INITIATIVES AND CHALLENGES IN CONSEQUENCE MANAGEMENT AFTER A WMD ATTACK

by

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I. Introduction

In the past decade, as the threat from rogue states and terrorist groups has increased, the U.S. and its allies have devoted far greater attention to how to manage the consequences of prospective uses of weapons of mass destruction (WMD). Consequence management[1] is a process *to mitigate the effects* of the use of weapons of mass destruction, including:

- detecting and characterizing weapons of mass destruction attacks;
- measures that protect public health, ensure safety, and protect the environment;
- measures to medically counter the effects of weapons of mass destruction attacks;
- measures that restore essential services to government, businesses, and individuals; and
- planning, training, and equipping to coordinate/synchronize the civil-military response.[2]

A thorough review and discussion of U.S. plans for consequence management will include the following:

- The **history** of consequence management of the effects of weapons of mass destruction, with particular focus on the period since 1993.
- The **mandate** for consequence management in the recent *U.S. National Security Strategy* and *National Strategy to Combat Weapons of Mass Destruction*.[3] These strategies direct U.S. efforts both in the homeland and in support of U.S. forces and allies overseas, though these efforts are organized differently.

- The **potential effects** of weapons of mass destruction, including the types of weapons of mass destruction threats and the kinds of damage such weapons could cause to military forces and civilian society.
- **Current concepts** of consequence management, how it would be organized, and how the capabilities for consequence management have changed since 1993.
- The **potential ability to improve** consequence management in the future, especially in response to developing threats.

II. History of WMD Consequence Management

When the late Secretary of Defense Les Aspin announced the Defense Counterproliferation Initiative on December 7, 1993, a formal concept of a coordinated response to deal with the consequences of a weapons of mass destruction event did not exist. While the Federal Emergency Management Agency (FEMA) would likely have taken the federal lead due to its disaster relief mandate, it was not until 1995 that consequence management as a concept developed within the U.S. government counterterrorism community. Consequence management in many ways originated from the dispute over the drafting of Presidential Decision Directive 39 (PDD 39), signed on June 21, 1995. It established the Clinton administration's counterterrorism policy. In particular, it addressed the potential for mass casualty terrorism resulting from weapons of mass destruction. A dispute developed regarding the responsibilities of various federal agencies, specifically between the Federal Bureau of Investigation (FBI), which had the lead for domestic counterterrorism, and the Federal Emergency Management Agency, which had the lead for managing federal agency responses to disasters. To clarify the situation, PDD 39 distinguished between crisis management, where the FBI had the lead to prevent an incident or to conduct law enforcement investigations, and consequence management, where the Federal Emergency Management Agency was the lead federal agency.[4]

PDD 39 also focused attention on the need to respond to the threat of chemical, biological, and nuclear terrorism, stating that, "The United

States shall give the highest priority to developing effective capabilities to detect, prevent, defeat and manage the consequences of nuclear, biological or chemical materials or weapons used by terrorists."[5]

Although PDD 39 was a significant step, efforts to implement the new policy highlighted certain key problems. First, responsibilities were diffused throughout the government. There was no senior government official who had clear authority over the many agencies with a legitimate role in consequence management. As a result, the Clinton administration discovered that it was difficult to resolve interagency disputes or to ensure that agencies were taking the steps needed to fulfill their responsibilities in this arena.

Second, efforts to develop responses in the area of chemical, biological, and nuclear terrorism revealed that the division of authority between the Federal Bureau of Investigation and the Federal Emergency Management Agency failed to resolve many of the bureaucratic difficulties entailed in managing responses to terrorism incidents. Specifically, the distinction between crisis and consequence management proved less clear in practice than it seemed in theory. There was no obvious timeline to define when crisis management would transition to consequence management. Indeed, it became apparent that both sets of activities might be underway at the same time. Thus, PDD 39 failed to provide clarity over the issue of who, within the federal government, would have the overall lead.

Additionally, it became obvious that there was a need to coordinate crisis activities taken by law enforcement agencies with consequence management efforts under the supervision of the Federal Emergency Management Agency. Thus, it was extremely plausible to believe the site of a terrorism incident would be a crime scene that the Federal Bureau of Investigation would need to manage to protect evidence, investigate leads, and prosecute perpetrators. Yet, at the same time, other agencies might need access to the site to assist victims of an attack.

Widespread concerns about the inadequacy of PDD 39 generated considerable support within the administration for another presidential decision that would resolve some of these bureaucratic obstacles. Unfortunately, it proved extremely difficult to negotiate a solution satisfactory to all the parties.

In 1996, Congress passed the "*Defense Against Weapons of Mass Destruction Act"* also known as the Nunn-Lugar-Domenici Act. The purpose of this Congressional initiative was to prepare local first responders for a biological, chemical or nuclear attack in the interval before federal resources become available. The Nunn-Lugar-Domenici Act called on the Department of Defense to develop and provide training and equipment for first responders in 120 U.S. cities.

In 1998, the President Clinton signed Presidential Decision Directive 62, in part to rectify the shortcomings of PDD 39. The new Presidential Decision Directive, PDD 62, made substantial changes in the federal government's bureaucratic structure for counterterrorism. The new directive clarified organizational responsibilities and strengthened the authority of the National Security Council over those agencies. Second, the President asked Congress to provide $294 million in additional funding—above funding levels requested when the budget was submitted earlier in the year—for programs enhancing responses to biological and chemical terrorism.

PDD 62 was adopted to resolve widely recognized bureaucratic problems. It detailed a new and more systematic approach to fighting terrorism by bringing a program management approach to U.S. counterterrorism efforts. The directive created a National Coordinator for Security, Infrastructure Protection and Counter-Terrorism, who had the responsibility to oversee a broad variety of relevant policies and programs, including areas such as counterterrorism, protection of critical infrastructure and consequence management for weapons of mass destruction. In addition, the National Coordinator could provide advice on the counterterrorism budget and was to coordinate guideline development for crisis management. The National Coordinator position was added to the National Security Council staff.[6]

The National Coordinator position was a compromise solution. One group of advocates argued that the administration needed to establish a czar who would control the federal budget for counterterrorism and could thus exert considerable control over the activities of the many agencies involved in counterterrorism. In contrast, other agencies opposed the creation of a position with such broad authority, and at least some are believed to have not concurred with the final proposal that was approved giving the National Coordinator more limited powers.

Responding to biological terrorism was the primary focus of the President's $294 million supplemental funding request. These funds were directed into three areas:

- $94 million for Department of Health and Human Services to create a pharmaceutical stockpile of antidotes and antibiotics to treat the victims of biological attack and to enhance public health surveillance and detection systems for disease outbreaks resulting from these weapons.[7]
- $10 million for the National Institutes of Health to conduct research on biological agents and possible treatments.
- $190 million to the Department of Health and Human Services, the Department of Justice, and the Federal Emergency Management Agency for efforts to enhance chemical and biological terrorism response capabilities. The bulk of these funds were to go to state and local governments, and the rest was directed to the Federal Bureau of Investigation to enhance its capabilities.[8]

The *1997 Quadrennial Defense Review* (QDR) expressed the official views of the Secretary of Defense, and carries considerable weight within the Defense Department. The QDR[9] discussed the need to counter asymmetric threats, reflecting concerns that hostile states, bent on countering the overwhelming conventional power of the United States, might focus on responses that exploited U.S. vulnerabilities using weapons that differed from those relied upon by the U.S. military or against which the U.S. military was not well prepared to respond.

The strategic implications of chemical, biological, radiological, or nuclear (CBRN) weapons, including in terrorist-like operations, were drawn out in a November 1997 study commissioned by the Office of the Secretary of Defense, *Assessment of the Impact of Chemical and Biological Weapons on Joint Operations in 2010* (also known as the *CB 2010 Study*).[10] This report focused on the impact that chemical and biological weapon use could have on the ability of the United States to project military power. The sponsors of the report were specifically interested in the impact of chemical and biological (CB) weapon use on the ability of the United States to prosecute major theater wars. They wanted to draw attention to the U.S. military's reliance on force projection

from the continental United States, which could be targeted by CBRN. The study examined a baseline scenario, which involved Iran and Iraq conducting a coordinated campaign against U.S. interests in the Persian Gulf arena in the 2010 timeframe.

The study team concluded that the United States could frustrate the campaign if the adversaries used only conventional warfighting capabilities. When the attackers also employed chemical and biological weapons against key power projection nodes, the results changed dramatically.[11] The most significant conclusion reached by the study group was that, "our military must be able to counter and cope with limited, localized CB attacks," but "massive battlefield use of chemical and biological weapons…is no longer the most likely threat."[12]

Comparing the baseline and the excursion involving chemical and biological weapons use, the study participants concluded, "The chemical-biological scenario resulted in delays, mispositioning of forces, and severe degradation of operational tempo."[13] Based on this result, the study team concluded, "Our nation's ability to project power is vulnerable to limited chemical/biological intervention in the force projection phase, including employment in the continental United States."[14] The study also emphasized the vulnerability of civilian, contractor, and host nation support personnel. Finally, the study worried about the potential impact of attacks on civilian populations.

Finally, it should be noted that President Clinton's direct interest in WMD threats and the need for an adequate consequence management response had a large impact on the progress made in the 1993-2000 period. His reading of The Cobra Event and subsequent discussion with a small panel of experts motivated not only staff on the National Security Council, but also those in the Department of Defense and other agencies.

It was during this time that for a period, the Defense Department created a new post, the Assistant to the Secretary of Defense for Civil Support, who led DoD efforts in the interagency process and who integrated internal DoD consequence management efforts. This position later morphed into what today is the Assistant Secretary of Defense for Homeland Defense. The Department of Defense also began to help in the planning that led to the setting up of what became the crisis responder unit now named the WMD civil support teams. Despite the lines of demarcation now laid out about who is responsible for what in responding

to a WMD crisis in the United States, there is still some disagreement about the role that the Department of Defense personnel will be called upon to play should the United States suffer from an attack in the homeland with very large or widespread consequences. In such cases other departments or agencies with the formal consequence management responsibility might be overwhelmed, leaving the DoD as the only department with enough resources to do the job.

III. Mandate for Consequence Management in the National Security Strategy

Until recently, the role of WMD consequence management in U.S. national security strategy has been somewhat vague, but several recent documents clarify this role. The 2002 United States' *National Security Strategy* identifies one major element of U.S. strategy as, "Prevent our enemies from threatening us, our allies, and our friends with weapons of mass destruction."[15] In turn, one of the three components of this strategy element is defined as: "Effective consequence management to respond to the effects of WMD use, whether by terrorists or hostile states."[16] The National Security Strategy states that:

> Minimizing the effects of WMD use against our people will help deter those who possess such weapons and dissuade those who seek to acquire them by persuading enemies that they cannot achieve their desired ends. The United States must also be prepared to respond to the effects of WMD use against our forces abroad and to help friends and allies if they are attacked.[17]

Three major roles for consequence management against WMD effects are stated in the *National Strategy to Combat Weapons of Mass Destruction*. First, "Defending the American homeland is the most basic responsibility of our government. As part of our defense, the United States must be fully prepared to respond to the consequences on our soil, whether by hostile states or by terrorists."[18] The United States, "…will develop and maintain the capability to reduce to the extent possible the potentially horrific consequences of WMD attacks at home."[19] Second,

"We must be prepared to respond to the effects of WMD use against our forces deployed abroad, and to assist friends and allies."[20] Third, these capabilities will help deter adversary WMD use and dissuade some adversaries from even acquiring weapons of mass destruction.

Part of the responsibility for the first two of these three roles is defined in the same document. "The White House Office of Homeland Security will coordinate all federal efforts to prepare for and mitigate the consequences of terrorist attacks within the United States, including those involving the continental United States…These issues, including the roles of the Department of Homeland Security, are addressed in detail in the *National Strategy for Homeland Security*."[21]

Presumably, the White House Office of Homeland Security will also coordinate consequence management in the United States in response to attacks by hostile states. Meanwhile, "The National Security Council's Office of Combating Terrorism coordinates and helps improve U.S. efforts to respond to and manage the recovery from terrorist attacks outside the United States.

In cooperation with the Office of Combating Terrorism, the Department of State coordinates interagency efforts to work with our friends and allies to develop their own emergency preparedness and consequence management capabilities."[22] However, this document does not specify who coordinates consequence management outside the United States against a hostile state attack, though it likely would not be the Office of Combating Terrorism, especially in the context of a war. In wartime, it would be the responsibility of the U.S. State Department together with the host nation that would take the lead in consequence management after any weapons of mass destruction attack, though the State Department would likely rely heavily on assistance from the Department of Defense.

The *National Strategy for Homeland Security* argues that the consequences of a weapons of mass destruction attack on the United States, "could be far more devastating than those we suffered on September 11—a chemical, biological, radiological, or nuclear terrorist attack in the United States could cause large numbers of casualties, mass psychological disruption, contamination and significant economic damage, and could overwhelm local medical capabilities." It indicates that existing

responses to terrorism, "…are based on an artificial and unnecessary distinction between 'crisis management' and 'consequence management.'

Under the President's proposal, the Department of Homeland Security will consolidate federal response plans and build a national system for incident management in cooperation with state and local government."[23] It later indicates that a national incident management system will be created as one of the major homeland security initiatives.

IV. WMD Threats and Their Potential Effects

Weapons of mass destruction are not a single category of weapons. The term weapons of mass destruction includes chemical, biological, radiological, and nuclear weapons, and there are major differences in effects between them. There are also some major differences even within these categories. The variety of weapons of mass destruction threats we face are described in Table 1,[24] which indicates how rapidly these weapons usually affect people, the relative potential for mass casualty events, and examples of the specific agents or weapons that fit into each class. These are the threats against which consequence management is designed in 2004; relatively little effort has yet gone into consequence management of advanced chemical or biological weapons.

Table 1. Different Kinds of WMD Threats[25]

Class of WMD	Speed Of Effect	Potential for Mass Casualties[a]	Example of Specific Agent/element
Chemical weapons			
Choking	Secs-Hours	Low	Chlorine, Phosgene
Blood	Secs-Minutes	Modest	Hydrogen cyanide
Blister	Hours-Days	Modest	Mustard, Lewisite
Nerve[b]	Secs-Minutes	High	Sarin, VX, Soman, Tabun

Riot control	Secs-Minutes	Very low	Tear gas
Toxic industrial chemicals	Secs-Days	Low-High	Ammonia, Malathion, Parathion
Biological weapons[c]			
Bacteria	Days-Weeks	Very High	Anthrax, Plague, Tularemia
Toxins	Hours-Days	High+	SEB, Botulinum
Viruses	Days-Weeks	Very High	Smallpox, Hemorrhagic fevers
Radiological	Hours-Weeks	Low-Modest	Cesium, Strontium, Cobalt 60
Nuclear effects			
Blast	≤ Seconds	Very High	Fission (Plutonium, Uranium), and Fusion (Tritium, Deuterium)
Crater	≤ Seconds	High	
Prompt radiation	Immediate	Very High	
Thermal radiation	Immediate	Very High	
Fallout	Hours-Weeks	High	
EMP/TREE[d]	Seconds	Low	

[a] Describes the relative potential for mass casualties per quantity of WMD used. Thus, compared to nerve agents, the effects of chlorine are low, while the effects of biological weapons can be very high.

[b] Some nerve agents are persistent (e.g., VX), others are not (e.g., sarin).

[c] Some viral and bacterial biological agents are contagious (e.g., plague and smallpox). There are some other forms of biological agents, but these are the most commonly considered for biodefense.

[d] EMP means electromagnetic pulse and TREE means Transient Radiation Effects on Electronics. Both are radiation effects created by a nuclear explosion.

With most nuclear effects (blast, heat, prompt radiation) and most chemical weapons, the effects occur very rapidly, before mitigating intervention can occur. In these cases, consequence management is largely limited to acting in the aftermath of the onset of effects unless personnel have strategic and/or tactical warning and are prepared before the attack. Biological weapons give time after exposure to begin prophylaxis that can prevent the disease effects, at least with bacterial diseases and others for which treatments have been developed. With radiological weapons and fallout, the key is detecting the threat and then

staying away from it. Radiation and some chemical weapons tend to be very persistent, remaining in an area long after initially being spread. On the other hand, many other nuclear effects are transient and most biological weapons decay fairly quickly in the air, especially in sunlight.

Dr. Ken Alibek, a former deputy director of the 30,000 technicians and scientists of Biopreparat, making up half of the Soviet biological weapon program, has stated that biological weapons can be employed in three ways:

- Contaminating water or food (water purification systems tend to protect water, but contaminated food can affect a modest number of people).
- Releasing infected vectors like mosquitoes or fleas (inefficient and can affect the attackers).
- Creating an aerosol cloud (can affect masses of people, depending upon how the cloud is produced, what agent is used, and the wind and weather).

Of these three, the aerosol cloud is the most effective in causing mass casualties.[26] Chemical weapons and toxic industrial chemicals can also be spread as an aerosol cloud, and fallout and radiological weapons can be dispersed similarly. But most nuclear effects are generated by a nuclear explosion and radiate in a circular pattern from that explosion.

Characterizing the Damage that WMD Could Cause

To illustrate weapons of mass destruction effects, Table 2 compares prompt nuclear, biological, and chemical effects from quantities of WMD that might be available, suggesting the areas that would be covered and the fatalities that might result if people are not medically treated. The chemical and/or biological weapons effects here assume delivery as an aerosol, presumably coming as a line source produced by an aircraft or vehicle with a sprayer. The areas affected would therefore differ by atmospheric conditions. In contrast, the prompt nuclear effects are roughly constant across these conditions. A biological agent like anthrax covers a larger area than a greater quantity of a chemical agent like sarin

because the biological agents tend to be far more toxic, by several orders of magnitude.[27] A biological weapon like anthrax might even affect a larger area than a nuclear weapon of the size that a terrorist or new nuclear power might possess. But nuclear casualties would occur promptly whereas the biological casualties would develop over time and could, for some agents, including anthrax, be more easily prevented by proper treatment after the attack is recognized.

Table 2. Comparing the Potential Lethality of (Untreated) WMD Attacks[28]

Weapons	Area Affected, Fatalities*		
	Clear, Sunny Day	Overcast Day	Clear, Calm Night
Nuclear: 12.5 Kt, blast effects	7.8 km^2, 23,000-80,000		
Biological: 10 kgs of anthrax	4.6 km^2, 13,000-46,000	14 km^2, 42,000-140,000	30 km^2, 100,000-300,000
Chemical: 1,000 kgs of sarin	0.74 km^2, 3,000-7,000	0.8 km^2, 4,000-8,000	7.8 km^2, 30,000-80,000

**Assuming an aerosol release of sarin and anthrax, with 3,000 to 10,000 unprotected people per km^2.*

In practice, weapons of mass destruction use does not just cause casualties and fatalities. Such use can cause various disruptions to military operations and society, and it would be expected to cause particularly large-scale psychological disruptions. These impacts combined could lead to serious operational and strategic effects. For example, an examination of the casualties in the Tokyo sarin subway event showed that about 4,000 "worried well"[29] and only about 1,000 actual casualties sought hospital care. In turn, this behavior led to overwhelming the medical care system; a really large-scale weapons of mass destruction attack as depicted in Table 2 could cause so many casualties that the health care system would fail, and people might take action against the government because of this failure.

Indeed, if hundreds of thousands of people are just seeking antibiotic treatment, local supplies could be exhausted for some period of time. The impact of weapons of mass destruction persistence was illustrated by the efforts to decontaminate the Senate Office Building and their high cost, as well as the duration of work disruption associated with the attack. Secondary effects on the economy as occurred after the 9/11 attacks would almost certainly cause crippling effects from events of the magnitude suggested here.

Delivering Weapons of Mass Destruction

The potential delivery means for weapons of mass destruction are described in Table 3. As indicated earlier, chemical and biological weapons would typically be sprayed as an aerosol and carried by the wind.[30] A large quantity (hundreds of kilograms or more) of chemical weapons would be required to cause a mass casualty event, making an aircraft or large missile the likely source for creating the spray, though artillery could also be used if enough rounds are fired. Most nuclear weapons are also large and would normally be delivered by a missile or aircraft. Because individuals such as special operations forces (SOF) can only deliver a small quantity, they are not a primary delivery means of chemical weapons unless the objective is to cause very selective and limited damage. A release from toxic industrial storage tanks is another way to cause mass casualties, as happened in Bhopal, India.[31]

Because much smaller quantities of biological weapons are required to cause mass casualties, special operations forces or terrorists could deliver these weapons. Radiological weapons would usually be carried by the wind after an explosion disperses the radiation, and these would tend to pose persistent threats in the areas where the radiation settles. Radiological materials could also be used without being dispersed, though they would affect a much smaller area and number of people.

Table 3. Delivery Means for WMD[32]

Kind of WMD	Expected Delivery Means	Likely Covert?	Other Delivery Means
Chemical weapons	Artillery, ballistic/cruise missiles, aircraft	No	SOF*
Toxic industrial chemicals	SOF attack storage tanks	Yes?	SOF attack tankers
Biological weapons	SOF with sprayers, cruise missiles, UAVs**	Yes	Ballistic missiles, aircraft, ships, SOF in food/water
Radiological	SOF with bombs	Maybe	SOF deposit
Nuclear	Ballistic missiles	No	Cruise missiles, aircraft, ships, SOF

**SOFs are special operations forces; terrorists could also fill this role.*
***UAVs are unmanned aerial vehicles*

In terms of consequence management, the delivery means for weapons of mass destruction affects the ability to detect such weapons of mass destruction attacks and to attribute them. The delivery means also help determine the area and number of people affected.

V. Methods for Managing the Consequences of WMD Use

This section addresses the requirements of WMD consequence management, and how far consequence management has progressed in the decade from 1993 to 2003. Because there was little capability for consequence management of weapons of mass destruction incidents in 1993, most of the current capabilities represent advances, especially outside of the nuclear area.

Detection, Warning, and Confirmation

The steps in detection, warning, and confirmation are first, recognizing that a weapons of mass destruction attack has occurred, second, determining what type of WMD was used, third, warning potential

victims of the attack, and fourth, confirming the detection and identifying the type(s) of weapons of mass destruction involved.

Considering detection, there are three basic ways in which an adversary weapons of mass destruction attack could be observed: (1) detection of the delivery vehicle, (2) detection of the weapons of mass destruction and/or its immediate effects, and (3) detection of the effects of weapons of mass destruction on people. Detection of a delivery vehicle, at most, provides a cue to one of the other forms of detection, because the vehicle might not carry weapons of mass destruction; detection is most likely when a delivery vehicle has only military applications (e.g., a ballistic missile). The ability to do this has advanced only a little in the last ten years.

Detection of the effects of a nuclear explosion is the easiest to achieve because of how dramatic those effects are. Detection of the effects of chemical, biological, and radiological attacks requires the appropriate kind of detector. Radiation detectors are and have been the most commonly available; detectors of the presence of chemical weapons have become far more available and capable, and detectors for biological weapons have emerged that did not even exist in 1993. Still, biological agent detectors are not yet widely available, perform only point detections, and are relatively slow to achieve a detection. The roughly 30 minutes required generally does not allow action to be taken soon enough for people in the vicinity of the detector to protect themselves after being warned. Thus biological weapon detectors are usually referred to as "detect to treat" rather than "detect to protect" systems.

The relative unavailability of biological weapons detectors makes it fairly likely that victims of a biological warfare (BW) attack will seek medical care before a detector gives warning of the attack. This was the situation with the anthrax letters in late 2001. At that time, the medical personnel dealing with the first cases failed initially to recognize the symptoms of anthrax. It is now more likely (though far from certain) that small numbers of biological weapon cases would be recognized because of enhanced education and improved diagnostic procedures for detecting these symptoms, especially for anthrax.

Once sensors or observers signal that a WMD attack has been launched and/or its effects have been detected, the community must be warned immediately about the threat. This warning should encourage

people to seek shelter or other protection when possible, to avoid exposure to weapons of mass destruction effects. The warning should also alert medical personnel to be looking for certain effects, and encourage those who were likely exposed to seek appropriate medical care. Warning should be supported by appropriate information of the weapons of mass destruction effects, seeking to reduce panic and other psychological effects. It should also reach out to the affected community, but not far beyond, to limit the number of "worried well" who would otherwise become psychosomatic casualties. Most U.S. cities were ill prepared to provide such warning in 1993 and are not much better prepared today.

Once chemical, biological, or radiological weapons effects are detected, it is essential to confirm the detection and identify what type(s) of weapons of mass destruction are involved. Some detectors (especially for biological weapons) are prone to false positives that could lead to unnecessary and potentially harmful treatment, and there is not a universal procedure for treating all WMD victims. Confirmation and identification is generally a laboratory process. Laboratory confirmation and identification of biological weapons was very limited in 1993, with only two reference laboratories available in the United States for most forms of biological weapons, one at the Centers for Disease Control and another at the U.S. Army Medical Research Institute for Infectious Diseases. In the aftermath of the 2001 attacks involving the anthrax letters, laboratory capabilities have been more widely disseminated and improved (quicker options are now available), allowing for more rapid confirmation and identification.

Assessment

After a weapons of mass destruction attack has been confirmed, the assessment process determines who has been affected and what resources will be required for managing the consequences of the attack. It also seeks to attribute the attack to the responsible parties. With any weapons of mass destruction use, one of the first actions is to determine the area affected. This is relatively easy to do for most nuclear effects because of the physical evidence of damage, but more difficult for chemical weapons, biological weapons, and various forms of radiation including fallout, because of the lack of a visual damage pattern. For prompt nuclear effects

and chemical nerve agents, this area determines both where most of the casualties will be located and where residual contamination may also be. With weapons of mass destruction that cause delayed effects (more than a few minutes, especially with biological weapons and radiation weapons), it will also be essential, albeit potentially very difficult, to determine when the attack occurred, and to provide this as a reference to determine who was likely in the affected area at the time. While it is usually assumed that the casualties will promptly seek health care, some may be incapacitated, and medical care may need to enter the affected and surrounding areas to seek out these people.

The ability to estimate the time of the attack and the area affected was relatively poor in 1993. There were some simple models of WMD effects that required information on the quantity and characteristics of the weapons of mass destruction, how and where it was disseminated, and the wind and other atmospheric conditions at that and subsequent times during the dissemination process. Unfortunately, little of this information would be known in the aftermath of a WMD attack.

The United States has sponsored at least one effort to develop a system that would estimate the attack timing and area affected based upon post-attack observables, but that effort has not yet led to a completed system. Thus, even today this aspect of assessment would be difficult to accomplish. At best, a rough approximation of the affected area would be developed over time.

The next step is to determine who was in the area affected, and how seriously they were each affected by weapons of mass destruction. This is more difficult to do with weapons that have a delayed effect like biological weapons, because it may be days before the attack is detected and many people who were in the area attacked will have moved to other locations. At the very least, the assessment needs to estimate the number of people potentially affected, though the limited databases on population location (largely census-based, and thus not showing population fluctuations by time of day) made this a difficult process in 1993, and this is only marginally easier today.

Even today, there is no basic system available to determine who was in an affected area at the time of an attack; improvisation and broad questioning could provide at least some of this information. Whether people will be affected is in part a function of where they were located and

what they were doing at the time. For example, some people might have been relatively protected, having been indoors or in an underground location. Moreover, some people may have greater resistance to weapons of mass destruction. There is relatively little information of this type available to help adjust raw estimates of the people affected.

The third step is to determine the requirements for treating those who have been affected. If one knew the degree to which each person was exposed to weapons of mass destruction effects, one could roughly estimate medical requirements. Naturally some people have more resistance to WMD effects, and some have less.[33] Some computer models that did not exist in 1993 exist today to help make such estimates,[34] but even these produce only very rough estimates.

The final step is attribution of the attack. The victim will normally want to identify who was responsible for the attack. If the attacker has used a delivery system like a ballistic missile, the origin of the attack can be easily determined, though the country of origin could claim that a renegade group was responsible. Otherwise, unless the attacker is apprehended or other intelligence information is available on the culprit, it is very difficult to attribute the attack. Some laboratory analysis may be able to determine a unique country or area of the world from which a particular chemical or biological weapon originated, though this is still not definitive in providing attribution. While some advances have been made in attribution since 1993 (e.g., the entire genome effort relative to different kinds of biological weapon agents), capabilities in this area are still very poor.

Medical Resolution

In addition to public health efforts, medical resolutions of weapons of mass destruction threats can be divided into five categories: (1) prevention, (2) pretreatment, (3) post-attack prophylaxis, (4) immediate treatment, and (5) long-term treatment. To begin any of these interventions, the nature of the medical challenge must first be determined. For example, peoples' symptoms may be quite similar from various biological agents, yet the medical intervention would be quite different depending upon the disease. There are also significant differences in medical interventions required, depending upon the type of WMD effect to which the person was exposed.

In addition, it is normally assumed that affected people will seek medical care on their own. However, many people may be incapacitated or unaware that they are being affected; a more proactive effort to find casualties may be required, especially in a mass casualty event. Yet many of the personnel who might perform such a search would be involved with the treatment of casualties. In addition, the affected area may not be well known. It is therefore unclear when and how such a search would be initiated.

Before most people exposed to weapons of mass destruction can receive medical treatment, they must be decontaminated. Personnel decontamination relative to chemical and radiological agents is relatively easy because detectors can promptly define areas on the body requiring decontamination. It is more difficult to decontaminate people exposed to biological weapons because of the lack of a prompt detector for them.

Prevention. Most prevention actions are actually not a part of consequence management, but are, rather, a part of passive defenses. Nevertheless, because all medical interventions are often included in consequence management, we discuss these actions briefly. Usually, there are not preventive medical actions against chemical or nuclear weapons, though good health condition is a preventive means with some effectiveness against all forms of weapons of mass destruction.

With biological weapons, vaccines are the key preventive means. In 1993, while there were various vaccines in use to protect researchers in the biological defense program, no vaccines against biological weapons were applied to broader populations. In the last few years, the vaccines for anthrax and smallpox have been applied more broadly as preventive means. However, for a number of biological agents that could be weaponized, there still does not exist a means of disease prevention for the broader military and civilian populations. Many in the community are also concerned that the evolution of threats, new or modified diseases, is outpacing the development of new vaccines

Pretreatment. Pretreatments are used to prepare personnel for treatment, making treatment eventually effective. For example, the nerve agent soman requires pretreatment with pyridostigmine bromide tablets within 8 hours prior to nerve agent exposure for the nerve agent antidote kit (NAAK—discussed under immediate treatments below) to work properly. Pyridostigmine bromide tablets were used for pretreatment

during Operation Desert Storm, but became a potential cause of Gulf War Syndrome, and thus the military plans use of these tablets only in very specific situations. Only if a clear soman threat or some other threat requiring pyridostigmine bromide treatment is part of the established chemical weapons threat is it likely that these tablets would be issued today. This may leave some U.S. and allied forces unprepared if soman use is not appropriately anticipated.

Post-Attack Prophylaxis. Post-attack prophylaxis is treatment of people who might be exposed to a disease or medical hazard but who have not yet shown symptoms. For example, in response to the anthrax letters in late 2001, antibiotics were given to thousands of people who might have been exposed to the anthrax. Because antibiotics can defeat bacterial diseases like anthrax, the use of antibiotics before the development of symptoms was intended to prevent people from getting sick at all, a clear preference with a disease as serious as anthrax. Prophylaxis is most appropriate for diseases that have incubation periods of at least a few days, and which can be cured by the use of one or more medicines. Thus, prophylaxis applies primarily to biological agents.

In 1993, it was understood that antibiotics could defeat bacterial diseases, but the procedures for prophylaxis were not well developed. Indeed, the Food and Drug Administration (FDA) did not approve the use of antibiotics before the development of disease symptoms. Nevertheless, many experts felt that personnel exposed to anthrax, for example, would die if not provided antibiotics prior to the development of symptoms.[35]

Interestingly, some experts still feel this way despite the survival of anthrax letter victims who did not receive antibiotics until days after the development of symptoms.[36] Since 1993, procedures for prophylaxis have been identified,[37] and the Food and Drug Administration has approved some drug uses for post-exposure prophylaxis. From a military perspective, military commanders can now order the use of antibiotics for prophylaxis in the aftermath of a presumed biological weapons exposure. Nevertheless, the lack of medicines to cure many kinds of biological weapons, especially the toxins and viruses, and the potential antibiotic resistance of even bacterial agents leaves post-exposure prophylaxis an incomplete response.

Nuclear explosions create a radioactive iodine threat. This iodine can be absorbed in the human body. Potassium iodide pills can be used to block the absorption of the radioactive iodine if given as a prophylaxis. Since

1993, the U.S. government has developed supplies of potassium iodide for just such a use.

Immediate Treatment. With some chemical weapons, especially nerve agents, treatment must begin extremely promptly after exposure. As indicated in Table 1, effects occur in seconds to minutes. Therefore, the initial treatment must usually be self-administered with on-hand supplies. Because of the focus of the chemical defense community on the nerve agents, this early treatment has been packaged for military purposes in a nerve agent antidote kit, which has self-injectors carrying atropine, 2-Pralidoxime chloride, and diazepam.[38] These treatments are only effective against nerve agents, and against the nerve agent soman, they are only effective after the pyridostigmine bromide pretreatment discussed above. In 1993, only some of the U.S. military personnel serving in the forward area had nerve agent antidote kits; today, these kits are generally available for forward deployed personnel, though normally they are kept in central storage until a specific threat is perceived to reduce what troops must carry and prevent use of the nerve agent antidote kits in inappropriate circumstances.

With biological agents, immediate treatment usually begins after the disease is recognized, which could be as long as days after the development of symptoms. As noted above, bacterial diseases are normally susceptible to treatment with antibiotics, though in the case of anthrax it is now recommended that multiple antibiotics be given simultaneously.[39] Some toxins can be treated with anti-toxins, and some viruses may be treated with anti-virals, though often only supportive treatment is available for these diseases. In 1993, the anti-virals were not available, and the national antibiotic stocks had not been acquired. These are significant advances today. But there is still much to do in treatment, as the difficulty in treating the viral illness Severe Acute Respiratory Syndrome (SARS) has shown.

With nuclear weapons, there is a combination of effects that require medical treatment. Medical injuries associated with blast effects usually require typical trauma treatment familiar to hospitals. But with small nuclear weapons the size that terrorists or new nuclear states may possess prompt radiation will tend to be the primary source of injury and fatalities. This prompt radiation is released in the first minute after an explosion; while it consists of many components, the principal ones in terms of

radiation effects are gamma rays and neutrons. The weapon also will release fission products that decay over time, causing the radiation that can contaminate downwind areas in the form of nuclear fallout. Immediate medical treatment against such injuries is critical, and United States capabilities are relatively advanced, as shown in the 1986 Chernobyl case. Advances in U.S. radiation treatment and trauma care since 1993 make the United States better prepared to deal with such threats, though the number of expected casualties from even small nuclear weapons used in a city would likely overwhelm locally available hospital care, even today.

Long-Term Treatment. We refer to long-term treatment as care required after the initial medical crisis-causing injury has been addressed. Much of long-term care is supportive. For nerve agents, this care should begin within hours of exposure; for many biological agents, this care will begin within several days after symptoms develop. With nuclear weapons, this care would also likely begin within days.

An example of this kind of care was the hospital treatment given to the anthrax letter victims. Five of the six survivors who developed anthrax symptoms remained hospitalized for 18 to 25 days after symptoms initially developed, and even when released from the hospital they required follow-up care.

U.S. capabilities for long-term care have advanced since 1993, providing better abilities to return weapons of mass destruction victims to health. Nevertheless, many victims will have protracted care requirements, which very likely would challenge the U.S. medical system in a mass casualty environment. With regard to military populations, it is likely that many weapons of mass destruction victims will need to be evacuated even for parts of the immediate treatment and certainly for most long-term treatment, making an early return to duty unlikely.

Protecting Public Health and Preventing Panic

Medical treatment is only a part of the medical requirements for consequence management. Additional action is required to contain whatever contamination exists, including the potential requirement for quarantine or other movement restrictions. Also, human remains must be properly handled. Finally, both because many casualties will be self-diagnosed and because the psychological effects of weapons of mass

destruction use can be severe, efforts are required to provide appropriate information to the public and use this information to establish calm and control.

Quarantine and Isolation.[40] Quarantine involves separating people or products that might have been exposed to a disease or other form of WMD contamination from people and products that are not exposed. Quarantine continues until: (1) decontamination can be accomplished; (2) the incubation period of a disease has passed and it can be confirmed that the people will not develop symptoms; or (3) the people develop symptoms and are moved to isolation. Quarantine seeks to prevent the spread of disease or other weapons of mass destruction contamination. Isolation involves separating people who have disease symptoms to prevent the spread of that disease. Quarantine and isolation are usually applied in the case of contagious human disease but could be applied more generally to reduce fear or other psychological reactions.

U.S. procedures for quarantine and isolation exist and are practiced with various endemic diseases. The World Health Organization has defined diseases that it monitors and could take action to control.[41] In addition, President Bush has recently issued an executive order that updates the list of diseases where quarantine should be applied in the United States.[42] However, the Defense Department regulation on quarantine is dated and mainly focused on preventing the spread of agricultural diseases.[43] The military medical system normally assumes that military casualties will be stabilized in forward conflict areas and then moved for most treatment to major medical centers in the United States. But it does not establish rules for when biological casualties or those who may have been exposed to BW can be moved or procedures for moving them.

The United States Transportation Command developed (March 25, 2003) an interim policy on how to handle such movements, but it applies to only seven diseases with bioterrorism potential and focuses mainly on isolation during movement of those already showing symptoms. But there is a developing sense that it would be best not to move contagious casualties, and some concern about properly applying quarantine and prophylaxis in moving those who may have been exposed to contagious disease.

Thus, while some progress is being made, there remain many issues for resolution, such as how to move patients back into the United States or through foreign countries en route to the United States, or how to apply

mass quarantine/isolation to the tens of thousands of non-combatants who may be evacuated to the United States in some future contingency which involves biological weapons use.

Travel Restrictions. Even in cases where quarantine or isolation is not called for, weapons of mass destruction contamination may require some forms of travel restrictions. Some travel restrictions are applied on a normal basis with endemic diseases, and could be extended to other kinds of contamination, including biological agents. For example, when the SARS virus developed in China and other countries, travel warnings were issued to limit the people going to those areas and potentially exposing themselves to a contagious disease. Similarly, travel restrictions could be established around an area contaminated with residual radiation by a radiological or nuclear weapon.

With biological agents, some further procedures may be required to limit psychological reactions. For example, if an anthrax attack were detected in area A, it may be appropriate to "quarantine" the entire area A to prevent people who may have been exposed from traveling to area B where they could become sick with anthrax and create anxiety that an attack had also occurred in area B. Neither the requirements nor the procedures for these travel restrictions are well developed.

Dealing with Human Remains. Human remains contaminated with chemical, biological, or radioactive agents pose a hazard that must be dealt with. Unless these remains are promptly interred, they could lead to other outbreaks of disease. Proper interment requires decontamination of the remains (especially for those chemically and radiologically contaminated), cremation, or sealing the remains in pouches that will leak neither liquids nor gases. Otherwise, ground water and soil could also become contaminated.

Without individual protection for those performing these functions, it may be difficult to handle these remains. These efforts may be very difficult to complete after a mass fatality attack. Consider, for example, the difficulties of burying tens of thousands of fatalities in crowded urban areas or on a battlefield. Mass graves may be required at least as an interim solution, but finding a location for such graves may require moving the fatalities out of an urban area. An alternative health measure may be to cremate the remains, especially to destroy the disease infested dead.

Recent work in the RESTOPS ACTD (Restoration of Operations Advanced Concept Technology Development) program has helped to develop procedures for handling remains and examined appropriate remains pouches, though it did not find a fully acceptable candidate. Before Operation Iraqi Freedom, the Defense Department examined alternatives to returning U.S. military weapons of mass destruction fatalities to the United States, but an acceptable solution was not found.[44] Thus, considerable work is still required in this area.

Public Information. The effects of some weapons of mass destruction attacks will be obvious (e.g., a nuclear crater, or thermal and blast effects). In other cases, people will not understand that they have been exposed. And in either case, people may not know what to do about casualties or when/how to apply prophylaxis or medical treatment. Thus, one function of public information is to help people self-diagnose their exposure or potential exposure to weapons of mass destruction effects and take appropriate action in response. The reverse of this is information that would help people conclude that they have not been exposed and do not need prophylaxis or treatment—essential to limiting chaos and panic and the consumption of scarce medical services and supplies, thereby reducing the size of the "worried well" population. Even as late as the anthrax letters in 2001, it was clear that the United States did not have standard public information packages to fulfill these functions, though the U.S. Centers for Disease Control and other web sites have now posted some information to help in these areas. The Department of Homeland Security is working more on these functions.

In the aftermath of a weapons of mass destruction attack, public information also needs to provide a more general, calming function and seek to sustain governmental control in the affected area. This information should be synchronized with efforts to provide adequate medical assistance, resolve contamination, and restore services. Experience with the anthrax letters suggests that the inconsistent instructions provided by multiple sources undermined the credibility of those sources, and caused employees to question whether they could trust their bosses. A coherent and consistent response plan is needed; the United States government has not at this time published such a plan.

Resolving Contamination and Restoring the Environment

Each form of weapons of mass destruction leaves a different kind of contamination residual. Some chemical agents, such as hydrogen cyanide, chlorine, and phosgene, rapidly become gases in most weather conditions, and disperse fairly quickly, leaving negligible residual contamination. Even the nerve agent sarin is like water, evaporating and dispersing within minutes in many weather conditions, depending upon the particle size. Many biological agents decay rapidly when aerosolized, within an hour or so, including plague, tularemia, and botulinum toxin. And most nuclear effects, such as cratering, blast, thermal radiation, and prompt radiation, are over very quickly. But other forms of weapons of mass destruction persist for a long time, including chemical agents like VX nerve agent which has an oily consistency, biological agents like anthrax which forms spores resistant to decay, and some forms of nuclear fallout/radiation. These longer-term threats generally require some form of decontamination effort to restore the ability of people to live and work in contaminated areas.[45] Indeed, it is reported that there are places in France that still show signs of chemical contamination from World War I.

Before decontamination can begin, it must be determined what areas have been contaminated. Decontamination of chemical and biological weapons effects can then be done with various liquids and foams. Most of these decontaminants can damage sensitive electronics, and some are toxic and/or can cause damage to metals and other surfaces. A wider range of decontaminants are available today compared to 1993, but the damage that they can cause still limits their potential use. Moreover, the waste products from decontamination require special handling so as not to damage the environment, including soil and water tables. While there has been some progress on addressing these issues, much yet needs to be done.[46]

Restoring Services and Confidence

If the weapons of mass destruction attack were to happen on the territory of the United States, some unique challenges would need to be faced. Certainly, one of the most difficult challenges to state and federal authorities following a weapons of mass destruction event is the timely restoration of government services and the need to retain confidence in the

government's ability to manage the event effectively. Affected populations must see government elements quickly moving to contain damage, provide real and immediate services to ease suffering, and make assurances that plans and procedures are being implemented for prompt restoration of critical services.

According to the Federal Emergency Management Agency, recovery includes all types of emergency actions dedicated to the continued protection of the public or to promoting the resumption of normal activities in the affected area.[47] The Federal Emergency Management Agency definition encompasses a broad array of activities, crossing many functional areas and intergovernmental jurisdictions. Emergency actions range from attributional forensics and intelligence, to law enforcement and police activities to ensure the functioning of services, to logistics actions to enhance survivability of affected populations to medical countermeasures. However, it is important to note that the jurisdictional component does not stop at the public sector. Large private sector ownership of critical infrastructures also requires that plans and policies for recovery take their interests as stakeholders into account. Indeed, involving the private sector in response plans can enhance the reach of essential services and buttress the likely strained resources of state and local actors as they respond to a weapons of mass destruction incident. Essential to restoring services and thus promoting government confidence is developing robust intergovernmental plans across federal, state, and local authorities that are flexible, adaptable, and tested and retested through training exercises.

Planning and Coordination

While the federal lead agency for crisis management is the FBI, the Federal Emergency Management Agency is the federal lead agency and integrator for consequence management operations. State governments remain the lead authority for consequence management activities, with federal support coordinated through the Federal Emergency Management Agency, whose consequence management role is to manage and marshal federal support provided by other agencies in a coordinated manner to support recovery efforts underway by state and local authorities.

During crisis management operations, the Federal Bureau of Investigation has the federal lead since these activities consist of primarily law enforcement functions. However, consequence management is an emergency management function and includes measures to protect public health and safety, restore essential government services, and provide emergency relief to governments, businesses, and individuals affected by the consequences of a weapons of mass destruction event.

The Federal Emergency Management Agency organizes its federal consequent management response based on the Federal Response Plan. These efforts include support missions as described in other federal operations plans, and include decontamination efforts, simulation and modeling, and developing recommendations for population protection.

Pursuant to the Federal Response Plan, state and local governments submit requests for federal consequence management assistance through established channels. Requests for federal assistance by state and local governments, as well as those from owners and operators of critical infrastructure facilities, are coordinated with the Federal Emergency Management Agency and its liaisons assigned to coordinate requests to ensure consequence management plans and actions are consistent with overall priorities.

Domestic vs. Overseas Consequence Management

Overseas consequence management operations have significant political-military implications for the Department of Defense, even though the State Department is the lead agency for the conduct of overseas consequence management operations in support of foreign governments or to assist U.S. civilians. The reason is simple: the State Department has virtually no response capabilities of its own, and relies on other agencies to provide assets needed for consequence management operations.

Thus, the Department of Health and Human Services would provide expert medical advice to State in the event of a chemical or biological incident, while the Environmental Protection Agency would assume a similar role when addressing chemical incidents. The Office of Foreign Disaster Assistance in the Agency for International Development would provide critical support in coordinating international responses to an

incident, as well as providing access to certain resources needed on a time-sensitive basis.

Despite the significant role that non-DoD agencies may play in U.S. government responses to a consequence management operation in support of a foreign government, the U.S. military will probably be the most important single source of resources. Thus, the Department of Defense airlift capabilities will probably be responsible for transporting response assets to the scene of the incident. Depending on the nature of the incident, DoD personnel, supplies, or units could provide a significant portion of the deployed response capabilities.

Limited DoD Ability to Assist Overseas Civilian Populations. This capability is always constrained, and is likely to become even more limited in the context of contingency operations in a chemical or biological environment. DoD has relatively few consequence management capable units, the time required to deploy such units to distant incident scenes is excessive, and there is likely to be a high demand for such units in prosecuting a warfight and protecting the homeland.

DoD Depends Heavily on Host Nation Consequence Management Capabilities. The Department of Defense has limited consequence management resources to support its military forces deployed overseas. Only during periods of crisis is the U.S. military likely to expand its overseas force deployments with significantly enhanced consequence management capabilities. As a result, under many circumstances, U.S. military forces operating overseas must rely on host nation capabilities. For example, in many countries the United States has limited medical facilities, and must rely on host nation hospitals for treating mass casualties. Most U.S. installations have only limited ability for chemical defense or dealing with hazardous materials. In addition, reliance on host nation resources may be a preferred option to enhance the timeliness of response and minimize the impact of the same constraints that limit Department of Defense support for overseas civilian populations. Nevertheless, host nation populations (both military and civilian) will usually be affected in large numbers by a weapons of mass destruction attack that also targeted U.S. forces overseas. In such cases, the host nation will tend to focus on taking care of its own people, leaving little resources available for taking care of U.S. personnel.

Support to Coalition Partners Often Seen as Secondary to Warfighting. Many people in the Department of Defense tend to believe that consequence management activities in support of coalition partners should be a lower priority than domestic responses or support of combat operations. From many perspectives, this attitude is perfectly understandable. The Department of Defense faces many constraints in its consequence management activities, partially due to the extent to which its capabilities depend on assets that are in short supply or that are needed to support warfighting capabilities. The cost of diverting such assets could be a significant threat to the ability of the United States to prosecute wars against adversaries armed with weapons of mass destruction.

Consequence management capabilities would become even more limited in the context of contingency operations in a chemical or biological environment. The Department of Defense has relatively few units trained, organized, and equipped to perform consequence management. The time required to deploy such units to distant incident scenes is excessive, and there is likely to be a high demand for such units in prosecuting a warfight and protecting the homeland.

At the same time, some officials with responsibility for managing alliance relationships point out that circumstances may not permit the United States to ignore requests for consequence management support. Access rights and coalition solidarity would likely depend upon the United States responding to requests for protection against weapons of mass destruction and providing consequence management assistance. There are numerous recent examples of the United States diverting scarce, high value, high demand military assets for such reasons. In 1991, the United States supplied Patriot missile batteries to Israel as part of a campaign to convince the Israeli government that it should stay out of the war against Iraq even if attacked with Scud missiles. Similarly, in February 1998, the Department of Defense reportedly provided Israel with chemical and biological defense supplies at a time when the United States was preparing to initiate hostilities against Iraq. More recently, this kind of support was provided during the conflict in Iraq by a NATO deployment of Patriot air defense missile systems to Diyarbakir and Batman in South Eastern Turkey.

VI. Toward a Capabilities-Based Approach

Much has been done to improve consequence management capabilities since 1993. Nevertheless, even against existing threats, current capabilities are clearly inadequate, and against some threats (like aerosolized hemorrhagic fevers), current capabilities are seriously inadequate. Investments by the United States and its allies to create defenses for these areas will gradually enhance U.S. and allied capabilities. However, to complicate matters even more, the threat is also evolving. Key concerns include:

- New kinds of chemical weapons are being developed. One example is the Russian fourth generation agents, about which the Pentagon has said, "…since 1992, Russian scientists familiar with Moscow's chemical warfare development program have been publicizing information on a new generation of agents, sometimes referred to as 'Novichoks.' These scientists report that these compounds, some of which are binaries, were designed to circumvent the Chemical Weapons Convention and to defeat Western detection and protection measures. Furthermore, it is claimed that their production can be hidden within commercial chemical plants. There is concern that the technology to produce these compounds might be acquired by other countries."[48]

- The genetic revolution raises many new possibilities for the evolution of biological weapon threats. Even before the recent advances in genetics, before the demise of the Soviet Union, their biological weapons program was pursuing a variety of antibiotic resistant strains of biological agents, and also strains that would suppress the immune system. They also worked on variants of serious diseases that would potentially thwart existing vaccines or treatments.[49] Further advances in these and other areas can be expected.

While some ongoing defensive efforts may help to counter these evolving threats, it appears to be the case that the offensive weapons of mass destruction capabilities are both well ahead of the defensive/consequence management capabilities, and in some areas moving even further ahead.

Part of the challenge in this area is the requirement that defenses focus on established threat lists. For example, Defense Department counters to biological weapons are focused on an established threat list of biological agents that intelligence sources have sufficient information to confirm. This approach focuses new defensive efforts on the offensive threats that emerged usually two or more decades ago. Moreover, this approach is inconsistent with the strategy laid out in the Defense Department's 2001 Quadrennial Defense Review, which called for capabilities-based, as opposed to threat-based, planning.

In a capabilities-based planning framework, one focuses more on the most serious threats that could plausibly exist, for example, smallpox or some hemorrhagic fevers, and fields defenses prioritized against those threats.[50] Indeed, the Quadrennial Defense Review includes a strategy component referred to as "Dissuasion," which seeks to develop capabilities against the most serious threats before adversaries can even develop those threats in an effort to dissuade adversaries from pursuing the threats in the first place.[51] In terms of military competition, dissuasion seeks to put the United States in the lead of the "challenge and response cycle,"[52] giving it a leading rather than a trailing role. But such an approach is generally not allowed or followed today.

To pursue a capabilities-based approach, sufficient funding must be applied to enhance the capabilities needed for consequence management of weapons of mass destruction attacks. While this funding has been increasing significantly in recent years, especially in terms of homeland security, the funding is still well short of being adequate. As Secretary of Defense Rumsfeld has said, "It would be reckless to press our luck with false economies or gamble with our children's future. This nation can afford to spend what is needed to deter the adversaries of tomorrow and to underpin our prosperity. Those costs do not begin to compare with the cost in human lives and resources if we fail to do so."[53]

Notes

1. This analysis considers passive defenses and protective concepts of operation only in the context of protecting personnel who are otherwise performing consequence management activities and not the broader applications of these approaches to preventing damage in the first place. It also considers preparation, training, and coordination with allies, only in the context of performing consequence management.

2. This definition is a modification of the definition agreed to by representatives of the United States and the Gulf Cooperation Council (GCC) states (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE) in the Eagle Resolve 2000 conference sponsored by USCENTCOM (U.S. Central Command). That conference focused on consequence management as one of its two key issues. Major Mike Warmack of SOCCENT (Special Operations Command Central) initially proposed this definition. While the original definition also included the use of high explosives and natural/industrial disasters, which the Gulf States considered an integral part of their consequence management efforts, the scope is limited here to weapons of mass destruction uses.

3. "National Strategy to Combat Weapons of Mass Destruction," *The White House,* December 2002, 5.

4. A redacted version of PDD 39 is widely available. Specifically, PDD 39 directed FEMA to update the Federal Response Plan to ensure that the federal government was prepared to respond to the consequences of terrorist attacks directed at "large" populations in the United States. The Terrorism Annex to the Federal Response Plan was released on February 7, 1997.

5. National Security Council, Subject: U.S. Policy on Counterterrorism, June 21, 1995. An unclassified version of the document provided to the Pentagon Library on February 24, 1997, was used here. Significant portions of the document were excised.

6. "Fact Sheet: Summary of Presidential Decision Directives 62 and 63," May 22, 1998, and "Fact Sheet: Combating Terrorism: Presidential Decision Directive 62," *Office of the Press Secretary, The White House,* 22 May 1998. On-line, Internet, 11 May 2004, available from http://www.whitehouse.gov.

7. This program is now referred to as the Strategic National Stockpile (formerly the National Pharmaceutical Stockpile). On-line, Internet, 11 May 04, available from http://www.bt.cdc.gov/stockpile/index.asp.

8. "President Requests Additional Funding for Protection against Biological and Chemical Weapons," *Office of the Press Secretary, The White House,* 8 June 1998. On-line, Internet, 1 July 2004, available from http://www.fas.org/spp/starwars/program/

news98/980608-wh3.htm; "Press Briefing by Richard Clarke, National Coordinator for Security, Infrastructure Protection, and Counter-Terrorism, and Jeffrey Hunker, Director of the Critical Infrastructure Assurance Office," *Office of the Press Secretary, The White House,* 22 May 1998. On-line, Internet, 1 July 2004, available from http://www.fas.org/irp/news/1998/05/980522-wh3.htm.

9. Kenneth F. McKenzie, Jr., *The Revenge of the Melians: Asymmetric Threats and the Next QDR*, McNair Paper No. 62 (Washington, D.C., National Defense University Press, 2000), 1.

Although the concept was implicit in some earlier post-Cold War thinking about threats to U.S. security, the QDR represented the first official use of this terminology.

10. Office of the Assistant to the Secretary for Nuclear, Biological, and Chemical Matters, and the U.S. Army Chemical and Biological Defense Command, *Assessment of the Impact of Chemical and Biological Weapons on Joint Operations in 2010: A Summary Report*, November 1997, Booz-Allen & Hamilton; McLean, Virginia. The report was funded by the Office of the Secretary of Defense (including the Office of Net Assessment and the Office of the Deputy Assistant to the Secretary of Defense for Counterproliferation and Chemical/Biological Defense), the U.S. Army Chemical and Biological Defense Command, and the Executive Office of the Joint Service Materiel Group. However, the study report explicitly notes that it "is not to be considered an official position of the Department of Defense."

11. Among the attacks postulated was an aerosol release of encapsulated cholera against the U.S. forces deployed at Diego Garcia, the use of mustard gas against air and sea ports of embarkation used by U.S. forces deploying to the Persian Gulf, mustard attacks on air and sea ports of debarkation and on prepositioned equipment in the Persian Gulf arena, and a mustard attack on the Pentagon. See *CB 2010*, 12-18.

12. *CB 2010*, 23.

13. Ibid., 18.

14. Ibid., 1.

15. President George W. Bush, *The National Security Strategy of the United States of America*, The White House, September 17, 2002, 1.

16. Ibid., 14.

17. Ibid.

18. *National Strategy to Combat Weapons of Mass Destruction*, The White House, December 2002, 5.

19. Ibid., 2.

20. Ibid., 5

21. Ibid.

22. Ibid.

23. Office of Homeland Security, *National Strategy for Homeland Security*, The White House, July 2002, x.

24. Some sources associated enhanced high yield explosives (like full-air explosives) with WMD; see, for example, the 2001 QDR discussion of CBRNE, page 4. This chapter does not address enhanced high yield explosives.

25. Table was developed by Bruce Bennett using various sources.

26. Alibek Testimony to the House Armed Services Committee Oversight Panel on Terrorism, May 23, 2000.

27. While in theory each gram of anthrax contains 100 million lethal doses, in practice a much smaller number of people would be affected because of atmospheric dispersal. Thus, the several grams of anthrax contained in the anthrax letters mailed in late 2001 infected only 11 people to the point of showing symptoms before wide-spread antibiotic prophylaxis was begun.

28. *Proliferation of Weapons of Mass Destruction: Assessing the Risks*, U.S. Congress Office of Technology Assessment, August 1993, 53-54; adapted by Bruce Bennett to a smaller amount of anthrax and corrected for sarin coverage (which is an order of magnitude too low in the original.) The numbers for chemical casualties printed by OTA were off by an order of magnitude (a multiplication error?), as confirmed by Steve Fetter, "Ballistic Missiles and Weapons of Mass Destruction: What Is the Threat? What Should Be Done?" *International Security*, (Summer 1991): 21-27. The area affected by anthrax and the quantity of anthrax used were both reduced by a factor of ten to put them more in the range of a quantity that an adversary would likely use. The biological fatalities assume that all of the lethal area is urbanized. Because the biological cloud could be very long and narrow, (unless the attacker is very well prepared and very skilled) going well beyond the urbanized area, these fatalities should be considered an upper bound.

29. The "worried well" are people who think they have been exposed to WMD effects but have not been, yet they seek medical care.

30. Chemical and biological weapons could also be put in food/water and could contaminate a location, though these are not likely means to cause mass casualties.

31. The 1984 incident in Bhopal, India involved the release of 20 to 30 tons of methylisocyanate. The accident caused 2,500 immediate fatalities and approximately 100,000 casualties requiring some form of medical treatment. There were also several thousand animals injured and roughly 1,000 killed.

32. Table was developed by Bruce Bennett.

33. For example, there has been considerable speculation that the woman in Connecticut who died from the anthrax letters likely received a very low dose of anthrax. At least one expert claims that even a few spores could cause death in some people, even though the dose required for a 50 percent chance of getting anthrax is about 8,000 retained spores. See C.J. Peters and D.M. Hartley, "Anthrax Inhalation and Lethal Human Infection," *The Lancet*, February 23, 2002, 710-711.

34. One example is a model called NBC Crest.

35. "Almost all inhalational anthrax cases in which treatment was begun after patients were significantly symptomatic have been fatal, regardless of treatment." USAMRIID, *Medical Management of Biological Casualties Handbook*, February 2001, 23. This reference does not clarify what "significantly symptomatic" means. One example of the view which held prior to the anthrax letters cases is: "Unless there has been prior immunization, once symptoms appear, treatment invariably is ineffective, although there are anecdotal reports of patients surviving after very early confirmation of exposure and extremely aggressive antibiotic and supportive therapy." Lieutenant Commander Pietro Marghella, "The Second, Silent Attack on Pearl," *U.S. Naval Institute Proceedings*, May 1999, 61.

36. All six of the patients who received antibiotics during the first phase of the disease, starting from 1 to 7 days after symptoms began, survived. See Jernigan, John A., et al., "Bioterrorism-Related Inhalation Anthrax: The First Ten Cases Reported in the United States," *Emerging Infectious Diseases* 7 (Nov/Dec 2001). On-line, Internet, 11 May 2004, available from http://www.cdc.gov/ ncidod/EID/vol7no6/jernigan.htm.

37. For anthrax, see Thomas V. Inglesby, et. al., "Anthrax as a Biological Weapon," *JAMA*, May 12, 1999, 1735-1745. On-line, Internet, 11 May 2004, available from http://jama.ama-assn.org/cgi/reprint/281/18/1735.pdf; Thomas V. Inglesby, et. al., "Anthrax as a Biological Weapon, 2002: Updated Recommendations for Management," *JAMA*, May 1, 2002, 2236-2252. On-line, Internet, 11 May 2004, available from http://jama.ama-assn.org/cgi/reprint/287/17/2236.pdf.

38. A replacement to the NAAK, the Antidote Treatment Nerve Agent Autoinjector (ATNAA), is in the process of being fielded. This new kit combines the atropine and 2-Pralidoxime chloride for delivery from a single needle, delivering antidotes faster from a more compact package.

39. This change in procedures apparently made a significant improvement in the survival of the anthrax letter cases, per Jernigan, 942.

40. The CDC draws the distinctions made here between quarantine and isolation. On-line, Internet, 8 May 2004, available from http://www.cdc.gov/ncidod/sars/isolation quarantine.htm.

41. See the *World Health Organization website*. On-line, Internet, 8 May 2004, available from http://www.who.int/csr/disease/en.

42. See "Executive Order 13295: Revised List of Quarantinable Communicable Diseases." On-line, Internet, 8 May 2004, available from http://www.cdc.gov/ncidod/sars/executiveorder040403.htm.

43. See Headquarters, Departments of the Army, the Navy, and the Air Force, "Quarantine Regulations of the Armed Forces," Army Regulation 40-12, 24 January 1992.

44. In February 2003, it was reported that a DoD panel had made recommendations on how to handle human remains contaminated by WMD. See: Erin Q. Winograd, "DoD Given Guidelines for Dealing With Soldiers Killed by CBN Agents," *Inside the Army*, Feb. 2003.

45. With chemical agents like VX, which persists for days to weeks on glass surfaces depending upon the temperature, there is a debate on the degree to which they absorb into surfaces like concrete, asphalt, and paint, and whether they are then benign. This subject, referred to as "agent fate," is being studied by the DoD to determine the nature and duration of the residual threat, and the need for avoidance or decontamination.

46. In 2002, the defense community fielded a series of new decontaminants (especially several foams), but subsequent testing showed that these agents could fail to decontaminate some CBW agents, and still had the corrosive drawbacks of traditional decontaminants like bleach solutions. As of 2004, the community is still seeking a better form of decontaminant.

47. United States Government Interagency Domestic Terrorism Concept of Operations Plan, January 2001, p. B-4. DoD's definitions of recovery and reconstitution are, "1. Those actions taken by one nation prior to, during, and following an attack by an enemy nation to minimize the effects of the attack, rehabilitate the national economy, provide for the welfare of the populace, and maximize the combat potential of remaining forces and supporting activities. 2. Those actions taken by a military force during or after operational employment to restore its combat capability to full operational readiness." Joint Publication 1-02: *Department of Defense Dictionary of Military and Associated Terms*, 12 April 2001 (As amended through 5 June 2003), 444.

48. Office of the Secretary of Defense, *Proliferation: Threat and Response, January 2001*, 57.

49. Dr. Kenneth Alibek, "Biological Weapons," briefing presented to the USAF Air War College, November 1, 1999, slide 9.

50. Department of Defense, *Quadrennial Defense Review Report*, September 30, 2001, iv.

51. Ibid., 12.

52. The term "challenge and response cycle" was coined by Sam Gardiner and Dan Fox as part of RAND's early 1990s work on Revolutions in Military Affairs.

53. *Quadrennial Defense Review Report*, vi.

USAF Counterproliferation Center

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