**Introduction**

Topics to be covered include:

* Weapons of Mass Destruction (WMD)
* Chemical, Biological, Radiological andNuclear (CBRN )threats

Many Americans are unfamiliar with the types of threats they are vulnerable to should another terrorist attack occur. The events of 9/11 are the most horrific our nation has experienced and the long-lasting effects of a foreign terrorist attack still linger today. Some are not familiar with the other types of weapons used to threaten or instill fear in others. With the advances in modern technology many different types of biological weapons can be created in a lab setting.

Terrorism has presented a threat to the United States intelligence community as well as other nation states. While we would never consider the possibility of a plane, let alone three in one day, flying into a building on purpose as an act of terrorism this demonstrates the lengths terrorists will go to in order to fight their “holy war” against the West. Weapons of mass destruction (WMD) are also used by terrorists in a number of ways and these threats should be taken seriously. In this lesson, we will discuss WMD as well as the individual weapons that are used at length.

**Weapons of Mass Destruction**

The uncertainty of facing an attack using weapons of mass destruction (WMD) against the United States remains high on public policy efforts. We must plan our homeland defense strategies, policies, and programs based on the low probability of a future attack as there is no definitive way to determine what type of weapon would be used or the method in which the given weapon would be delivered. Delivery of a weapon of mass destruction could be on a small scale such as through the use of a backpack bomb covertly or overtly or it could be a suicide bombing attempt by a foreign nation state or non-state actor.

The intelligence community continues to stress that terrorists are more likely to use conventional weapons rather than a chemical or biological one. The reason for this is because chemical and biological weapons (CBW) are more difficult to weaponize and the results from use are unpredictable. While there has been documented increases in the use of CBWs by nation state actors and non-state actors, they are mainly used on foreign soil.

We have traditionally noted that CBWs have been used throughout history by politically motivated groups and non-state actors. With the introduction of nuclear weaponry in 1945, the United States experienced three different periods of vulnerability: the atomic bomb (A bomb), nuclear arms race, and nuclear, biological, and chemical (NBC) terrorism (Gurr and Cole 2002). The United States has remained the reigning global superpower and renowned conventional military power, allowing a brief sense of security, but with the re-emergence of the use of NBC weaponry in the 1990s, it was short-lived. The threats were not only foreign but we saw them become domestic also. Americans are more fearful of NBC threats from foreign groups rather than “the enemy within,” introducing a new vulnerability when domestic terrorist attacks were on the rise.

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 Salmonella Bacteria

In 1984, the Rajneesh religious sect wanted to influence a local election in Oregon through the incapacitation of opposing voters. Two members of the sect produced and distributed salmonella bacteria in salad bars in eight different area restaurants (CIA 2002).

 Cyanide Champagne

Tajik opposition members spiked champagne with cyanide on New Year’s Eve in 1995, killing seven and making countless other party-goers ill.

 Botulinum

*Botulinum* toxin was found in three suitcases near a train station in Tokyo in 1995, a failed biological attack by Japanese cult Aum Shinrikyo. Five days later, the same cult successfully used improvised chemical devices (ICD) in a subway station to deploy sarin gas, killing 12 and injuring thousands.

 Weapons of Mass Destruction

Plotting to kill select government officials in 1998, two members of the Republic of Texas were apprehended and convicted for threatening to use a weapon of mass destruction.

 Poisoned Wine and Fruit

In 2000, Chechen rebels were accused of poisoning wine and canned fruit that were to be delivered to Russian soldiers in Chechnya.

 Water System Poisoning

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## Conventional Explosives and Secondary Devices

Conventional explosives have been used by terrorists for centuries. Traditional, or those which are manufactured, and IEDs are typically the most easily accessible weapons for terrorists to acquire and use. These types of weapons are easily accessible and when expertly used, can impose significant amounts of devastation to property and may be the cause of multiple injuries and fatalities.

Conventional explosives are the greatest of worry regarding weapons because of their ability to effectively spread chemical, biological, or radiological agents. Conventional explosives and IEDs can be explosive or combustible in nature. Explosives employ the use of physical devastation which causes the expansion of gases that result from the ignition of different explosive materials (e.g., simple pipe bombs, backpack bombs, letter or package bombs, or a car bomb). Incendiary devices such as firebombs rely on the ignition of fires to cause damage or harm (e.g., Molotov cocktails or napalm bombs).

Explosions and conflagrations can be dispensed using missiles or projectile devices such as a rocket, rocket-propelled grenade (RPG), mortar, or an air-dropped bomb. Since these types of weapons rely on low technology and are comparatively easy to move and deliver, they are the most common choice of terrorists. Although suicide bombings are becoming more common, the majority of devices are detonated by a radio or cell phone with timed remotes.

Let’s take a look at different attack scenarios that might occur.

### Scenario A

In a large metropolitan area, radiological powder is injected into the HVAC system of several highly populated buildings and hotels over the course of a few weeks. It takes a few days for symptoms to manifest and it can be days or even weeks following the introduction of the powder before a public warning is announced. Once the powder has been discovered following the rise in symptoms long term efficacy and damage may not be easily predicted. If the area is one that is a tourist destination then the economy may suffer because no one will travel to the location for an extended period of time following contamination. There is a distinct possibility that the buildings may have to be rebuilt in order to rid them from the contamination.

### Scenario B

Terrorists may become employed as cleaners for a large shopping mall, airport, or office building as their cover. Over the course of a few days or weeks cleaning products containing a chemical agent are delivered and ready for use on a specified date. These “cleaners” may introduce the chemical agent to air filters and replace existing ones so that it is spread through the HVAC system or they may use the contaminated cleaning products in bathrooms and food service areas. They would most likely begin the attack during peak hours with high traffic so that the highest number of people possible are affected by the agent.

### Scenario C

Terrorists who have been immunized against a chemical agent use typically seen containers such as purses, briefcases, or suitcases to transport the agent. They may breech government offices and detection is less likely in the innocuous containers. They will easily pass through x-ray machines and security since no official weapon would be identified. A powder such as anthrax could be stored in a sealed plastic bag to avoid detection. Once they are inside the desired target the chemical agent can then be released or abandoned. Once again it may take days or weeks for symptoms to show, delaying the identification of an agent within the confines.

### Scenario D

A terrorist group may acquire a remote controlled helicopter used to spray crops as their method of release of an agent such as Ebola. No one would suspect a crop spraying helicopter when it is used for agricultural purposes. The agent is then released on crops and workers who help spread the contamination to neighboring counties. The remote controlled helicopter may then be crashed into a body of water to destroy it, making it look like an accident.

### Scenario E

A truck filled with what appears to be light gravel is driven through the streets of a city during rush hour or another heavy traffic period. A visible powder does come out through the tarpaulin covering the truck, but the spread of the powder is so light that no attention is paid to it. The driver and his assistant are immunized against the modified form of anthrax carried in the truck, which is being released from behind the gravel or sand in the truck. The truck slowly quarters key areas of the city. Not only are commuters and those in the area infected but they are now transporting the spores to their work or home to infect more people. Once the symptoms are noticed the attack has now become an epidemic. As many as 40 to 60 percent of the population exposed to the spores die, and area medical facilities have been overwhelmed with the number of patients that require medical assistance.

### Scenario F

Simultaneous release takes place of anthrax spores at ten to twenty scattered subway platforms during rush hour and at commuter rail stations as well. No notice is given of the attack. Incubation takes one to seven days and the attack is only detected when symptoms appear. A large number of people are now exhibiting flu-like symptoms, showing difficulty with breathing. At this point, several million people using the mode of transportation targeted are exposed. Prompt treatment is no longer an option because the attack went undetected for too long, making decontamination efforts useless. Medical facilities are overburdened with the influx of patients.

### Scenario G

An explosive device is detonated on a military base in an area that is densely populated with personnel, spreading mustard or nerve gas. While emergency teams respond quickly and assess the damage, other responders are evacuating the affected area as fast as possible in order to reduce the number of affected individuals. A few hours later it is noted that the device not only contained mustard or nerve gas but also a biological agent which is the cause of death for the majority of emergency responders. The evacuation area must now be expanded to account for this discovery.

These scenarios illustrate the different types of attacks that could potentially occur on domestic soil, injuring or killing thousands or millions of people. Terrorists have infiltrated businesses as employees or contractors in order to coordinate attacks. It is also easy to see how dangerous it is to assume that terrorists act in predictable ways. They are also able to attack emergency responders, lessening the chances of containing the agents. We would be remiss to think that terrorists would only use large scale weapons for attacks when they can easily use much smaller and common ones.

## Chemical Weapons

Chemical Weapons on U.S. Soil

Historically, ***chemical weapons*** have not been effectively used in attacks on domestic soil. In the 1990s, a chemical weapon attack was planned by the Ku Klux Klan in Dallas, Texas. They attempted to use an improvised explosive device to release hydrogen sulfide from a refinery tank. The United States lacks the ability to characterize the effects that a chemical attack would have on domestic soil. While terrorists traditionally use explosive devices for their lethal effects, a chemical attack would result in larger scale damage long term. These are the types of weapons of choice to intimate others and create fear and panic.

Types of Chemical Weapons

As with explosives, chemical weapons have been around and used for centuries and throughout history. Chemical weapons were, and still are, designed for the primary purpose of killing, injuring, or incapacitating people. People may inhale or digest the toxin or it may penetrate the skin or eyes. There are six general categories of chemical weapons that have been developed and are categorized based on their physiological effects each have on their victims:

* Nerve Agents– Sarin gas or VX (Most potent of all nerve agents)
* Blister Agents– Mustard gas
* Blood Agents– Cyanide
* Choking or Pulmonary Agents– Phosgene
* Irritants – Tear gas or pepper spray
* Incapacitating Agents– BZ (central nervous system depressant) or Agent 15 (Hallucinogen)

Execution of Chemical Weapons

Chemical weapons can be delivered by terrorists through several different methods. Aerosol devices can distribute chemicals in liquid, solid (powder) or gas states by causing tiny particulates of the chemical to be suspended into the air. Explosives may also be used to distribute chemicals through the air in the same approach. A tanker truck or train carrying chemicals may also be penetrated, exposing the chemical to the air or water. Chemicals that may be easily absorbed through the skin may be placed directly on the potential victim’s skin, causing harm or death.

Characteristics of Chemical Weapons

Chemical attacks are typically identified immediately, while it may be not clear to victims and responders until further testing has taken place that an attack has occurred based on the method of deployment. The testing will determine whether the attack was chemical or biological so that the proper response can be given. Chemical weapons may linger in the affected area following the attack for an extended period of time or evaporate quickly because of their lighter-than-air qualities, stemming from the loss of ability to harm or kill after approximately 10 or 15 minutes in open areas. In unventilated rooms, chemicals linger for a substantial longer period of time.

## Biological Weapons

***Biological weapons*** are live organisms, either a bacteria or virus, or the toxic by-products  generated by living organisms that are manipulated in order to cause illness, injury, or death in humans, livestock, or plants. Advances in weapons technology have allowed this type of weapon a more effective reach and application on intended victims. Bioweapons may be dispersed overtly or covertly by terrorists. When covertly dispersed, bioweapons are extremely difficult to recognize because their negative effects can take hours, days, or even weeks, to emerge. This is especially true with bacteria and viruses, although toxins generally prompt an immediate reaction (Bullock, Haddow, and Coppola 2013).

Recognition of a biological attack is made through a range of methods, including the identification of a credible threat, the discovery of weapons, and the correct diagnosis of affected humans, animals, or plants. Detection depends on a concerted public health monitoring system, trained, patients who seek medical care after exposure, and equipment suitable for confirming the diagnosis. Bioweapons are unique in this regard, since detection is likely to be made not by a first responder, but by members of the public health community after exposure and symptoms develop.

The destructive capacity of bioweapons is confused or ignored by people normally because they have no idea that they have been exposed to an agent or toxin. During the incubation period, when they do not exhibit symptoms but are contagious to others as we see with the Ebola virus, they can spread the disease by touch or through the air. Incubation periods can be as short as several hours but can be as long as several weeks, which allows for spreading to farther geographic areas because of the efficiency of modern travel. Biological weapons are also effective at disturbing economic and industrial sectors of society, even when animals or plants are the targets because these affect the food supply and commerce. Terrorists could potentially spread a biological agent undetected over a large geographic area, causing significant devastation to crops. If the agent is easily spread then the consequences could cripple an entire industry (Bullock, Haddow, and Coppola 2013).

The categories of biological weapons are:

### Category A

Agents such as anthrax, smallpox, the plague, and botulism pose a serious threat to a large geographic area. These have the potential to cause great harm to a large number of people.

### Category B

Agents such as ricin, salmonella, and typhus are easily dispersed over a large geographic area but have low mortality rates. These generally cause illness and require medical attention.

### Category C

Common agents such as tuberculosis may be engineered and these pathogens can cause great damage by terrorists.

## Nuclear and Radiological Weapons

Nuclear and radiological weapons are those that involve the movement of energy through space and through material (Bullock, Haddow, and Coppola 2013). There are three primary mechanisms by which terrorists can use radiation to carry out an attack: dispersal of radiological material, detonation of a nuclear bomb, or an attack on a facility housing nuclear material such as a power plant, research laboratory, or storage site.

***Radiological dispersion devices (RDDs*)**are uncomplicated explosive devices that distribute harmful radioactive material upon detonation without the involvement of a nuclear explosion. These devices are often called “dirty bombs.” Certain radiological dispersion devices do not require explosives for dispersal and while illnesses and fatalities very close to the point of dispersal are likely, these devices are more likely to be used to spread terror. As with many biological and chemical weapons, it may be difficult to initially detect that a radiological attack has occurred and special detection equipment is required (Bullock, Haddow, and Coppola 2013).

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If a radiological or nuclear attack were to occur, humans and animals would experience both internal and external consequences to exposure to the agents or weapons used. External exposure results from any contact with radioactive material outside the body, while internal exposure requires ingestion, inhalation, or injection of radiological materials. Radiation sickness results from high doses of radiation, and can result in death if the dosage is high enough. Other radiation exposure symptoms are damage to the immune system, higher chance of developing cancer. Or red or burning/stinging skin or eyes.

***Nuclear weapons*** are the most devastating of the various attack forms listed previously. They are also the most difficult to develop or procure, therefore they are considered the lowest threat of the three in terms of terrorist potential. A nuclear weapon causes damage to property and harm to life through two separate manners. With the first, a blast is created by the detonation of the bomb, releasing an extremely large amount of energy, which is the result of an uncontrolled chain reaction of atomic splitting. The initial shock wave, which destroys all built structures within a range of up to several miles from detonation site, is followed by a heat wave reaching tens of millions of degrees close to the point of detonation (Bullock, Haddow, and Coppola 2013).

The second manner in which nuclear weapons inflict harm is through harmful radiation. This radiation and radiological material is most dangerous close to the area of detonation because high concentrations can cause quick death and particles may also reach high into the atmosphere, posing a threat several hundreds of miles away under the right weather conditions. Radiation can also persist for years after the explosion occurs.

## Key Characteristics of Weapons of Mass Destruction

The following information has been adapted by Anthony H. Cordesman (The Office of Technology Assessment, Proliferation of Weapons of Mass Destruction: Assessing the Risks, U.S. Congress OTAISC559, Washington, D.C. (August 1993), 56-67).

Chemical Weapons

**Destructive Effects:**

Poisoning skin, lungs, nervous system, or blood. Contaminating areas, equipment, and protective gear for periods of hours to days. Forcing military units to don highly restrictive protection gear or use incapacitating antidotes. False alarms and panic. Misidentification of the agent, or confusion of chemical with biological agents (which may be mixed) leading to failure of defense measures. Military and popular panic and terror effects. Major medical burdens that may lead to mistreatment. Pressure to deploy high cost air and missile defenses. Paralysis or disruption of civil life and economic activity in threatened or attacked areas.

**Typical Targets:**

Infantry concentrations, air bases, ships, ports, staging areas, command centers, munitions depots, cities, key oil and electrical facilities, desalinization plants.

**Typical Missions:**

Killing military and civilian populations. Intimidation. Attack of civilian populations or targets. Disruption of military operations by requiring protective measures or decontamination. Area or facility denial. Psychological warfare, production of panic, and terror.

**Limitations:**

Large amounts of agents are required to achieve high lethality, and military and economic effects are not sufficiently greater than careful target conventional strikes to offer major war fighting advantages. Most agents degrade quickly, and their effect is highly dependent on temperature and weather conditions, height if dissemination, terrain, and the character of buildup areas. Warning devices far more accurate and sensitive than for biological agents. Protective gear and equipment can greatly reduce effects, and sufficiently high numbers of rounds, sorties, and missiles are needed to ease the task of defense, leave buildings and equipment reusable by the enemy, although persistent agents may require decontamination. Persistent agents may contaminate the ground the attacker wants to cross or occupy and force use of protective measures or decontamination.

Biological Weapons

**Destructive Effects:**

Infectious disease or biochemical poisoning. Contaminating areas, equipment, and protective gear for periods of hours to weeks. Delayed effects and tailoring to produce incapacitation or killing, treatable or non-treatable agents, and be infectious on contact only or transmittable. Forcing military units to don highly restrictive protection gear or use incapacitating vaccine antidotes. False alarms and panic. High risk of at least initial misidentification of the agent, or confusion of chemical with biological agents (which may be mixed) leading to failure of defense measures. Military and popular panic and terror effects. Major medical burdens that may lead to mistreatment. Pressure to deploy high cost air and missile defenses. Paralysis or disruption of civil life and economic activity in threatened or attacked areas.

**Typical Targets:**

Infantry concentrations, air bases, ships, ports, staging areas, command centers, munitions depots, cities, key oil and electrical facilities, desalinization plants.

**Typical Missions:**

Potentially far more effective against military and civil area targets than chemical weapons.

Killing military and civilian populations. Intimidation. Attack of civilian populations or targets. Disruption of military operations by requiring protective measures or decontamination. Area or facility denial. Psychological warfare, production of panic, and terror.

**Limitations:**

Most wet agents degrade quickly, although spores, dry encapsulated agents, and some toxins are persistent. Effects usually take some time to develop (although not in the case of some toxins). Effects are unpredictable, and are even more dependent than chemical weapons on temperature and weather conditions, height of dissemination, terrain, and the character of the built-up areas. Major risk of contaminating the wrong area. Warning devices uncertain and may misidentify the agents. Protective gear and equipment can reduce effects. Leave buildings and equipment reusable by the enemy, although persistent agents may require decontamination. Persistent agents may contaminate the group the attacker wants to cross or occupy and force use of protective measures or decontamination. More likely than chemical agents to cross the threshold where nuclear retaliation seems justified.

Nuclear Weapons

**Destructive Effects:**

Blast, fire, and radiation. Destruction of large areas and production of fallout and contamination, depending on character of weapon and height burst. Contaminating areas, equipment, and protective gear for periods of hours to days. Forcing military units to don highly restrictive protection gear and use massive amounts of decontamination gear. Military and popular panic and terror effects. Massive medical burdens. Pressure to deploy high cost air and missile defenses. Paralysis or disruption of civil life and economic activity in threatened or attacked areas. High long term death rates from radiation. Forced dispersal of military forces and evacuation of civilians. Destruction of military and economic centers, and national political leadership and command authority, potentially altering character of attacked nation and creating major recovery problems.

**Typical Targets:**

Hardened targets, enemy facilities, and weapons of mass destruction, enemy economic, political leadership, and national command authority.

Infantry concentrations, air bases, ships, ports, staging areas, command centers, munitions depots, cities, key oil and electrical facilities, desalinization plants.

**Typical Missions:**

Forced dispersal of military forces and evacuation of civilians. Destruction of military and economic centers, and national political leadership and command authority, potentially altering character of attacked nation and creating major recovery problems.

**Limitations:**

High cost. Difficulty of acquiring more than a few weapons. Risk of accidents or failures that hit friendly territory. Crosses threshold to level where nuclear retaliation is likely. Destruction or contamination of territory and facilities attacker wants to cross or occupy. High risk of massive collateral damage to civilians if this is important to attacker.

## Conclusion

This lesson covered WMD in detail along with the limitations of some of them. While the majority of Americans are unaware of the risks involved with WMD, they are familiar with the fact that the effects can be long term and lasting. Emergency responders are tasked with learning more about each type of potential weapon and how to properly respond in the event of an attack. Extensive training is required to have successful response even if the detection of the agent is delayed.

Terrorists are innovative and are using many different types of weapons to attack their enemies now. Rather than use traditional explosive devices and injure or kill those directly in the path of the weapon, they are able to disperse agents which can be spread from contact or simply by breathing in the agent.