creating a different epidemiological model and different problems that needed to be solved. Unlike the two agents used in the exercise, Anthrax bacteria can not spread by interpersonal contact. An individual must come in direct contact with the bacterial spore and receive a large enough "dose" in order to contract Anthrax. The difference in vector transfer, as well as the differences in the three agents themselves, changed the nature of the public health aspects of the comparisons, and in turn narrowed the scope of the comparison of the public health aspects of the study.

A third confounding variable was in the level of detail that emerged at the debriefings, and the level of details

[28]www.cdc.gov/od/oc/media/transcripts

that were covered in the exercises. While the TOPOFF exercise was very loosely scripted and did not provide a great amount of external detail, the participants themselves gave copious feedback on communication methods, chains of command, decision-making aspects, and other exercise details that were not specifically scripted in the exercise, but participants felt had contributed or detracted from their ability to get the job done. On the other hand, *Dark Winter* tightly scripted how the information flowed, who had access to the information and how information was shared. This tight scripting influenced the feedback given by *Dark Winter* participants, who tended to focus their debriefing remarks on what difficulties they encountered within the roles they were assigned, the knowledge and information they had available to them, and the scope of their authority and their ability to use that authority effectively. Their debriefing statements were appropriate to the stated objectives of the exercise, but did not lend themselves to this particular cross-comparison. By its very nature, the Anthrax attack was not scripted and information flow was not controlled or directed by an outside individual. This made it easier to compare with the information flow from TOPOFF, even though the issues that were confronted were closer to

the issues examined and discussed during the *Dark Winter* exercise and debriefing.

These differences in exercise details required that the research extend beyond comparison of individual factors and variables and examine all three situations for common themes that grew out of the experiences of the participants and were shared during the debriefings. The small number of cases and the inability to control for external confounding variables limited the amount of meaningful statistical analysis that could be derived from the study. To complete the picture, the statistical data was combined with the published debriefing statements, congressional testimony, and follow-up articles, in a detailed qualitative analysis, more commonly used in the political science and history disciplines, than in the scientific, medical, and public health disciplines. It is highly unlikely that this research could be fully replicated in another study, however, the study itself has value because it created a framework for examining the question of bioterrorism and national preparedness from an interdisciplinary perspective.

Definition of the Terms

Anthrax: *B. Anthrasis* (Latin). Bacteria that causes the disease Anthrax. Anthrax is a zoonotic disease that is found

in livestock, primarily sheep and cattle. It hibernates in spore form in the dirt. It has three forms: Cutaneous [skin], inhalational (also seen in some of the medical literature as pulmonary), and gastro-intestinal. It is also known as "Woolsorter's Disease" because it was most commonly seen in people that worked in the tanning and livestock industries before a vaccine was available. The cutaneous form is also called "Siberian Ulcer" because the farmers and ranchers in the Soviet Union often contracted the cutaneous form of disease. Anthrax is not commonly seen in the United States and other industrialized nations because domesticated farm animals and individuals in the livestock industry are routinely vaccinated for the disease. Bioweapon (Also seen in the literature as biological weapon or BW, occasionally it will be referred to with a chemical weapon with the initials BCW): A weapon that uses a disease as its means of destruction.

Biological agent: (May be used in Department of Defense (DoD) literature as a synonym for bioweapon) Type of disease used in a biological weapon. Agents may be identified according to their classification-viral, bacterial, or toxin, or by name-i.e. Smallpox. When agents are discussed in the public health or medical literature, they will usually be identified by common name, and might also be

called by their Latin scientific name-such as *B. Anthrasis* [anthrax].

Biopreparat: Soviet bioweapon program that was theoretically discontinued during Mikhail Gorbachev's administration, and reengineered into a bioweapon defense program under the Ministry of Health. United States experts in the field of biological weapons questioned whether or not the offensive portion of the program was dismantled, and whether it still continues in secret. The defection of Ken Alibek revealed that the offensive program continued until the collapse of the Soviet Union at the end of the Cold War.

Blood-born pathogen: Infectious agent spread through direct contact with contaminated blood or other bodily fluids.

"Bolt from the Black": Expression used by the national security community to describe an event that appears to come out of nowhere, literally "out of the black" with no previous warning. Usually also colloquially indicates that the intelligence community did not see it coming.

Centers for Disease Control (CDC): Federal agency in charge of overseeing the research, diagnosis, containment, and treatment of infectious diseases in the United States. It coordinates with state and local information to provide information and resources on the detection, diagnosis, and

treatment of infectious diseases in the United States. It also works with local and state public health agencies on disease prevention and public health education in concert with the Department of Health and Human Services.

Chemical and Biological Weapons Convention (CBWC, also occasionally seen as CBTWC-Chemical, Biological and Toxic Weapon): 1972 treaty that outlawed the development of chemical and biological weapons and weapon research. It also limited the type of defensive research that could be conducted.

Ciprofloxacin Hydrochloride: (most often seen in the literature under its generic name, ciprofloxacin, or its patent trade name, Cipro©) Antibiotic manufactured by the Bayer© Pharmaceutical corporation under the trade name Cipro© specifically FDA labeled to prophylactically treat anthrax. The drug received FDA approval in August of 2000.

Chemoprophylaxis (chemoprophylactic, chemoprophylactically, prophylactic, prophylactically): Drug or vaccine treatment given to individuals following exposure to an infectious agent in order to prevent illness.

Department of Health and Human Services: (DHHS, often abbreviated HHS, or Office of HHS): Federal-level department that oversees the development, implementation, and enforcement of United States Health policy and

administers the CDC, the FDA, the Offices of the Surgeon General, and other advisory and regulatory agencies.

Deterrence: Term used to describe one country preventing or dissuading another country from obtaining nuclear weapons by demonstrating a superior strategic or tactical position-usually military, but can also be through a treaty or an alliance. It can also be used to describe one country preventing or dissuading another country from attacking it, depending on the context.

"Dirty" ("dirty bomb", "dirty weapon"): Used when discussing a weapon of mass destruction. Weapon that is designed to disseminate as much destructive material over as large an area as possible. The term is most commonly used in conjunction with a nuclear weapon, but can be applied to biological weapons as well.

Disease Reservoir: Location where the infectious agent of a disease "hibernates" until it comes in contact with a host. The Anthrax bacteria spore "hibernates" in the dirt.

Doxycycline: Antibiotic approved for treatment of anthrax that received a label-supplement update to include prophylactic treatment for exposure to the anthrax spore. This update was released in the Federal Register November 2, 2001 during the anthrax outbreak. The label supplement was approved for both Doxycycline and Penicillin G Procain.

Emerging Infectious Disease: Disease that is relatively unknown and unstudied in the infectious disease community. During the 1980's, Human Immunodeficiency Virus was classified as an emerging infectious disease. A current example would be Severe Acute Respiratory Syndrome (SARS)

Food and Drug Administration (FDA): Regulatory agency under the administration of DHHS that oversees the development, implementation, and enforcement of national policies that regulate the food and pharmaceutical industries-with the exception of farming and livestock which are overseen by the USDA.

FDA-labeled (also seen in the literature as FDA approved, label-approved, labeled-for): Medical term for the FDA instructions on what specific diseases or conditions over the counter or prescription drugs are approved to treat, the instructions for how the drug should be taken, and the side effects and counter-indications that have been observed for each drug. The labeling information is set at the time that the drug is released to the public along with extensive descriptive information on how to safely use the drug. The complete FDA instructions for each approved drug can be found in the PDR.

Infectious Agent: Bacteria or virus that causes disease. Also called a pathogen.

Infectious Disease: Disease that is caused by an infectious agent.

Mutually Assured Destruction (MAD): Cold War term used by the national security community to define the Soviet nuclear strategy. It encapsulates the idea that if the United States and the Soviet Union were to engage in a nuclear exchange, both superpowers were capable of launching nuclear weapons in time to assure that even though nuclear destruction might be inevitable, it would not go unanswered.

National Intelligence Council (NIC): Council of advisors and analysts in charge of preparing National Intelligence Estimates on matters the intelligence community and/or the president deem important to protecting national security.

National Intelligence Estimate (NIE): Intelligence report that looks in-depth at a particular subject or issue of importance to national security. Often two reports are prepared–one that is prepared using open-source materials that is unclassified, and one that is prepared using a mixture of open-source and classified materials that is restricted to those with the appropriate security clearance. Occasionally a report is prepared that is unclassified and available to the public. The special NIE on Infectious

Diseases and National Security Implications is unclassified and available from the NIC.

Non-proliferation Treaty (NPT): Treaty that agrees that signatories will not develop weapons of mass destruction or export information or technology that will help other countries develop weapons of mass destruction in exchange for technology and information on nuclear and biological research aimed at peaceful, defensive applications.

Nuclear, Chemical, Biological Warfare (NBC Warfare, NBCW): Collective term used by the national security community to indicate an attack or war scenario using a weapon that is either nuclear, chemical, or biological in nature. Often used along with the WMD descriptor. Depending on context, NBCW can also stand for nuclear, chemical, or biological weapon.

Re-emerging Infectious Disease: Infectious disease that was thought to be eradicated or contained, that has once again become an infectious disease threat. Infectious Turburculosis (TB) in developed countries was thought to be contained, but since the spread of the AIDS virus it has once again become a health threat, and has been classified as a Re-emerging Infectious Disease.

Physicians Desk Reference (PDR): Medical reference book that contains complete FDA labeling on all prescription and over-the-counter drugs.

Proliferation: Term used by the national security community to describe the acquisition of nuclear, chemical, or biological weapons by another country or the dissemination of weapon technology between one country and another.

Stepnogorsk: City in Kazakhstan that became the site of a Soviet bioweapon facility when the bioweapon program was relocated from Sverdlovsk and reorganized under the Ministry of Health under the *Biopreparat* Directorate. The facility was mothballed at the end of the Soviet regime, and Kazakhstan health officials have been petitioning the US for aid in cleanup and restructuring of the facility for civilian health research purposes.

Sverdlevosk: Site of a major Soviet bioweapon research facility. The city is infamous for an April 1979 bioweapon accident in which Anthrax spores were released into the nearby community and 69 people died from Anthrax infections. The site is located in the modern day Russian city of Ekaterinberg (Yekaterinberg).

United States Department of Agriculture (USDA): Regulatory agency that oversees food safety and infectious

disease issues that are related to farming and livestock. The USDA is in charge of monitoring livestock herds for evidence of infectious diseases, particularly diseases that can be spread to humans.

Vozrozhdeniya Island (Also seen in the literature as Renaissance Island or Rebirth Island): Island in the Aral Sea that was the site of a Soviet infectious agent research and storage facility. The island was shut down and abandoned at the end of the Soviet regime. The island has become a source of controversy because of the infectious agents that are still stored there and the gradual evolution of the island into a peninsula due to the draining of the Aral Sea by the surrounding communities. Research teams have found evidence of infectious agents buried at Vozrozhdeniya Island that can still be used for the purposes of research and weapon development.

Weaponized, weaponized agent (most often referred to in the national security literature by the name of the disease or agent-i.e. "weaponized Anthrax"): Infectious agent that has been bioengineered to make it more useful as a weapon.

Weapon(s) of Mass Destruction (WMD): Collective term used by the national security community to indicate a nuclear, chemical, or biological weapon, without discriminating between type. Term is most often used in

literature when discussing theories on proliferation, deterrence, or destructive capabilities. There is a discussion in the community to rename the term to something more appropriate, as the WMD abbreviation is often used when discussing Cold War national security policy and theory, and since the collapse of the Soviet Union weapons of mass destruction are now also available to small rogue states and terrorist groups. The term currently preferred is "unconventional weapon."

Zoonotic: Term used by the medical and public health community to classify a disease that is native to animals but can cross over into humans if humans come in contact with the disease under the right conditions.

CHAPTER TWO

REVIEW OF THE CURRENT LITERATURE

National Security

In 1999, the Clinton Administration identified emerging infectious diseases and public health as a national security issue[29]. In January of 2000, President Clinton requested that the National Intelligence Council (NIC)produce an unclassified NIE focusing on the connection between national security and infectious disease. In the NIE, the NIC included the threat of bioterrorism as one national security issue related to infectious disease. It called for further study of the issue and highlighted the need for a stronger public-health infrastructure to prepare for the potential threat of a bioweapon attack.

The NIE also addressed other infectious disease issues that were not directly related to the threat of a bioweapon attack. These were included because they had the potential to trigger violence against the United States or its allies and could have implications for national security in general. AIDS, because of the political instability it was causing in South Africa and its potential for causing political instability in other states, was flagged as a

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[29]Garrett, "Clinton Administration Declares Aids a Security Threat."

potential national security concern. Critics of the Clinton Administration argued that infectious diseases were by their very nature a public health issue with only indirect ties to national security. Senator Trent Lott supported this position in an interview with Fox News with the statement: "This is just the president trying to make an appeal to certain groups."[30] They argued that the management of an infectious disease outbreak was under the jurisdiction of the Center for Disease Control and other public health agencies, and only had implications for national security if the outbreak was directly tied to an act of terrorism sponsored by another state.

As a result of this, national security literature has primarily focused on the larger aspects of bioweapons and bioterrorism, taking an approach that is closer to that of its discussion of nuclear weapons. The current literature focuses primarily on deterrence aspects of WMD's including bioweapons. In his essay, "Universal Deterrence or Conceptual Collapse? Liberal Pessimism and Utopian Realism" Richard Betts argues that biological weapons may pose the "greatest WMD threat of all."[31] He discusses the

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[30]Ibid.

[31]Richard K. Betts, "Universal Deterrence or Conceptual Collapse? Liberal Pessimism and Utopian Realism," in *The Coming Crisis Nuclear Proliferation, U.S. Interests, and World Order*, ed. Victor A. Utgoff (Cambridge: MIT Press, 2000), 60.

difficulties associated with defending against a biological attack because of their simplicity to obtain and the likelihood they will be used by a terrorist acting on the behalf of a small group or country[32]. Proliferation issues are also discussed.

Prior to October of 2001, bioweapons were considered to be a threat more likely to be faced in a theater of war, than on the domestic front.The threat of a biological weapon used within the United States borders was considered "near zero" and likely to be the work of a domestic terrorist group rather than a state-sponsored act. Following the Amerithrax Outbreak, there has been a division between congressional leaders that feel that infectious disease-particularly diseases spread through malicious intent-are a national security issue, and those that feel that the disease outbreak itself is not a national security issue, and it only becomes a security issue when it involves an act of aggression by another state. Proponents for studying the effects of biological weapons as a national security issue face strong opposition from those who feel that the study and management of public health emergencies stemming from the use of biological weapons belongs in the jurisdiction of the Department of Health and Human services

[32]Ibid., 79.

and its accompanying agencies, not the federal government or national security council. Proponents for counter that given a large enough emergency, all aspects of government will be affected, including issues that pertain to military readiness, immigration, domestic and international travel, commerce, and international relations. They argue that because of the broad, interdisciplinary scope of a large enough bioterrorism incident, the national security community must become aware of the national security implications of a large-scale bioterrorist attack and prepare accordingly.

Public Health and Clinical Medicine/ Infectious Diseases

Following the release of the NIE, the public health community began addressing the public health and emergency response issues inherent in a biological weapon attack. The CDC issued updated guidelines for management of a bioterrorisism incident. These guidelines are currently available through the CDC website: www.cdc.gov. Individual state and local public health offices also began running their own trainings, and began to publish articles specifically targeting the issues and concerns that specifically related to a bioterrorist attack. Emergency management officials also put together materials to educate

and inform their employees on how to effectively manage a potential biological attack while minimizing the possibility of becoming infected. The recent congressional legislation both following the NIE and following the October 2001 attacks focus on public health issues related to terrorist attacks and biological weapon attacks specifically.

The majority of infectious disease literature prior to the October 2001 attack was focused on the clinical aspects of infectious disease management for the different biological agents involved. Studies that focused specifically on bioterrorism addressed clinical and epidemiological aspects of how the disease was spread and containment issues. Only a handful of articles looked at the larger picture between biological weapons, medicine, and national security. The August 1997 issue of the *Journal of the American Medical Association* (JAMA) was a special issue devoted entirely to the subject of bioterrorism. It focused on both clinical aspects of diseases used in bioterrorism, the history of bioterrorism, and information to help clinical physicians identify bioterrorism threats and how to manage a bioterrorism attack.

Now, following the October 2001 Amerithrax Outbreak, the clinical medicine and public health disciplines are piecing together the epidemiological, clinical, and

scientific research data to make sense of the broader picture of the attack. Many clinicians are recognizing the interdisciplinary feature of a biological weapon attack and beginning to write articles that touch upon this issue. Many top-level public health and clinical medicine professionals are realizing that many aspects of a biological weapon attack fall outside of their immediate jurisdiction and need to be addressed from an interdisciplinary aspect that includes state and local public health and clinical medical professionals in order to be effectively managed.

> We must understand that public health is now an essential aspect of national security. We must establish a strategic plan to upgrade the capacity of federal, state and local public health departments to respond to bioweapon attacks and must prepare to invest the resources needed to implement such upgrades. . . .we should require regular and sophisticated drills and exercises involving multiple health agencies and elected officials. Such drills have proven very useful in revealing coordination problems among response agencies and in suggesting solutions.[33]

The majority of clinical literature used in this study was to gain information on current drug labeling, the chemoprophylatic use of ciprofloxician, doxycycline, and

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[33]Government Affairs Subcommittee on International Security, Proliferation, and Federal Services, *Terrorism through the Mail Protecting Postal Workers and the Public (Part II)*, 31 October 2001 2001, 4.

other antibiotics, outcomes of drug studies and research on infectious agents used in biological weapon attacks, and comparison information between clinical study outcomes and epidemiological outcomes of the Sverdlovsk outbreak in 1979. With the wealth of clinical literature on the physiology of different infectious agents, it was necessary to focus on just the handful of articles that related to the interdisciplinary aspects of bioterrorism, national security and clinical medicine or clinical public health.

Sociology/Social Work/Urban Studies

In developing the framework for comparative study between the two exercises and the Amerithrax outbreak, I drew extensively from research and articles from the Sociology, Social Work, and Urban Studies disciplines. Clifford, Burke, Ferry, and Knox's article on training and assessment of social work education discussed the use of project participants in developing and evaluating a framework model.[34] Golant and McCaslin's article on development of a classification model for geriatric

[34]Derek Clifford et al., "Combining Key Elements in Training and Research Developing Social Work Assessment Theory and Practice in Partnership," *Social Work Education* 21, no. 1 (2002).

services.[35] and Choi's article on evaluating organizational and team effectiveness provided examples of theoretical framework development and hierarchical modeling[36]. The theoretical frameworks in these articles addressed development of a theoretical framework[37], the application of qualitative research on formulating a theoretical framework[38], and the implementation of a scoring system for a theoretical framework based on organizational and team performance.

Statistics and Mathematics

After developing the framework, I selected the Cochran-Q test from Woodrow W. Wyatt's *Statistics for the Behavioral Sciences*. This is a statistic textbook devoted to discussing the use of non-parametric statistics in the social and behavioral sciences. Research articles and information from Game Theory and Statistics also helped develop the

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[35]Stephen M. PhD Golant and Rosemary MA McCaslin, "A Functional Classification of Services for Older People," *Journal of Gerontological Social Work* 1, no. 3 (1979).

[36]Jin Nam Choi, "External Activities and Team Effectiveness: Review and Theoretical Development," *Small Group Research* 33, no. 2 (2002).

[37]Ibid.

[38]Clifford et al., "Combining Key Elements in Training and Research Developing Social Work Assessment Theory and Practice in Partnership."

mathematical portion of the theoretical framework. I used the information gained from Wyatt in assisting in the interpretation of the quantitative data and determining the difference in how success is determined from the development and training perspective and the participant perspective. Articles that helped clarify the differences in perspective were found on the internet at the following web addresses: http://webword.com/moving/cochransq.html and http://www.texasoft.com/manual44.htm.

CHAPTER THREE

METHODOLOGY

Design of the Investigation

The investigation was of a small sample (n=3 cases) of two bioterrorism exercises and a real-life bioterrorist attack in the United States October-November 2001. The study was a post-hoc study comparing the three situations and identifying factors common to all three as well as factors that were unique to each one. The investigation made extensive use of debriefing statements, congressional testimony, and articles published describing the findings and outcomes of the exercises. The anthrax portion of the investigation made extensive use of CDC published materials, including teleconferences with the media, special reports to doctors and public health personnel, published public health warnings, and articles published in its professional journal Emerging Infectious Diseases. Additional resources included news articles and broadcasts that occurred during the attack, statements of congressional leaders and members of the public health and national security communities to their constituents during the crisis, and political science articles published after the crisis was over.

The study was designed to pinpoint similarities and differences in the three cases and find correlations between

the three in terms of problems, solutions, and common questions/concerns. The study also attempted to find patterns of correlation between the questions and problems uncovered during the training exercises and the questions and problems that emerged during the bioterrorist attack. The comparisons that were drawn were created through the development of a theoretical framework and the analysis of the cases according to the framework.

The analytical design was created through the creation of a theoretical framework for examining the two exercises and the attack. The framework was created through examination of the debriefing statements, testimony, and articles and identifying common themes. The rational for determining and defining these themes is discussed in the treatment section of this paper. The analysis design included both qualitative and quantitative methods to obtain as much useful data as possible from the limited sample size.

Population/Sample

The study utilized three independent cases. Two of the three cases were bioterrorism exercises, conducted with the intent of studying what would happen in a "real-life" situation. The two exercises were tabletop, pencil and paper

exercises that made hypothetical use of local, state, and government agencies. The third incident was a bioterrorism attack using Anthrax in the fall of 2001 (referenced elsewhere in this paper as the Amerithrax attack).

The first exercise analyzed was TOPOFF, short for "Top Official." TOPOFF was conducted primarily to observe and comment on what would happen in terms of public health and clinical medical concerns during a bioterrorist attack. It involved individuals from several teaching hospitals as well as key local public health officials and individuals who represented the state and government agencies that would also be involved in a real bioterrorist attack. A few individuals also represented the local branches of federal agencies that would become involved in the case of a bioterrorist attack. Because of exercise design, not all individuals received the same information prior to the beginning of the exercise. Everyone involved in the exercise knew that the exercise would involve a bioweapon that contained an infectious disease. Only some people knew that the infectious agent used would be plague. This gave some participants an edge in preparing for the exercise. Other participants had bioterrorism and WMD containment plans in place. They were able to review their policies for gaps before the exercise started. Other hospitals did not have

bioterrorism containment plans ready. They found themselves at a disadvantage in this area. These variables were allowed to remain and were not adjusted for in the final analysis.

Dark Winter was the second exercise analyzed. The *Dark Winter* exercise participants were comprised of individuals playing role-playing officials in the executive and congressional branches in charge of making decisions involving national security policy. The exercise also included individuals role-playing key officials from agencies outside the executive and congressional branches, but charged with advising the two branches on matters of policy and national security. All individuals involved in the exercise were not briefed on what form the exercise would take, and each brought to the exercise their own individual knowledge of bioterrorism and infectious disease, as well as knowledge about the official that whose role they were assigned. Again, this produced a somewhat "lopsided" sample with some individuals having more knowledge and skills than others. These discrepancies were also allowed to remain and were not adjusted for in the final analysis.

The third case analyzed was the "Amerithrax" outbreak. This case study used a compilation of data drawn from news stories, congressional testimony, interviews, and observations about the anthrax attack. Again, prior

knowledge and experience varied widely between hospitals that received anthrax victims, individuals and agencies that were targets of the terrorist attacks, and knowledge and skills of individuals charged with making decisions and determining plans of action for dealing with the anthrax attack. Because this was an actual attack, the variables were allowed to remain as they were and were not weighted or adjusted for during analysis. Mortality rates and exposure rates were compared with known statistical rates for anthrax to determine whether or not the attack and outbreak were successfully contained.

Variables that were adjusted for and noted in the final qualitative analysis were:

- Type of bioterrorist attack (large scale, small scale)
- Type of biological agent used
- Method used to distribute agent
- Level of awareness prior to attack
- Level of awareness during attack
- Level of preparedness prior to attack
- Level of preparedness during attack

- Cooperation between local agencies/national agencies

- Cooperation between local media and local/national agencies
- Cooperation between private citizens and local health and law enforcement agencies

Treatment of the Data

The examination of the data was broken down into three distinct processes. First, the exercise objectives, step-by-step actions, actions and decisions of participants, debriefing statements, and post-exercise interviews/congressional testimony were evaluated for key items and similarities. Anything that was mentioned as a problem or a difficulty was listed. Individual reflections on the participants' feelings about the exercise were noted. Things that individuals mentioned as working well or being a positive contributing factor to the outcomes were also noted. Frustrations about specific skills that were lacking or poorly used were also noted. Fears about specific problems happening or not happening were also added to the list. Each exercise had its own list of positives and negatives about the exercise. Congressional observations on key strengths or weaknesses were also noted.

After the list was drawn up, each list was examined for overall themes or skills. If a problem or positive factor

that was mentioned in more than one way or by more than one person, it was included in the list. Factors that only appeared once were evaluated to see if they were similar to items mentioned in other exercises or could be combined with other items into a single problem or factor. Those that could be incorporated with others were incorporated. Those that could not were not included in the analysis.

Problems and factors were then organized into categories. Again, debriefing and interview statements were used extensively to determine similarities and assign problems and factors to specific categories. Rational for determining categories were as follows:

- each category had to have at least two significant problems or factors associated with it
- each category had to be a single, discreet entity that described all the problems and factors that were included within it-i.e. drug shortages, manpower shortages, lack of hospital space, lack of vital equipment were all classified into a single category of "Shortages"
- each category had to be represented in at least two of the three samples

Once categories were assigned and problems and factors were assigned into the different categories, each category

was again reviewed against whether or not it was interdisciplinary in nature. The rational for whether or not a situation was considered interdisciplinary was determined by the following factors:

- The category contained factors not controlled by a single entity or person-such as the decision to call out the national guard to maintain/restore order.
- The category contained factors that were controlled by a single person/entity but would affect how other agencies/entities would function. In other words, the decision to close a small community hospital for lack of bed space and/or medical personnel is a decision that is usually made by hospital administrators without input from outside sources. It would not be considered interdisciplinary because most small community hospitals only have the facilities to provide basic emergency treatment and hospital care. The decision to close a Level 1 trauma facility because of lack of bed space and/or medical personnel is a much larger issue that will often involve county emergency management officials and emergency personnel. Therefore it is a decision

that affects people and entities outside the hospital, and is ultimately interdisciplinary in nature.

- The category contained factors that required coordination between local and state agencies or local and national agencies. The request for the CDC to send out an investigator or the decision to send out a CDC investigator is something that often requires coordination and cooperation from local public health officials and CDC officials back in Atlanta. This is a common interdisciplinary situation that is encountered during an infectious disease outbreak, even when it is not a bioterrorism incident.
- The category contained factors that required two or more agencies to share knowledge, skills, or personnel to resolve a situation.

All categories classified as interdisciplinary contained at least one of the above factors, and many of them contained two or more. If a category was not defined as interdisciplinary, it was maintained for the purpose of evaluating the outcomes of the exercise, but was not used to determine gaps, strengths, or weaknesses in the exercise from an interdisciplinary perspective. Once the categories

were established, the individual factors were assigned to their corresponding categories.

Once the exercises had been analyzed for commonalities and a framework for evaluation had been created, the first part of the process was complete. The categories and related factors were then organized into a table to facilitate the second process of evaluating the outcomes of the exercises and analyzing the outcomes according to an interdisciplinary perspective. At this point, I returned to my hypotheses and key questions to systematically analyze the data. The data was evaluated on a case-by-case basis and assigned a pass or fail rating.

The second step in the process was to evaluate the data quantitatively. Using a Cochran-Q for differences, I analyzed each factor according to whether or not it had been rated a success or failure. Using the results of this process, I pulled out the factors that had the same rating for all three exercises. These factors were determined to be significant areas of strength or weakness for the three cases. Areas that had two areas rated the same with only one difference were noted and set aside for further examination during the qualitative analysis.

The third step in the process was to evaluate the factors according to how they scored in the qualitative

portion of the analysis. Those that had the same rating for all three cases were compared qualitatively to see if there were comments about common strengths or weaknesses made by the participants. Any comments about these areas were noted. Those factors that scored the same for two exercises and different for a third were evaluated to see if the differences were caused by an uncontrolled variable, a change in policy or procedure that had happened following one of the two exercises, or another factor that was unique to the one case where the difference occurred. Differences that occurred as the result of an uncontrolled variable were reported as being influenced by the differences in the variable. Differences that occurred as the result of learning from an earlier situation were noted, along with a description of the type of learning that took place. Differences occurring because of data anomalies were flagged along with a warning that because this was a clear difference in earlier observed data, it might have tested differently under different circumstances.

Data Analysis Procedures

Because the data was nominal in nature and was not weighted to control for discrepancies within and among groups, a Cochran-Q test for non-parametric nominal data was used. The Cochran-Q test is a non-parametric statistical

test used when there are three or more sets of nominal data that are compared to one another. The data must be rated "pass/fail", meaning that each item in the data set must be evaluated as either meeting a certain standard (a pass) or not meeting the standard (a failure). The data set can also be comprised of individuals answering a set of "yes/no" questions with the results for each question compared between the participants. For the purposes of this study, a framework of factors (potential problems) was developed and each factor (problem) within a category was rated as either a success or a failure. The research goals defined the standard for success and failure. Because the goal was to assess preparedness, a successful rating was given if a factor was anticipated and competently negotiated according to the debriefing statements, news stories, or congressional testimony. A factor was rated a failure if either the factor caused problems during the exercise, or a factor was not anticipated with a concrete plan on how it would be managed if it did arise even if it never became an actual problem. If a factor was not anticipated, then there could be no clearly defined plan in place to deal with the factor if and when it became a problem.

Once individual factors were rated either as a success or a failure, the number of successes and failures were

totaled up in each category and the category was assigned an overall rating of either success or failure. Once each category had an overall rating, then the number of successes and failures among categories were totaled up, and the exercise received a rating of either success or failure. This analysis resulted in a mixed result of successes and failures significant enough to end up cancelling out an overall success or failure rating for the exercise. This approach to data analysis was abandoned, and a new approach was developed.

The individual factors were again reviewed and summarized into broader themes which gave a better overall indication of the level of preparedness for each factor. Each category was again given a pass/fail rating, but this time no total score was given to the exercise. The exercises were compared to see which factors received corresponding pass/fail ratings and qualitative analysis was scored according to these factors, rather than rating the exercise pass/fail as a whole.

Once all categories and factors in each exercise had been rated as successes or failures, each exercise was scored using the Cochran-Q, to determine if there were differences in the three sets of data. The null hypothesis for this test was that no correlation between exercises

existed in each of the categories and that the net results of the difference scoring would be zero. The alternative hypothesis was that a high degree of correlation existed between the three exercises, and that correlation would be highest in categories where the number of successes and failures were the closest. The formula used for scoring was:

$$\frac{(k-1)*\left[\left(k*\sum G^2\right)-\left(\sum G\right)^2\right]}{\left(k*\sum L\right)-\sum L^2}$$

Figure 1. Cochran-Q Formula

where N equals the number of cases (rows) and k equals the number of factors (columns). G^2 is the sum of the squares of the columns and L^2 is the sum of the squares of the rows. To calculate Q, square all the values of G and add them together, add all the values of G together and square them, multiply the result of the sum of G^2 by k, then subtract the result of the sum of all the G's squared. Multiply this result by k-1. Add together all the values of L and multiply the result by k. Add together all the squared values of L. Subtract the sum of the squared values of L by the sum of the sum of all the L's multiplied by k. Divide the result of

the G's by the result of the L's[39]. To simplify the computational process, SPSS was used to run the statistical model and evaluate the outcomes.

Once the quantitative analysis had been completed, and the exercises scored using statistical measures, the investigation turned to qualitative measures to judge how individual participants felt about their performance and the performance of their colleagues. The analysis did not take into account how the exercise designers felt-for example, the designers of TOPOFF classified the exercise as a success, due to the fact that the exercise highlighted key issues and areas that needed improvement. However, the participants expressed anger, frustration, confusion and uncertainty because the exercise brought home how unprepared the public health and clinical medical community was to provide support to federal and state officials charged with advising government leaders and making political decisions directly affecting the citizens they were charged with caring for. Added to that stress were the feelings of inadequacy that surfaced when critical personnel and supplies ran short. These discrepancies between design

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[39]Woodrow W. Wyatt and Charles M. Jr. Bridges, *Statistics for the Behavioral Sciences* (Boston: D.C. Heath and Company, 1967).

success and participant success are discussed in more detail in the discussion section

Once the qualitative and quantitative analysis was completed, the two were reviewed in comparison to one another to see if what was observed during the qualitative portion of the investigation was mirrored in the quantitative analysis. This was achieved by returning to the theoretical framework and examining the feelings and reactions of the individual participants in light of the quantitative outcomes. Correlations were drawn between areas of weakness as expressed by participants and areas of weakness determined by the quantitative results. Correlation outcomes are discussed in detail in the results section.

Results

The results from the non-parametric, quantitative analysis were inconclusive in three of the five areas studied. The exercise results showed that state and federal disaster teams were not prepared to deal with quarantines, food, and medical shortages, economic and political implications of a bioterrorism epidemic, and difficulties caused by a cutoff or disruption in communication. The medical and first response teams fared better. A simple explanation for this is that medical and first-responder

teams have a clear cut set of policies and chains of command. A better explanation is that these teams work together on a more frequent basis, share a similar medical language, and the clear cut set of policies and chains of command have been tested and developed over time, which gives them an advantage during times of crisis.

Following the first qualitative analysis, the quantitative results were mixed. Several categories showed a high-degree of preparedness, while others showed significant weaknesses. In order to attempt to account for the wide variability, the categories were narrowed and scored again. With the second scoring a pattern of strengths and weaknesses began to emerge. At the end of this second scoring, two areas showed distinct flaws in terms of preparedness. In the broad categories of Communication and Knowledge, all groups scored failures in both the category and sub-categories. Further probing of these failures in the qualitative analysis revealed key issues that led to these failures.

Because the exercises had to be scored and evaluated non-parametrically, it was important to do a qualitative analysis following the non-parametric quantitative analysis. The qualitative analysis revealed parallels between the failures scored during the quantitative analysis and areas

of concern that emerged during the debriefings of the exercises. Qualitative analysis of these parallels showed a strong correlation between perceived areas of weakness and evaluated failures. It is impossible to determine if the correlation is genuine because of the extensive use of the debriefing materials to create the hierarchy used to evaluate the exercises, or if the correlation reflects issues that were mentioned again and again during the debriefings by different people and their repetitiveness created focal points for articles written following the exercises.

Two key issues that were mentioned again and again during the qualitative debriefings for all three case studies focused on knowledge and communication. In the TOPOFF and *Dark Winter* exercises, information concerning details on the infectious agents presented was specifically controlled for. In TOPOFF, doctors had to use the symptomatic information presented to them in order to make a diagnosis and execute and infectious disease containment plan. In *Dark Winter*, policymakers were given the information on the disease after a sufficient length of time had elapsed to simulate the time required for doctors to assess, test, and formulate a diagnostic opinion. In both exercises, information was tightly controlled and access to

the information was limited, as it would be during a real bioterrorism attack.

During the Amerithrax incident, information was more readily available in comparison to the information in *Dark Winter* and TOPOFF, but it was not as neatly packaged. Public health officials were corroborating with experts from the CDC in the early days of the attacks. However, the advantage officials had during the anthrax outbreaks were the anthrax letters that clearly identified what the potential threat was. However, there was little practical information to help CDC and public health officials predict what the disease potential was. It was difficult to know how many people had potentially been exposed, what their level of exposure had been, and what they likely outcomes were. Additionally there was the question of what type of Anthrax had been used. Was it a weaponized form that had been developed by the Soviet Union in their bioweapons program? Was it a weaponized form of unknown origin developed by a terrorist organization or state sponsored group? Was it an unweaponized form that had been distilled into a powder by a single individual or group that was here in the United States? This information was not readily available and CDC officials had to refocus their efforts to try and help FBI and intelligence officials unravel the source of the Anthrax.

Areas that were not reliant on federal or state level decision making and that merely required reporting information to the state and federal level received higher success scores than areas requiring the sharing of knowledge between the local, state, and federal level or areas requiring that decisions be made at the state or federal level but required implementation at the local level. In these areas, knowledge and communication scored the most poorly, with local preparedness and implementation scoring the highest. Of the three case studies, *Dark Winter* received the highest number of failures within the knowledge and communication categories, with the Anthrax outbreak receiving the lowest. Examining possible factors for the reasons behind the lower failure scores revealed that the CDC and local public health agencies were proactive in using several different communication mediums, including local news broadcasts and the internet to convey information. Within a day of the first confirmed Anthrax attack, the CDC had set up a special web page with links to pertinent information for doctors, pharmacists, public health officials, and the general public. They also published local and national hotline numbers that people could call if they had specific questions that were not answered by the FAQ on the website. The post office website also published

information for postal workers and the general public on the internet. They included a link to the anthrax information posted on the CDC website and included their own hotline numbers to call.[40]

The CDC also held daily and weekly press telebriefings to keep the press up to date on the latest information on preventive measures and important facts regarding Anthrax. The results of these telebriefings were also published on the CDC website, and made available to newspaper reporters and broadcast journalists. The attack on the NBC building gave the news media extra incentive to air this information and keep the public informed on the measures being taken to protect their health and safety. The *Dark Winter* and TOPOFF exercises did not discuss use of the news media apart from their scripted role in the exercise. The Anthrax outbreak showed that the media could be used as a valuable tool in disseminating information and reassuring the public.

These two innovative measures were used along with the more traditional press briefings, phone calls, and the CDC investigative processes. The CDC was able to successfully track the beginning of the outbreak to a tainted letter delivered to the *The Sun* in Florida. Careful questioning of the employees at the facility revealed that the

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[40]www.cdc.gov/media, www.usps.gov

photojournalist had received an anthrax letter similar to those received by the others, also filled with a white powder. The journalist had dismissed it as another empty threat and had thrown the letter and the powder away. By the time he had been diagnosed and investigators went to look for evidence, the letter had already been disposed of.[41]

One telling area where all three case studies received failing marks was in their communication of key facts and information specific to the diseases that were being dealt with and the policy decisions that needed to extend from that information. This area was underscored during the qualitative analysis where time and time again individuals being debriefed were concerned that they did not have the knowledge they needed to make timely decisions. This was felt the most strongly on the part of policymakers. The resulting theme that emerged from the debriefing was that they just did not have the information they needed to make good policy decisions.

> Sam Nunn and others kept calling throughout the exercise for more intelligence information as they called it, more data, more data, more data. Everything they wanted to know was public health data. And they got a lot more in this exercise then they would ever get in real-time in a real like situation where you have the poor beleaguered

[41]Preston, *The Demon in the Freezer.*

> public health departments trying to figure out what's going on and report it in.[42]

This concern regarding timely information was felt by both policymakers and by the medical/public health community. Most public health specialists had the impression that Anthrax was not as great a bioterrorism threat as was smallpox or plague. Their reasoning was simple. Anthrax could not be spread person to person. It required that a person come in direct contact with the anthrax bacteria or spores to become infected. Many infectious disease specialists even questioned whether or not the spores were stable enough to be manufactured into a bioweapon. What public health and infectious disease specialists did not know was that the United States had experimented with weaponizing Anthrax with a high degree of success. They did know that Russia had limited success with weaponizing Anthrax in small quantities, but that they were not hardened against ciprofloxicin. They also questioned whether or not the spores would be viable following a delivery by a ballistic missile.

Upon discovering that the Anthrax outbreak was venerable to doxycycline and tetracycline, the infectious disease and public health communities with the help of the

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[42]"Institutions, Policies, and the Threat of Bioterrorism," in *Globalization and Disease* (Washington D.C.: Johns Hopkins University School of Advanced International Studies, 2001).

CDC began looking at the origins of the Anthrax spores used in the outbreak. After a lengthy investigation, the spores were eventually traced back to the United States offensive bioweapon program that had been shut down during the Nixon administration. These spores had not been hardened against doxycycline and tetracycline, but they had been engineered to withstand being processed into powder fine enough to be aerosolized-information that was not widely known outside of the USAMERID infectious disease research program.

At this time, the Amerithrax outbreak continues to be a subject of analysis and discussion in the medical and public health communities. The October 2001 outbreak changed the nature of the discussion from a hypothetical exercise into a serious and viable topic rich in complexities. At the time of the outbreak, the information that anthrax had been studied as a potential biological weapon, and that "weaponized" strains had been developed both in the United States and the former Soviet Union was not widely known outside the national security community.

> Furthermore, they [the CDC officials advising the National Security Council on an interagency conference call] did not know much, if anything, about how weapons-grade anthrax is made. Those methods were classified. Perhaps no one had briefed CDC officials on the methods for weaponizing anthrax spores. The CDC officials were public health doctors, and up until then, they had

> no reason to learn the secrets of making a biological weapon.[43]

This was only an introductory study into the relationship between bioterrorism training exercises and preparedness for a bioterrorism attack. More studies using better statistical models and exercise evaluation scales will be needed in order to further evaluate the correlation between training exercises and preparedness. Ideally, further exercises would include both quantitative methods of evaluation, such as Likert scales, as well as extensive qualitative analysis using third-party observation and analysis of both the exercise and the follow-up debriefing.

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[43]Richard Preston, *The Demon in the Freezer* (New York: Random House, 2002), 173.

CHAPTER FOUR

DISCUSSION

The question of preparedness is difficult and complex question to quantify. Since the Gulf War in 1991, the specter of a bioterrorist attack has garnered attention in the public health, emergency service, law enforcement, and clinical medicine communities. Military and civilian doctors, EMT's, nurses, and public health specialists have participated in a variety of internal exercises designed to test their readiness for handling a biological or chemical attack. These exercises have been designed to familiarize members of these communities with the characteristics of a bio/chemical attack, what agents are likely to be used, and how to effectively protect themselves while responding to an attack.

Trainings are also given in the form of conferences, round-table discussions, and continuing-education courses. They are designed to convey discipline-specific information to be used in professional practice. They may occasionally include a broader focus that incorporates topics from other disciplines, but will rarely address topics from other disciplines in-depth unless it directly relates to professional practice.

The question of preparedness when addressed from a national security perspective is even more complex-consisting of highly theoretical questions that relate to policy and ideology. Among the questions addressed are the questions of retaliation, proportional response, the nature of the attack, whether the attack is state-sponsored or sponsored by a domestic group in the United States. Occasionally it may address actual working policy, but usually within the context of the political ideology of the current presidential administration and addressing the larger, broader issues of how does the United States as a member of the global community address and respond to attacks on its borders. Domestic response to a bio/chemical weapon attack is viewed as the bailiwick of state and local agencies, and the discussion rarely turns to practical issues such as the National Pharmaceutical Stockpile, when do National Guard units come under the authority of the state and when are they federalized if the situation they are needed for falls outside of policy guidelines? How do we deal with the closing of national borders? How do we deal with interstate commerce and transportation? How do we support our state and local agencies so that they do not become overwhelmed and the situation devolves into a domestic security issue?

In the two exercises studied, these questions were placed at the forefront of the investigation. The exercises were run so that state and federal agencies could find the weak spots and begin to formulate solutions. The TOPOFF exercise was deemed a success-by those who designed and ran it. For them, the exercise was a success because it did exactly what it was designed to do-point out the weaknesses and holes in the organizations in charge of managing the crisis following a terrorist attack. Those who participated, expressed a mixture of emotions, primarily stress, frustration, anger, and helplessness. They did not personally feel that the exercise had been a success. Dr. Thomas Inglesby, in a paper summarizing the outcomes of the TOPOFF exercise, gave this quote from an unnamed participant:

> At the end of the exercise, many issues were left unresolved. It is not clear what would have happened if it had gone on. There were ominous signs at the end of the exercise. Disease had already spread to other states and countries. Competition between cities for the National Pharmaceutical Stockpile had already broken out. It had all the characteristics of an epidemic out of control.[44]

Many of the participants were overwhelmed by the holes that existed, knowing that it was their job to look after

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[44]Thomas V. Inglesby, "Observations from the Top Off Exercise," *Public Health Reports* 116, no. 2001 Supplement 2 (2001): 68.

the health and welfare of their communities, and realizing that they lacked adequate resources if a full-scale biological attack were to occur. They were left with more questions than answers, and it was clear that more needed to be done to prepare for a bioterrorism emergency.

The participants in the Dark Winter exercise expressed many of the same feelings and emotions following the exercise. In an internal briefing memo to the House subcommittee on National Security, Veterans Affairs, and International Relations, following the *Dark Winter* exercise, R. Nicholas Palarino, a senior policy analyst, submitted the following testimony from the Honorable Tommy Thompson:

> Current organizational structures and capabilities are not well suited for the management of a biological weapon attack. Major "fault lines" exist between different levels of government (federal, state, and local), between government and the private sector, among different institutions and agencies, and within the public and private sector. These disconnects could impede situational awareness, and contribute to loss of life....Should a contagious biological weapon be used, containing the spread of disease will present significant ethical, political, cultural, operational, and legal challenges....The National Guard and public health officials will be prominent players during a biological weapons attack. Their role and how they communicate, coordinate, and control personnel will be a contributing

> factor in how many people are left standing in the aftermath of an attack.[45]

In both my quantitative analysis of the exercises and in the subsequent qualitative analysis of the debriefings, three key areas of weakness emerged-knowledge, communication, and supply-demand. The supply-demand issues seemed to stem from complications connected to either knowledge, communication, or both. Issues that surrounded supply and demand also had to do with the amount of available personnel and supplies that were not adequately prepared for ahead of time. Again, depending on situation, this could also be attributed to foundational/prior knowledge of infectious disease epidemics and planning accordingly.

When analyzing the response to the Amerithrax Outbreak in comparison to the exercise data, the quantitative analysis also pointed to knowledge, communication, and supply-demand problems, but to a lesser extent. When examining the qualitative statements made during and following the outbreak, knowledge turned out to be a much greater issue than the quantitative results demonstrated. In published statements, most public health and medical

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[45]House Subcommittee on National Security, Veterans Affairs, and International Relations, *Combating Terrorism: Federal Response to a Biological Weapons Attack*, 107th Congress, 18 July 2001 2001, 5.

officials expressed relief that this was not a typical disease outbreak where they did not have knowledge of the disease that they were working with. They also expressed concern that there were features of the anthrax spore that they had not taken into consideration when evaluating anthrax as a potential biological weapon. One of the most concerning aspects of the attack was the ease with which the anthrax powder became aerosolized. Previous information had indicated that the weight of the anthrax spores would make aerosolization, even with the anthrax in powdered form, much more difficult than it turned out to be. There was also concern with its ability to cross contaminate letters and equipment after becoming aerosolized. This was knowledge that was learned during the epidemiological investigations occurring at the late stages and the end of the attacks.

Knowledge

In both exercises, participants expressed dissatisfaction with their levels of knowledge when dealing with different aspects of the exercise. Public health and clinical medical professionals in the TOPOFF exercise expressed dissatisfaction with their knowledge of the chain-of-command when responding to a state emergency. Many

individuals did not know whom they were supposed to get in touch with, or how to go about contacting them.

In TOPOFF, medical and public health specialists were also concerned that they did not have enough expertise in diagnosing an attack in which plague was the agent used. Because of the other diseases that have similar symptoms to plague, plague is often a difficult disease to diagnose, especially if the victim has not participated in any activities in which they would be exposed to the plague bacteria-such as camping in a remote area where local wild animals are known to be carrying plague. They were also concerned because plague can be spread from one individual to another once the bacteria has been spread to a human host, and there is limited data on how exactly transmission occurs.

Individuals representing state emergency response individuals also had difficulties with questions involving the chain-of-command. There were times when they were looking to the medical and public health professionals for guidance in how to implement emergency plans and procedures and the medical and public health officials were either making recommendations that were contrary to established plans and procedures, or were creating plans and procedures because no plans or procedures existed. There were also

times when both parties did not know where their jurisdiction ended, and another's began. There were also questions with command and authority that involved state versus federal control.

In *Dark Winter*, tensions rapidly developed between state and federal authorities in several contexts.

> State leaders wanted control of decisions regarding the imposition of disease-containment measures....Federal officials argued that such issues were best decided on a national basis to ensure consistency and to give the President maximum control of military and public-safety assets.[46]

Qualitative analysis of the *Dark Winter* exercise revealed many of the same problems, but from the point of view of federal policy and decision makers. Many individuals portraying individuals in charge of briefing and advising the President found themselves inadequately prepared because of their lack of practical medical knowledge. They were receiving needed information from the medical professionals on the scene, but did not know how to translate the medical data into useable information. Many did not know the basic medical terminology that many of the public health professionals and medical professionals were reporting back to them in. Others simply did not have the bioterrorism

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[46]Tara O'Toole, Michael Mair, and Thomas V. Inglesby, "Shining Light on Dark Winter," *Clinical Infectious Diseases* 34 (2002): 982.

background required to adequately brief and advise the President. The media could not be relied upon as an adequate and reliable source of information because of the conflicting information that was being made available. Many of the issues that emerged from the *Dark Winter* debriefing spoke to the frustration that many participants had because they were being forced to read, evaluate, and advise on information they did not completely understand. They also did not know what follow-up or clarifying questions to ask professionals because their knowledge of what they were evaluating was extremely limited. Many of them expressed frustration that they had such limited knowledge, and they were uncertain of whom to receive advice from regarding the situation.

Knowledge for policy and decision makers during the Amerithrax attacks was again a problem. Again, individuals in charge of briefing top advisors lacked key information. Misinformation and confusion on how to proceed following the attacks on the Senate building and the congressional mail facility only compounded the problem. CDC and Public Health officials were providing as much accurate and current information as possible. Unfortunately, it was the first deliberate anthrax attack on the United States, and there was very little clinical data to go by. Except for the

accidental release of anthrax from the Sverdlovsk facility in Russia, there was very little information on epidemiology and disease patterns concerning an artificially inflicted anthrax infection. Most anthrax incidences occur in isolated cases with a small handful of cases each stemming from a particular point of infection or index. It was also difficult to gage how the epidemiological data from the October 2001 anthrax outbreak compared with the 1975 Sverdlovsk outbreak. Following the aftermath of the September 11 attacks, and the subsequent bioterrorist attack, HHS Director Tommy G. Thompson announced the creation of the Office of Public Health Preparedness, designed to "coordinate the [HHS] Department-wide [response] to public health emergencies."[47] During his testimony, Director Thompson stated that "our best information told us that inhalation anthrax was 80 percent fatal...but the fatality rate for inhalation anthrax in these attack has been 40 percent."[48] What Director Thompson did not clarify in his testimony was that the statistical 80 percent he was quoting were 80 percent of cases left untreated or not treated within the 24-48 hr. chemoprophylatic time frame as observed during CDC animal studies and recent drug trials

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[47]Committee on Energy and Commerce, *Hhs Bioterrorism Preparedness: Cdc's Role in Public Health Protection*, 15 Nov. 2001 2001.

[48]Ibid.

during the approval stages of Cipro.©

> morbidity due to anthrax for animals that received a 30-day regimen of oral Ciprofloxacin beginning 24 hours post-exposure was significantly lower (1/9) compared to the placebo group (9/10) [p=0.001]. The one ciprofloxacin treated animal that died of Anthrax did so following the 30-day drug administration period.[49]

These statistics that were much closer to the fatality rates for those whom their inhalational anthrax was diagnosed after the 48 hour window of opportunity had passed during the October 2001 attacks. Director Thompson unknowingly presented erroneous information because he was not a public health specialist, nor was he familiar with the epidemiological profile of Anthrax. Had Director Thompson been more familiar with the epidemiological profile of Anthrax, he would have been more aware of this discrepancy and might have tailored his remarks to reflect this knowledge.

This misquoting of important statistical data is one example where accurate background knowledge and accurate reporting are essential to decision-making. Untreated, anthrax still has a statistical fatality of =>80% if not aggressively treated during the early stages of the disease. This has been observed in both laboratory conditions, and

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[49]*Physician's Desk Reference 57th Edition*, 57 ed. (Montvale: Thompson PDR (Thompson Healthcare), 2003).

from the data collected from the Sverdlovsk outbreak. Conservative estimates based on the Sverdlovsk data state that 66 of the 77 people who contracted anthrax from the accidental release of aerosolized anthrax spores during the Sverdlovsk outbreak died-an observed mortality rate of 85.7%.[50] More liberal reports place estimated deaths at 68 out of 77, increasing the observed mortality rate to 88.3%.[51] Reports from those who witnessed the incident do not indicate whether or not prophylatic antibiotics were given to the victims, or if they were, how soon after the attack they were administered. The 40% observed mortality rate quoted by Director Thompson does not distinguish between those who received timely prophylactic treatment, those who received prophylactic treatment outside the optimum time period, and those who may not have received prophylactic treatment because their anthrax diagnosis was done post-mortem.

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[50]LTC George W. Christopher, USAF, MC et al., "Biological Warfare: A Historical Perspective," *Journal of the American Medical Association* 278, no. 5 (1997): 416.

[51]Robert A. Wampler and Thomas S. Blanton, *The September 11th Sourcebooks Volume V: Anthrax at Sverdlovsk, 1979* [Internet] (George Washington University, 2001 [cited 2003]); available from www.gwu.edu/~nsarchiv/NSAEBB/NSAEBB61/index2.html.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Overall, the quantitative portion of the study lacked power. The training exercises did not include an ordinal scale to allow for participants to score different portions of the exercise. This required that an analysis framework be set up independently from the exercises and the real-life event to allow for a non-parametrical statistical analysis. No significant statistical findings can be derived from the statistical analysis done. The non-parametric analysis does point to areas of correlation between training and preparedness, particularly between groups. In areas where differences were found, successful outcomes had a high correlation with policies established prior to the trainings and individuals who were familiar with the policies and the procedures used to implement emergency policies. Overall, the health professionals had a higher number of successful ratings than their government counterparts.

This correlation was again supported during the Amerithrax Outbreak. Because of previous experience in responding to infectious disease outbreaks and the need for a quick, organized response, the health professionals had higher numbers of success in dealing with the immediate needs created by the attack. The CDC made resources

available to state and local agencies, and responded to their needs as was required. The non-parametric analysis between the groups pointed out areas where both groups had weaknesses or strengths. One key area of weakness was in the knowledge base of both groups. Neither group spoke the other's language. The health professionals group did not have adequate knowledge of the government chain of command outside their professional area to be able to effectively communicate and advise. The national security community did not have an adequate grasp on medical and public health knowledge to accurately evaluate the information they were receiving. The lack of overlapping knowledge between the two communities created confusion at a time when knowledge and communication needed to be at their best.

Communication was another area where the combined groups failed. Again, the health professionals scored better as a group when looking at individual factors, however their overall success score was lower. This was due to the fact that many of them had never needed to communicate with other agencies, and quite a bit of time was spent establishing communication procedures. Methods of communication also created difficulties. TOPOFF established that not all methods of communication worked equally well. Reliance on conference calls and personal phone calls between people

were found to be less effective than other forms of communication including email and personal business radios.

> Almost all observers and participants reported that the process of decision-making by conference call was highly inefficient and led to indecision and significant delays in the taking of action....Participating officials who were using 800-Mhz [business band] radios [to communicate] reported having been able to communicate efficiently, whereas communication by regular phone lines became highly dysfunctional.[52]

Communication on the government side met many of the same difficulties that the health professionals faced. However, they also faced some of their own internal difficulties, including issues surrounding classification, security clearances, and who was allowed to have access to different forms of information. There was also less continuity in how the information was being presented-instead of the biological attack being presented as part of a comprehensive package, the President in the *Dark Winter* exercises was receiving piecemeal information from the different advisors and individuals in the national security community, as well as members of state governments. The President was required to make decisions on various aspects of the crisis without a clear picture of the crisis

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[52]Thomas V. Inglesby, Rita Grossman, and Tara O'Toole, "A Plague on Your City: Observations from Topoff," *Clinical Infectious Diseases*, 1 February 2001 2001, 439-40.

as a whole. Because of the lack of continuity, the President was receiving conflicting reports on the state of the outbreak. There was also the tensions encountered as different advisors lobbied for different actions based on their political beliefs and ideologies. There were no clearly established policies and procedures for how to deal with the crisis.

> In Dark Winter, even after the smallpox attack was recognized, decision makers were confronted with many uncertainties and wanted information that was not immediately available....This lack of information, critical for leaders' situational awareness in Dark Winter, reflects the fact that few systems exist that can provide a rapid flow of the medical and public health information needed in a public health emergency.[53]

The same issues were also observed during the anthrax outbreak. There were differences of opinion on whether or not the senate building should be closed, if congress should have a brief recess until the crisis was resolved, what emergency measures should be taken, and who would be in charge of reporting on the anthrax situation. There were also questions about which agencies had jurisdiction over different aspects of the crisis, what measures should be taken to protect other government employees from being exposed, and what their potential risk was.

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[53]O'Toole, Mair, and Inglesby, "Shining Light on Dark Winter," 981.

CHAPTER SIX

CONCLUSION

These three case studies drew attention to the difficulties in co-ordinating training, preparedness measures, and interconnecting public health and national security policy. Once thought to be the purview of the public health community, the control and containment of an infectious disease when it as been deliberately and maliciously used as a weapon of mass destruction against the civilian population stands at the junction between national security and public health. Politicians and policy makers do not have the luxury of ignoring the issue under the guise of partisan politics. As these three case studies showed, issues of containment and control will cross the boundaries separating public health and national security and national security advisors must be prepared to speak knowledgably and comprehensively on issues concerning federal policies and guidelines that pertain to containing and controlling an epidemic.

National security advisors, intelligence analysts, and policymakers have the additional responsibility to keep the public health and infectious disease community appraised of new discoveries in bioweapon development, capabilities, and emerging threats. They no longer have the luxury of

classifying such information under "need to know" strictures and intelligence code words. To be an effective team player, the public health and infectious disease community must be fully aware and informed of the bioweapon threats they may be facing so that they can fully train and prepare their frontline professionals in the event of a bioterrorist attack. Had the infectious disease and public health community believed that Anthrax was a viable terrorist weapon outside the theater of war, they might have been better prepared to deal with the civilian outbreak that occurred in October 2001.

Regular trainings and debriefings are an essential part of developing preparedness. Simulated exercises as well as pen and paper exercises provide opportunities for individuals from both disciplines to come together and review strategies for dealing with a biological or chemical attack against the civilian population. Trainings and debriefings will also separate viable strategies and containment plans from those that are ineffective and counterproductive. Regular simulations and trainings will also familiarize individuals from both disciplines to learn the language and terminology specific to each group so that during an attack valuable time isn't wasted attempting to clarify what the other side was saying; each side will be

able to communicate with their counterpart clearly and effectively.

Bioterrorism and its impact on public health, national security, and preparedness continues to be a highly partisan issue that is the subject of debate by members of congress, key leaders in the national security and public health community, and leading experts in these fields. It is a multidisciplinary problem that intersects with many different government and non-government entities at many competing levels of jurisdiction. The need for these entities to develop a clear, cohesive plan of action for dealing with the effects of a large-scale bioterrorism attack is vital. Only then can the plan be successfully implemented under test conditions and give both the public health and national security communities an accurate picture of how to successfully defend against another bioterrorist attack.

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