

**POTENTIAL THREAT OF BIOTERRORISM AND IMPACT ON  
PUBLIC HEALTH**

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**POTENTIAL THREAT OF BIOTERRORISM AND IMPACT ON PUBLIC HEALTH**

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## **POTENTIAL THREAT OF BIOTERRORISM AND IMPACT ON PUBLIC HEALTH**

### **ABSTRACT**

After the events that followed September 11<sup>th</sup>, the United States found itself in a vulnerable position. The Anthrax letters caused 5 deaths, 25 other non-fatal cases, and 10,000 people to take prophylactic antibiotics for 2 months. From this biological terrorist act, the United States realized how weak the public health system was. From communications between health facilities to stockpiling weapons and vaccines and assessment of critical medical equipment, the U.S. public health system needed a redesign to make it work more efficiently and cohesively.

### **PURPOSE**

The purpose of this paper is to evaluate the possibility of a bioterrorist event based on recent history and to determine if United States would be ready to respond to a bioterrorist event—mainly how the public health system is working towards being able to respond to a biological event.

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### **METHODOLOGY**

By reviewing recent biological events, such as biocrimes and bioterrorism, I will seek to determine how likely is the threat of a biological attack and if it did occur could our public health system respond. All publications are within the last five years and most are within the last three. The reason for the recent publications is that much has changed since the September 11, 2001 attacks. With the first anthrax letter, biological terrorism became a reality for the United States.

The first portion of this paper will discuss the evolution of terrorism. The next part will explore the activity (terrorist and criminal) of biological agents and compare it to the total terrorist picture. The last section will deal with policy which protects the public in response to a biological attack. Terrorist weapons can be divided into three categories: weapons of mass destruction, weapons of mass casualty, and weapons of mass disruption. In this paper I will focus on weapons of mass casualty.

## **INTRODUCTION**

### **DEFINITION OF TERRORISM**

Terrorism has a history that is at least 2000 years old whose methods have relatively remained unchanged. Although the targets, victims, perpetrators, causes and justifications for the use of terror have changed, the motives of the terrorists have always remained the same—to cause terror and fear through violence in order to force change in societal behavior or to force a society to acquiesce to the goals of the terrorist.<sup>1</sup> As Ezeldin (1987, p.7) explains, “All terrorist organizations, however different their political orientations may be, have one feature in common. Rightist and leftist, liberationist and separatist, anarchist and subversive—all generally agree on methodology.”

Terrorism can be understood as a tool that has seven key components. Terrorism is (1) an intentional, (2) rational, (3) act of violence (4) to achieve a political goal (5) by causing fear (6) in the target audience or society (7) in order to change behavior in that audience or society. Terrorist violence is a means to an end because the violence is less important than the result of the terrorist act.

While terrorism is aimed at creating fear in a society to achieve a political goal, an act of terrorism can be understood as either being objective-driven (hostages) or terror driven (retaliation/warning). Terrorism is not defined by the amount of lives lost but by the effect of the violence on a specific situation. It does not seek specific victims, but it does seek specific targets for a desired outcome.<sup>2</sup>

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<sup>1</sup> Garrison, p.39

<sup>2</sup> Garrison, p.42

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Terrorism is separate from acts of war or guerilla warfare. Terrorism is a deliberate act of violence solely for the purpose of causing terror in order to elicit a change of opinion or policy in the desired audience.<sup>3</sup> Terrorism is not synonymous with any type of warfare. In war, a target is selected because of its militaristic value. The target has a specific military function that needs to be removed while minimizing civilian loss. On September 11<sup>th</sup>, 19 men hijacked 4 planes bringing down the two towers, part of the pentagon, 266 passengers and killing around 3000 people. Their goal was to cause massive damage and instill fear in the Americans so that the US would change their policy about interfering in the Middle East.<sup>4</sup>

### **HISTORY OF TERRORISM**

During the late 1700s in France, modern terrorism began with Robespierre who believed that terrorism could be used as a tool to achieve governmental ends and used terror to suppress opposition to his government. Thus began the government sponsored terrorism: the use of terror to maintain power and suppress political rivals.<sup>5</sup> This type of government sponsored terrorism was refined during Lenin's and Stalin's rule in Russia. In the late 1800s to early 1900s, the anarchists, who believed in abolishing all forms of government, introduced individual terrorism: the selective use of terror against an individual or group. These anarchists would assassinate people based on their titles and

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<sup>3</sup> Definitions of terrorism: The United States Code used for the State Department annual report on global terrorism defines terrorism as follows: "Terrorism is premeditated, politically motivated violence perpetrated against noncombatant targets by subnational groups or clandestine state agents" (11 USCA 2657(f)(d), 1987, emphasis added). The Code of Federal Regulations defines terrorism similarly: "Terrorism is the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives" (22 Code of Federal Regulations §0.85, emphasis added).

<sup>4</sup> Garrison, p.43

<sup>5</sup> Garrison, p.44

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positions in hopes of uniting the masses to revolt against the government.<sup>6</sup> With the Irish Rebellion (1919-1921), three tactical methods were added to the development of terrorism:

1. selective terrorism: terror against a representative of a class to achieve political objectives
2. sustained terror over time: to break down the will of the government into a truce
3. cell operations: operational tactic in which the terrorist organization is decentralized and minimizes the discovery of the terrorists. Each specific cell has their own operations and knows nothing of the other activities within another cell.<sup>7</sup>

In 1929 the Hindustan Socialist Republican Association (HSRA) began the struggle for independence from British rule. Out of this struggle came a theory called the *philosophy of the Bomb*, which is that terrorism is inevitable in the struggle from oppression to freedom, thus the use of terror is a justifiable means to a justifiable end.<sup>8</sup> Post World War II, terrorism took a completely different victim. With the shift to the total war concept (civilians support a war and therefore are a fair target in war), terrorism also shifted from targeting government officials to targeting civilian infrastructures without minimizing the loss of civilian lives.

In 1966 Cuba hosted the Tri-Continental Conference sponsored by the Soviet Union which marked the internationalization of terrorism.<sup>9</sup> Terrorism was no longer isolated in

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<sup>6</sup> Garrison, p.45

<sup>7</sup> Garrison, p.46

<sup>8</sup> Garrison, p.46

<sup>9</sup> Garrison, p.47

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geographical areas. The conference offered a platform for these terrorist nations and liberalist groups to work together financially, politically, operationally, and logistically.

During the Cold War, there was state-sponsored terrorism: government exported terrorism to other parts of the world for their own political interests. During this time, the United States supported Israel while the Soviet Union supported various Arab countries. It was during this time that planes were used for terrorist acts.<sup>10</sup>

The 1990s brought terrorism to a tool of religious suicidal terrorists with the indiscriminate killing of civilians and high mass-casualty counts. According to the FBI, “It does appear that international terrorists will continue to focus attacks that yield significant destruction and high casualties, thus maximizing worldwide media attention and public anxiety” (FBI,1999, p.37).<sup>11</sup>

### **BIOTERRORISM**

Bioterrorism is the use of biological pathogens (bacteria, viruses, fungi, and toxins derived from living organisms to kill or incapacitate in order to cause fear and terror to achieve one’s political, religious, ideological, or ecological goal. So, from poisoned arrows (Scythians, and later the Viet Cong guerrillas) to poisoned wells (Sparta, Persia, Rome and others) to bombs with deadly bacteria (Japan, United States, Soviet Union and Iraq), the intentional use of biowarfare (biological weapons used for a military

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<sup>10</sup> Garrison, p.48

<sup>11</sup> Garrison, p.50

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advantage) has been around for centuries.<sup>12</sup> Biological weapons include using any type of germ warfare in an intentional release of a naturally occurring or human modified toxin or biological agent, e.g. cholera, smallpox, anthrax.

Biological warfare is of little use to the military because of the lack of control in the attack and it would take several days to implement (due to the incubation period of the biological agent) instead of an immediate reaction as with conventional weapons. This type of attack would not immediately stop an advancing army. The military using the weapon would have to have the proper protective equipment and inoculations to keep them from falling victims to the weapon used. As a strategic weapon, biological warfare is problematic, because it is difficult to prevent the attack from spreading to either allies or to the attacker and it is often difficult to deploy or renders the land useless because of the pathogen virulence. Also, a biological warfare attack invites immediate massive retaliation of the like—there is negative connotations in using a dirty bomb in order obtain freedom...or at least it used to be like that.

Ideal characteristics of biological weapons are low visibility, high potency, accessibility, and easy delivery. Diseases most likely to be considered for use as biological weapons are contenders because of their lethality and robustness. The biological agents used in biological weapons can often be manufactured quickly and easily. The primary difficulty is not the production of the biological agent but delivery in an infective form to a vulnerable target. Anthrax is considered an excellent agent because it forms hardy spores,

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<sup>12</sup> Johnson, Thomas J. *A History of Biological Warfare from 300 B.C.E. to the Present*

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perfect for dispersal aerosols, and usually does not cause secondary infections in other people (anthrax is not transmissible via aerosol between humans). The effect of anthrax is usually confined to the target. Using the postal system for delivery of anthrax bypassed all the potential inhibitors (rain, humidity) of an aerosol disbursement. All of the preparation to defend and respond to a biological attack was based upon most probably scenarios with a low flying crop duster in the middle of a cool night but never included an envelope.

The use of biological/chemical agents is not new, but before the 20th century, biological warfare took four main forms:

- deliberate poisoning of food
- use of microorganisms or toxins in a weapon system
- use of biologically inoculated fabrics
- use as a military tactic to gain an advantage

From poisoning well water to poisoning salad bars in restaurants, from poisoned arrows of 300 BC to poisoned punji stakes of 1960's, from catapulting plague victims to dissemination of the plague by aircraft, warfare/terrorism has included biological agents.

The difference now is the threat of biological agents cause hysteria and fear which can erode the public faith in the protection of their government and the public health system.

The biological terror is very real to the United States. The terrorist will use biological terror to prove that no one is protected. The terrorists will not care who dies only that they cause terror, gain media attention and further their cause or achieve their objective.

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### RESULTS

#### BIOTERRORIST CASES

According to Seth Carus, there have been 54 alleged terrorist cases but because of the quality and lack of information available, only 27 of the cases can be substantiated. For Carus' study, he included criminal cases with the use of biological weapons (total 56) and cases where the intent of the perpetrator is unknown (total 113). Biocrimes are included due to the fact that they may be considered in terrorist cases to extrapolate how these perpetrators obtained and/or produced the weapons. Below is a table of the confirmed cases of illicit biological agent activity:<sup>13</sup>

Type	Terrorist	Criminal	Other/Uncertain	Total Cases
Acquire and Use	5	16	0	21
Acquire	3	7	2	12
Interest	6	4	0	10
Threat/Hoax	13	29	95	137
<b>Total Cases</b>	27 (15%)	56(31%)	97(54%)	180

In the confirmed cases of illicit biological agent activities, a number of reasons lead terrorists and criminals to be interested in biological agents, such as: mass murder/murder, revenge, terror, extortion, disruption, anti-animal/crops, political statements and incapacitation (with extortion, terror and murder as the most common motives). From the cases that Carus included in his study, below is the breakdown of his observations for motives:

Type	Terrorist	Criminal	Other/Uncertain	Total Cases
Murder	4	17	0	21
Terror	6	9	22	37
Extortion	0	13	3	37
Disruption	0	5	0	5
Anti-animal/crops	1	2	0	3

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<sup>13</sup> Carus, p.8

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Type	Terrorist	Criminal	Other/Uncertain	Total Cases
Mass Murder	4	0	0	4
Revenge	0	3	0	3
Incapacitation	2	0	0	2
Political Statement	1	0	0	1
Unknown	9	7	72	88
<b>Total Cases</b>	<b>27</b>	<b>56</b>	<b>97</b>	<b>180</b>

In order to understand the threat of the use of biological agents, one first should look at the historical cases involving biological agents. Carus' list of cases involving biological agents was updated with new data to incorporate the anthrax and ricin letters. Below is a table showing the trends in use of biological agents:

Time Period	Terrorist	Criminal	Other/Uncertain	Total Cases
2000-2004	8	2	7	17 (8.6%)
1990-1999	19	40	94	153 (77.7%)
1980-1989	3	6	0	9 (4.6%)
1970-1979	3	2	3	8 (4.1%)
1960-1969	0	1	0	1 (0.5%)
1950-1959	1	0	0	1 (0.5%)
1940-1949	1	0	0	1 (0.5%)
1930-1939	0	3	0	3 (1.5%)
1920-1929	0	0	0	0 (0%)
1910-1919	0	3	0	3 (1.5%)
1900-1909	0	1	0	1 (0.5%)
<b>Totals</b>	<b>35</b>	<b>58</b>	<b>104</b>	<b>197</b>

With the cases of biological agents investigated, there is a trend in the increase use of biological agents. There is also reason for concern that future bioterrorism attacks may be more deadly than past. Three factors account for the change. First, an increasing number of terrorist groups—foreign and domestic—are adopting the tactic of inflicting mass casualties to achieve ideological, revenge, or “religious” goals, often hard to understand. If such groups acquired an effective aerosol dissemination capability for anthrax, for example, they could potentially kill tens or hundreds of thousands of people.

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The World Trade Center and Oklahoma City bombings both were conducted by people who had no compunction about mass killing and, in fact, sought to kill large numbers of civilians.<sup>14</sup> Second, the technological sophistication of the terrorist groups is growing. We now know that some terrorists have tried to master the intricacies of aerosol dissemination of biological agents. Perhaps more disturbing for the future, some terrorists might gain access to the expertise generated by a state-directed biological warfare program. Finally, Aum Shinrikyo demonstrated that terrorist groups now exist with resources comparable to some governments. Therefore, it is seems increasingly likely that some group will become capable of using biological agents to cause massive casualties.<sup>15</sup>

Only 33 of non-state cases involved actual acquisition of agent. Four different methods were used: purchase from legitimate suppliers, theft, self-production, and use of material of natural origin contaminated with biological agents. The data from Carus on acquisition routes are summarized below:

Type	Terrorist	Criminal	Other/Uncertain	Total Cases
Legitimate supplier	1	9	1	11
Theft	1	3	0	4
Self manufactured	1	4	1	6
Natural Source	2	4	0	6
Unknown	3	3	0	6
<b>Total instances</b>	8	23	2	33

Acquiring biological agents has usually proven to be relatively easy. Pathogens can be acquired from culture collections and natural outbreaks of the biological agent. Culture

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<sup>14</sup> Bruce Hoffman, *Inside Terrorism* (London: Victor Gollancz, 1998), pp. 92-94.

<sup>15</sup> Carus, p.11

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collections were a preferred source for pathogens even when the terrorists or criminals possessed the skills to culture organisms acquired in nature. To ensure purity and avoid cross-contamination of cultures with unwanted organisms, culture from standardized sources would be of a higher quality and easier to cultivate.<sup>16</sup>

Despite efforts to restrict the illicit acquisition of biological agents, it is likely that terrorists and criminals will be able to obtain the agent that they want when they want it. If unable to acquire from a legitimate culture collection or a medical supply company, they can steal it from a laboratory. If unable to steal it, a group with the right expertise could culture the agent from samples obtained in nature. Many biological agents are endemic, and a skilled microbiologist would have little difficulty culturing an agent from material taken from nature.<sup>17</sup>

Concerning what agents have been used, the agents are divided into two major categories: toxins and pathogens. From Carus' database, the table below shows the cases and the types of agents involved:

<b>Type</b>	<b>Terrorist</b>	<b>Criminal</b>	<b>Other/Uncertain</b>	<b>Total Cases</b>
Pathogen	20	38	83	141 (82%)
Toxin	9	15	2	26 (15%)
Unknown	4	1	1	6 (3%)
Total Cases	33	54	86	173

Bioterrorism is different than any other terrorist event. As mentioned before, bioterrorist attacks are not likely to show on the radar until the patients begin entering the hospitals

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<sup>16</sup> Carus, p.12

<sup>17</sup> Carus, p.13-14

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and public health facilities to be diagnosed and treated. It is imperative that the diagnosis is speedy in order to minimize the effects of the epidemic that could occur.

The World Health Organization has prepared the most authoritative estimates of the casualties likely to result from the biological weapon use.<sup>18</sup> Although these estimates are highly dependent on the assumptions built into the calculations, they provide a basis for understanding the potential consequences of release of a biological agent. The impact depends heavily on the nature of the attack, including the method of dissemination, the particular agents involved, the concentration of agent, and (in the case of aerosol dissemination) atmospheric conditions. Some of the WHO estimates are summarized in Table 7, which shows the potential impact on a city of one million people of aerosol releases. In all cases, the attacks assume a release of 50 kilograms of dried powder along a two-kilometer line at a right angle to the wind direction. As is evident, the impact varies considerably depending on the agent involved.

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<sup>18</sup> World Health Organization, *Health Aspects of Chemical and Biological Weapons* (Geneva: World Health Organization, 1970).

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**Table 7: Biological Agent Attack on City of 1,000,000 people**

Disease Caused by Agent	Number of People at Risk	Deaths	Incapacitated Only
Anthrax	180,000	95,000	30,000
Brucellosis	100,000	400	79,600
Epidemic typhus	100,000	15,000	50,000
Plague	100,000	44,000	36,000
Q fever	180,000	150	124,850
Tularemia	180,000	30,000	95,000
Venezuelan equine encephalitis	60,000	200	19,800

Source: World Health Organization, *Health Aspects of Chemical and Biological Weapons* (Geneva: World Health Organization, 1970), pp. 95-99. The WHO model assumes a city of 1,000,000 people in a developed country, and makes assumptions regarding the population distribution around a high density urban core that may no longer be appropriate. The model also makes certain assumptions about the agent (50 kilograms of dried powder containing  $6 \times 10^{15}$  organisms disseminated in a line 2 kilometers long at a right angle to the wind direction. The model nominally illustrates dissemination from an aircraft, but none of the calculations appears to depend on the type of the delivery vehicle involved. As an example, the model assumes that the Venezuelan equine encephalitis will survive for only about 5-7 minutes, during which time it will travel about 1 kilometer. About 60,000 people will be exposed to the agent. About 20,000 people will become incapacitated, including 200 who will die. In contrast, anthrax will survive for more than two hours and will travel for more than 20 kilometers. At least 180,000 people will be exposed to the agent, including 30,000 who will become incapacitated and 95,000 who will die.

There have been deaths and casualties associated with the biocrimes and bioterrorism in Carus’ study. Included are the bioterrorist events that have occurred since his update of his working paper. Below is a table which summarizes the casualties from use of bioagents:

Type	Total Casualties	Deaths
Bioterrorism	789*	5
Biocrimes	130	10
Totals	919	15

\*10,000 people were treated with prophylactic antibiotics for two months because of the anthrax letters. 45 people from the Rajneshees were hospitalized.

It is important to note that the casualties and deaths due to bioterrorism came out of 6 specific cases—5 of which were the anthrax letters and the other case: the Rajneshees and salmonella. The more important issue is that 10,000 people were treated with prophylactic antibiotics from the anthrax letters and 45 people were hospitalized from the salmonella event. Having this many patients needing hospitalization would be taxing on any one hospital and treatment would have to be coordinated across the regional public

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health system to determine the range of the epidemic and in order to ensure enough beds/isolation for the patients.

### TERRORIST ATTACKS SINCE 1988<sup>19</sup>

In order to understand bioterrorism as a threat, one must understand the threat of terrorism as a whole. Just to put the damages into perspective on bioterrorism, below is the terrorist acts from 1998 to 2002 (not including bioterrorism):

Year	Deaths	Injuries	# of Cases
2002	1566	3871	201
2001	4003	2422	165
2000	412	1526	151
1999	539	1154	62
1998	1122	6906	151
1997	233	845	107
1996	343	2622	95
1995	146	5605	86
1994	249	888	71
1993	86	1235	85
1992	83	499	50
1991	93	116	37
1990	50	97	26
1989	338	187	82
1988	422	1231	22
<b>Totals</b>	<b>9685</b>	<b>29204</b>	<b>1391</b>

It is also important to look at the types of weapons used in terrorist attacks since 1988.

Although chemical and biological weapons were used, they are still a low percentage of the overall terrorist cases. Bombs, whether conventional, car or suicide, are the most

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<sup>19</sup> All terrorism cases were analyzed from the database of International Policy Institute for Counter-Terrorism

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commonly use terrorist tactic. Below is a table outlining the top terrorism types/weapons used for 93% of the terrorist cases:

Type/Weapon of Terrorism	Number of Cases
Shooting	469
Bomb	339
Kidnapping	158
Car Bomb	119
Suicide Bomb	107
Knife	56
Hand grenade	41
<b>Total</b>	<b>1289</b>

### COMPARISON OF BIOTERRORISM TO TERRORISM

Below is a table that compares bioterrorism to terrorists acts:

Years	Bioterrorism	Terrorism	Total Terrorist Acts	Biological Agent Use (Bioterrorism)/ Total Terrorism Ratio
1990-1999	153 (19 confirmed)	770	923 (789)	16.5 % (2.4%)
Total available cases*	197 (35 confirmed)	1391	1588 (1426)	12% (2.5%)
Casualties*	919 (789 bioterrorism deaths)	29204	30123 (29993)	3% (3%)
Deaths*	15 (5 bioterrorism deaths)	9685	9700 (9690)	0.2% (1%)

\*These are not all inclusive numbers because the database used is not an all inclusive list of terrorist attacks since 1900.

From this table we can see the low percentage of biological attacks as part of the whole picture. Both biological terrorism and conventional terrorism is on the rise over the past several decades.

## DISCUSSION

The fear over biological terrorism is greater than the fear inspired by more conventional forms of terrorism. Indeed, some biological agents if used in certain ways have the potential to deliver a strategic strike with casualty results similar to nuclear weapons. In fact, simply the fear they evoke imbues them with power.<sup>20</sup> However if history is our guide to the future, then the past century would show us that biological weapons are not the weapons of choice for terrorists. Conventional weapons or other means (such suicide bombs (including airplanes) and car bombs) are tried and true and can cause just as much damage. These weapons are fairly accessible to any terrorist.

From the research provided in this paper, bioterrorism constitutes only 2.5% of all terrorist cases. If we include biocrimes, then this percentage would rise to 16.5%. However, the casualties and deaths of bioterrorism is very low compared to all other terrorist acts, which is 3% and 1% respectively. The reason for these low numbers is due to the fact that conventional weapons are easier to obtain, handle, and control with little scientific knowledge—biological weapons are not. There are several reasons why biological agents are less attractive to a terrorist:

- Lack of control over the agent (can go beyond the boundaries intended) or the terrorist falling victim to the agent
- The stigma of using the biological agent and the retaliation of a similar biological agent
- The large amount of resources needed for producing the agent (while a smaller amount is likely to kill a larger percent of the population, the quality of the agent

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<sup>20</sup> Parachini, John. *Combating Terrorism: Assessing the Threat of Biological Terrorism* p.1

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ends up needing more money and expertise. High consequence biological attacks would require the assistance of a state sponsor or considerable resources).

- The difficulty of achieving and balancing the transport and delivery of the agent (finding the right method to deploy the correct agent is imperative)

Aum Shinrikyo expressed an interest in several biological agents and attempted to disseminate biological agents. Although they were successful in producing biological agents, they were unsuccessful in all of their attempts due to the delivery method or the poor quality of the agent. With their failed bioterrorism program, they turned to chemical weapons and released sarin in the Tokyo subway causing 12 deaths and 5000 injuries.

The anthrax letters were covertly released and caused 5 deaths and 25 injuries but even more importantly 10,000 people were put on a prophylactic antibiotics for two months. This drain on the U.S. pharmaceutical industry became apparent with the anthrax attacks. Mass hysteria was experienced by the public fearing that supplies of certain antibiotics would be limited. Many went to their physicians to obtain an extra supply of the “coveted” antibiotic. The same concept was seen in the 2003 flu epidemic. Again, the shortage in the supply of the flu vaccine caused mass hysteria because of the media handing out misinformation and accentuating the shortage. Left out of most broadcasts was the piece of information that 100% vaccination is not necessary to obtain control of an epidemic.

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### BIOTERRORISM AND PUBLIC POLICY

The United States has taken some steps to protect itself from a biological attack. The USA Patriot Act was signed in October 2001 to provide national security and Federal law enforcement officials with enhanced tools to better counter terrorist activities in three areas: improves information gathering and sharing; strengthen law enforcement's ability to investigate, prosecute, prevent, and punish crimes of terrorism; and enhances immigration officials' ability to exclude or deport aliens in terrorist activity. The U.S. Public Health Security and Bioterrorism Preparedness and Response Act was signed in June 2002 to enhance controls on dangerous biological agents and toxins that could pose a threat to public health and safety. Some of the requirements of this Act focus on the assessment and improvement of public health capabilities (i.e., hospitals, public care providers) and sets up a national vaccine stockpile. The U.S. Department of Health and Human Services is dedicating over \$1 billion to upgrade the U.S. public health system's capability to respond to bioterrorism as well as mass casualties.<sup>21</sup>

Global public health is responding to the threat of biological agents through the Ottawa group (G-7 Ministers of Health plus Mexico's Minister of Health) and the World Health Organization (WHO). The Ottawa group is meeting on a periodic basis to strengthen collaborative efforts to better prepare for and counter bioterrorist threats, such as smallpox vaccine strategic reserve, pandemic influenza preparedness, and surveillance systems as an early warning system. In May 2002, WHO members agreed to strengthen health surveillance systems to detect any possible biological attack and improve

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<sup>21</sup> U.S Department of State, *U.S. Efforts to Combat the Biological Weapons Threat*

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international response to an outbreak. WHO members agreed to treating biological weapons as a global health threat and respond with shared resources, expertise and supplies.<sup>22</sup>

### **PREPAREDNESS OF THE PUBLIC HEALTH INFRASTRUCTURE IN THE U.S.**

In the TOPOFF 2000 drill in Colorado, the capacity of hospitals and the public health infrastructure was tested. Plague, yersinia pestis bacterium, was released in metropolitan cities to determine how the infrastructure would respond. In the early stages of the epidemic, health care facilities were seeing two to three times their normal volume. By the third day there were 500 cases with symptoms reported. Both ventilator and antibiotic shortages were being experienced. By the end of the third day, 800 cases were reported with over 100 dead. Over the next two days the situation worsened and the medical care infrastructure in the city was beginning to shut down. One week into the drill there were 3,700 cases with 950 to 2,000 deaths and ten times the normal volume of patients. They were no longer able to isolate patients or to prevent the spread of plague to the staff.

From this drill, it can be determined that if a biological attack did occur that resulted in an epidemic the US would not be able to control the epidemic. Although some steps have been made to improve communications and utilizations of resources throughout a region, there is still more work to do. According to the General Accounting Office (GAO)

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<sup>22</sup> U.S Department of State, *U.S. Efforts to Combat the Biological Weapons Threat*

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survey published in August 2003<sup>23</sup>, 80% of hospitals had plans addressing bioterrorism but omitted key contacts such as laboratories (who would test and confirm the biological agent). Less than half the hospitals had provided bioterrorism simulations for their staff to apply the skills they learned in their training (all the hospitals reported in training their staff for a biological attack). The hospitals responded as still lacking the critical medical equipment, such as ventilators and isolation rooms, to respond to a large influx of patients. Half of the hospitals reported having less than 6 ventilators per 100 staffed beds. The bottom line is that even though great strides have been made to enhance the current infrastructure more work is still needed with surge capacity or contagious patients.

In the Strategic National Stockpile, Health and Human Services plans to have a stockpile of medical supplies. In this stockpile will be: ventilators (2,700 by September 2003), antidotes, pharmaceuticals, and other medical supplies. This national stockpile is located in such a way that it is able to respond to an area in 12-36 hours after the area has been declared a state of emergency. The hospitals and healthcare facilities are on their own until they are declared in a state of emergency.

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<sup>23</sup> <http://www.gao.gov/new.items/d03924.pdf>

## **CONCLUSION**

The probability of a major biological attack by either a state or a sophisticated terrorist group seems remote. In contrast, smaller acts of biocriminality, such as the recent anthrax case in Florida, are much more likely biological terrorist attacks.<sup>24</sup> Even though the threat may be minimal, our healthcare infrastructure needs to be ready to respond to a public health emergency. This infrastructure in the United States has been neglected for decades. In 1988, the Institute of Medicine wrote that “public health in the United States has been taken for granted” and that “our current capabilities for effective public health actions are inadequate”. Since 1988 this situation has only gotten worse. It was not until the CDC enacted the Bioterrorism Preparedness and Response Office that an important step was taken towards strengthening state and local public health capacities.<sup>25</sup> From this point forward (and along with the Strategic National Stockpile as well as other policies that the U.S. has enacted), hopefully there will be a noticeable tightening of the healthcare infrastructure to enable it to respond efficiently and effectively to a public health event—whether it is bioterrorism or a mass casualty event.

With the advances of planning and preparing for biological attacks, most local health departments are better prepared for a bioterrorist attack than a year ago. According to the National Association of Counties’ and the National association of County and Health Officials’ survey, only 3% of health departments would be ready for a biological attack if

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<sup>24</sup> Parachini, John. *Combating Terrorism: Assessing the Threat of Biological Terrorism* p.5

<sup>25</sup> O’Toole, Tara. *The Medical First Response to Bioterrorism* p.3

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it happened tomorrow—18% are nearly ready, 47% are about halfway prepared, and 32% are in the early stages of planning or were not ready at all.<sup>26</sup>

More money has gone into planning and has not gone into ensuring adequate staff levels, bed space and the means to deliver vaccines.<sup>27</sup> Lab capacity, surveillance systems, and communication among the hospitals and public health facilities have improved with the planning. To ensure that facilities are ready for a biological outbreak, more studies will have to be conducted to determine the acceptable levels of surge capacity and how to ensure adequate staff levels and beds as well as effective plans to deliver the needed vaccines without burning out the staff.

U.S. pharmaceutical industry is still not to where they should be with stockpiling antibiotics and vaccines in case of a biological attack. This is due to Congress not approving the money in order to support the pharmaceutical companies in this endeavor. The necessity to control the outbreak can only happen with early recognition, good quarantine procedures and available vaccines and antibiotics.

State biological terrorism is a low probability threat, albeit one with potentially catastrophic consequences. During times of war, this threat increases in probability and is highest when a command authority perceives itself in a desperate situation in which using any means necessary may be its only option for survival.<sup>28</sup> It is imperative that the

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<sup>26</sup> Elliott, Victoria Stagg. *Public health's main fear over bioterrorism: surge capacity* p.2

<sup>27</sup> Elliott, Victoria Stagg. *Public health's main fear over bioterrorism: surge capacity* p.2

<sup>28</sup> Parachini, John. *Combating Terrorism: Assessing the Threat of Biological Terrorism* p.6

## **POTENTIAL THREAT OF BIOTERRORISM AND IMPACT ON PUBLIC HEALTH**

United States has a public health infrastructure to respond to and be ready for biological threats as well as naturally occurring pandemics or epidemics (such as SARS) due to globalization or mass casualty events. Although bioterrorist acts might cause an epidemic and mass hysteria and it is important to have a public health infrastructure to respond to these possible attacks, we need this strong infrastructure to also respond to naturally occurring epidemics and mass casualty events.

The heightened awareness that came with the anthrax letters and September 11<sup>th</sup> terrorist attacks catapulted the need for strengthening the public health infrastructure. Given that there still remains gaps in the public health infrastructure when responding to terrorist attacks (both biological and traditional), the work that has already been started must be sustained in the future. Congress should react appropriately with the necessary funds and legislation to address the longevity of the strengthening of this infrastructure and ensure that the United States will be able to respond to a public health terrorist threat. In the next decade with continuing efforts to further strengthen this infrastructure, the United States will hopefully have a cohesive network that can respond to any public health threat or mass casualty event.

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