Improving Emergency Preparedness and Public-Safety Responses to Terrorism and Weapons of Mass Destruction

Vincent E. Henry, PhD
Douglas H. King, DDS

This article, written from the perspective and based partially on the experience of law enforcement and public health practitioners, explores the very real public-safety threat posed by terrorists' use of weapons of mass destruction (WMDs). More specifically, it provides an overview of various types of WMDs and their properties; outlines the general policies, procedures, and protocols characterizing current police, fire, emergency medical service, and other public-safety agency responses; and illuminates potential gaps and lapses in current practice. Arguing the need for a more focused, integrated, and holistic approach that involves a broader array of personnel and resources from public- and private-sector entities and that emphasizes preparedness and prevention, the article concludes by describing a more effective strategic and operational process. Based on the highly effective Compstat crime control management model, this process involves the timely and accurate analysis of terrorist intelligence, effective tactical and strategic responses to various types of WMD events, rapid deployment of necessary personnel and resources, and relentless follow-up to ensure a more effective and integrated response to future WMD events. [*Brief Treatment and Crisis Intervention* 4:11–35 (2004)]

KEY WORDS: weapons of mass destruction, Compstat, terrorism, public health, police, emergency medical services, World Trade Center, bioterrorism, first responders, fire departments.

July Fourth was a beautiful day in Veterans Memorial Park, and Central City Police Officers Pedro (Pete) Bernal and Dennis O'Loughlin were happy to be assigned to the Park Car today. The thousand-acre park was full of people strolling, cycling, and rollerblading, a band was playing at the gazebo, and families spread their picnic blankets on the lawns and barbecued at the small beach at the edge of MacArthur Lake. ''It doesn't get much better than this,'' Officer Bernal said to his partner as they cruised slowly past the playground filled with laughing children, ''and it sure beats answering jobs all day in Sector Charlie. It's too bad every day can't be as nice and relaxed as today. A day like today makes you glad to be alive. Good country, America.''

From the Department of Criminal Justice and Sociology, Pace University (recently retired from the New York City Police Department after a 21-year career; Henry) and private practice (King).

Contact author: Vincent E. Henry, PhD, Department of Criminal Justice, Pace University, 41 Park Row, New York, NY 10038. E-mail: vhenry@pace.edu.

DOI: 10.1093/brief-treatment/mhh008
Brief Treatment and Crisis Intervention Vol. 4, No. 1

''It sure is. What should we do for lunch?'' O'Loughlin replied, savoring the aromas of various ethnic foods emanating from all the pushcarts in the park. ''It's almost one o'clock and I'm starving.'' After some discussion, they settled on a Cuban sandwich for Dennis and two hot dogs with mustard, relish, onions, and sauerkraut for Pete. The call came just as they were getting back in their cruiser.

''Park Car One on the air?''

''Park Car One. Go ahead, Central.''

''Park One, we have multiple aided calls in the vicinity of the gazebo on the Great Lawn. Callers state several people are having seizures. An ambulance is on the way. Please check and advise.''

Dennis and Pete looked at each other. Both were experienced and well-trained cops, and the implications of the call were readily apparent to them. Just this week the precinct's intelligence liaison officer, Lieutenant Kennedy, had briefed the outgoing roll call to be especially on guard for potential terrorist events during the holiday weekend. Based on information received at the weekly regional Terrorstat meeting, Kennedy related that credible but unspecified threats—''intelligence chatter''—had been received by the FBI and passed on to local agencies. Although the information was not specific, and although the nation and the city remained at Threat Condition Yellow, officers should be especially attentive when responding to unusual events.

''Ten-four, Central. Please try the callback numbers and determine the number of victims and if there are any other symptoms. Have the ambulance stand by at the south entrance to the park and have Park Two stand by near the Boathouse until we check and advise.''

Dennis and Pete regretfully put aside their food, started up their cruiser, and headed slowly toward the Great Lawn. They had been partners for almost ten years and were experienced enough to know that they should not rush into a situation like this, but instead respond carefully and gather as much information as possible on their way to the scene. A great many things had changed in police work during their ten years as partners, not the least of which was the strategic and tactical approach they now took to calls that might involve a possible terrorist act. The terrorist attacks on the World Trade Center and the Pentagon four years ago required cops across the nation to adopt a new and very different orientation to the way they worked, and the possibility that even the most mundane and seemingly ordinary call for service might have some terrorist connection was always in the back of their minds. So far, Central City had escaped the realities of terrorism, but Bernal and O'Loughlin and their entire department were well prepared and well trained to handle terrorist incidents.

Perhaps this was precisely why Bernal and O'Loughlin were also terribly frightened by the prospect of a terrorist attack—especially one involving weapons of mass destruction. Everyone, it seems, was affected by the September 11, 2001, terrorist attacks, and in that respect these police officers were no different: Like many others, they had been riveted by media accounts of the events and for days and weeks had closely followed their aftermath in the news. As police officers, though, Bernal and O'Loughlin had a particularly strong interest in the September 11 attacks. Because they were experienced cops, they could very easily relate to the challenges and struggles faced by police, fire, and rescue personnel who responded to the World Trade Center or the Pentagon, and felt great empathy for them. As experienced cops, they could well understand the extent of the human tragedy resulting from the terrorist attacks—the anguish of thousands of families torn apart, the sorrow of thousands of friends of those who had lost their lives, the pain

and suffering of all of those who had been injured, the economic impact on those who had lost their jobs and whose families had lost a source of income. Because Bernal and O'Loughlin understood all this so well—and because they were such good cops—they prepared themselves thoroughly for the possibility of such an event in their city. Their department provided excellent training, but like many other cops, they sought out additional knowledge and skills that might become important if a terrorist attack occurred.

Bernal and O'Loughlin knew a great deal about terrorism and weapons of mass destruction, and what they knew frightened them. They were frightened now, but they also could not afford to let their fear become immobilizing: They had a job to do, responsibilities to fulfill. The public needed protection, and it was their role as police officers to provide that protection. Beyond the cognitive knowledge and skills they'd developed, the two cops had prepared themselves physically, emotionally, and psychologically for this day. Later, they'd both talk about how frightened they had been, but their overall preparation enabled them to put their fear aside in order to fulfill the expectations of them from both the public and from themselves. Both would later say that although they had been afraid, they had also focused on the task in front of them, and their fear had had a somewhat distant or abstract quality to it. There was a job to do, and they refused to permit the substantial fear they felt prevent them from doing what needed to be done.

Despite the warmth of the day, they rolled up the cruiser's windows and turned off the air conditioner—if the situation turned out the way they hoped it wouldn't, at least they would be partially protected from airborne contaminants drawn in through the ventilation system. Pete rummaged in the gear bags on the cruiser's back seat, pulling out two pairs of binoculars, a small radiation detector, and a copy of the department's field guide to hazardous materials and weapons of mass destruction.

On the way to the scene, they carefully watched the holiday crowds for anything unusual or out of the ordinary. No one they passed appeared to be ill, and no one seemed to be in a particular hurry to leave the area. Dennis stopped the cruiser at the edge of the woods surrounding the Great Lawn, about a quarter mile from the gazebo.

Pete scanned the area with the binoculars, first looking at the commotion near the gazebo and then scanning the trees at the edge of the lawn. Dennis also scanned the scene with his binoculars. The band had stopped playing and highly excited people were milling around, trampling the picnic blankets and turning over barbecue grills. Some civilians lay prone or rolled on the ground as others tried to administer aid or gathered their children and tried to flee the chaotic scene. Some fell to the ground as they ran, and others fell to their knees to vomit.

''No birds,'' Dennis said to his partner. ''I don't see any birds in the trees. And there's a mist or cloud hanging over the area. It could be barbecue smoke, but I don't know. There's a dog having some kind of seizure, too. What have you got?''

''Rats,'' Pete observed. ''Look at the rats crossing the road. The rats are running away. The wind is blowing toward the west, spreading the cloud. Move the car up the hill to the east roadway, but don't get any closer to the gazebo. I think I see dead pigeons at the verge of the woods. I get nothing on the radiation detector for now, but we may be too far away.''

Dennis and Pete could hear frenzied shouting, and several civilians, spotting the cruiser, ran toward the cops. The first civilian to approach close to the cruiser was a highly distraught man with a flushed face, streaming tears, and vomit on his shirt, who shouted frantically at the cops

to help. Pete and Dennis both knew that time, distance, and shielding were the keys to their own self-preservation as well as to the survival of the victims and that they would become a liability if they became contaminated or affected by whatever substance was making these people sick. Pete used the loudspeaker to order the distraught civilian to back off from the police car: The man could potentially be a vector to spread whatever chemical or biological agent was afflicting the crowd. They'd later say that one of the hardest things about the situation had been avoiding the urge to rush in to immediately render aid—it is, after all, the natural tendency of cops and rescue workers to run toward trouble in order to help—but the very fact that they lived to make the statement was evidence that they acted wisely and in accordance with the way they'd been trained. Although they followed their training, they would nevertheless retain an amorphous and irrational sense of guilt.

Pete continued to communicate with the man through the loudspeaker, learning more about what had gone on near the gazebo as the first victims had fallen ill and taking notes about the symptoms. He learned that there had been a faint odor, like the smell of newly cut grass.

Dennis picked up the radio and spoke calmly: ''Park Car One to Central. Be advised we have a likely mass chemical or biological event on the Great Lawn. Numerous civilians down. There is a crowd of several hundred people, and we'll be moving them away from the scene to the east side of the park near the Boathouse. Notify the Emergency Response Unit. Notify Midtown Hospital, Saint Mary's, and all the other hospitals to expect casualties. Notify the Patrol Supervisor that we'll set up a temporary emergency headquarters in the Parks Department office north of the Lawn pending his arrival. Notify the Chief and the Fire Department. Have all available PD units respond to seal the park exits and perimeter, and have a unit respond to the Broadway bus station to prevent further contamination from people leaving the park. Have the ambulances respond to the Boathouse area to set up an aid station. Central, caution the responding units not to approach the gazebo or the Great Lawn itself until we have further information about the contaminant and its effects. Also caution the responding units to be aware of secondary devices or events. Here are the symptoms, Central . . . ''

The threat of terrorist events involving weapons of mass destruction (WMDs) is real, and the futuristic scenario described above is not at all far-fetched.

The September 11, 2001, terrorist attacks on the World Trade Center and the Pentagon changed America forever, ushering in a host of new and unprecedented realities for the American people, for the intelligence and national security communities, for medical personnel, for private security entities, and perhaps especially for police, fire, and emergency medical service (EMS) personnel. As the agencies and individuals most likely to be the first responders in possible terrorist attacks, they now face compelling demands to adopt new strategies and tactics, to undertake new training, and to view their roles and their work in an entirely different way. Police, fire, and EMS personnel are our first line of defense in case of terrorist attack, but the enormity and complexity of the challenges they face make it abundantly clear that they alone cannot bear the responsibility for ensuring our safety. Although first responders play an absolutely critical role in homeland security and domestic preparedness, and although a great deal of attention and resources have already been focused upon them in order to counter the terrorist threat, much more needs to be done. Perhaps most importantly, the realistic potential of attack upon the American people and their towns and cities by terrorists

demands that significant systemic changes occur throughout the range of public agencies and private entities charged with the responsibility for ensuring public safety. We must develop and implement a broader, more coordinated, more cohesive, and more focused approach to terrorism and to WMDs, and that approach must involve new relationships between and among all of these public agencies and private entities.

The actions necessary to bring about all these changes are extensive, and they lie well beyond the scope of this article to fully describe or explore. This article will, however, focus more narrowly on the issue of WMDs in the hands of terrorist groups, on the danger they pose to the American people and our nation as a whole, on the current lapses and gaps in our approach to the WMD threat, and on the steps necessary to create a more viable system to counter the threat. The importance of adequate preparation for future terrorist acts involving weapons of mass destruction is illuminated by the virtual consensus among knowledgeable experts that these future acts are a practical inevitability. It is not a matter of whether such incidents will occur, but when they will occur (Lynch, 2002; Shenon and Stout, 2002).

In the first part of this article, we will define weapons of mass destruction in general and provide an overview of specific types of WMDs as a way of understanding the nature of the threat they pose. We will then examine, in a general way, the type of response protocols that police, fire, EMS, and other agencies currently have in place and will highlight some of the problems and issues that tend to hinder their overall effectiveness. Finally, we will explore some of the possible solutions for these problems and issues, setting forth a rudimentary design or plan for achieving a better, more effective, and more efficient kind of interaction between public agencies and private entities: the kind of integrated system that will help ensure public safety through the timely and accurate analysis of terrorist intelligence, development of effective tactical and strategic responses to different types of events, rapid deployment of necessary personnel and resources, and relentless follow-up on terrorist intelligence to interdict future attacks and to apprehend and prosecute terrorists.

Because the authors seek to highlight the kind of challenges that might realistically confront public-safety and private-security personnel in the event of a terrorist attack involving chemical, biological, or nuclear WMDs, this article draws a great many of its examples from the realities experienced during and after September 11, 2001. In particular, because both authors had a professional involvement in the World Trade Center attack and the rescue and recovery activities that ensued, a great deal of the article focuses upon the protocols followed and the lessons learned in New York City. While fully cognizant that the World Trade Center attack was unique and specific and that terrorists might not engage in precisely the same or even similar strategies in the future, the authors believe that the events surrounding the attack serve as a useful model from which a variety of guiding principles and insights can be distilled. Our goal is not so much to articulate the kinds of actions and protocols first responders *should* or *must* use (to do so would be quite presumptuous and disingenuous, since key elements in any antiterrorist strategy are flexibility and adaptability to the specific situations confronted) as to broadly examine the type of response protocols and practices that first responders typically follow and use.

Weapons of Mass Destruction: An Overview

WMDs are devices, biological organisms, or chemical substances that, when successfully

detonated or dispersed, are readily capable of causing massive casualties. WMDs have been defined in various ways. The U.S. Department of Defense (Henneberry, 2001), for example, defines WMDs as ''weapons that are capable of a high order of destruction and/or of being used in such a manner as to destroy large numbers of people.'' The definition goes on to note that these can include nuclear, chemical, biological, and radiological weapons. For legal purposes, Title 18 of the U.S. Code (18 USC 113B) includes various types of firearms and other weapons in its definition of WMDs, but it goes on to include ''any weapon designed or intended to cause death or serious bodily injury through the release, dissemination, or impact of toxic or poisonous chemicals, or their precursors; any weapon involving a disease organism; or any weapon that is designed to release radiation or radioactivity at a level dangerous to human life.''

The Federal Emergency Management Agency (FEMA, 2001) defines WMDs as ''any weapon that is designed or intended to cause death or serious bodily injury through the release, dissemination, or impact of toxic or poisonous chemicals; disease organisms; radiation or radioactivity; or explosion or fire.'' The FEMA definition goes on to point out that WMDs are distinguished from other types of terrorist tools because they may not be immediately obvious, it may be difficult to determine when and where they have been released, and they pose a danger to first responders and medical personnel. Although a great deal of research has taken place on battlefield exposure to WMDs, scientists have a more limited understanding of how these weapons can affect civilian populations.

Examples of WMDs include nuclear devices (ranging from nuclear bombs to smaller and more easily constructed ''dirty bombs'' that spread deadly radiation in a relatively small area), biological agents (such as anthrax, smallpox, and other deadly toxins), and chemical agents (such as nerve agents and gaseous poisons). These three categories are often referred to collectively as NBC (Nuclear, Biological, and Chemical) weapons. While they will be the primary focus of this article, we should recognize that the airliners hijacked for use in the September 11 terrorist attacks on the Pentagon and the World Trade Center clearly conform to the FEMA definition provided above: They were essentially flying bombs (high-powered explosive devices loaded with highly flammable fuel) that caused a tremendous number of casualties; they were not immediately obvious as weapons; and they posed an exceptionally high degree of danger to first responders and medical personnel.

Biological and Chemical Agents in Warfare and Terrorism

Chemical and biological agents have been used in warfare between nations for many years, and they have been extremely effective in terms of causing casualties and death as well as in spreading fear and panic among enemy soldiers. More recently, they have become the weapons of choice for terrorists and extremist groups for essentially the same reasons, as well as the fact that they are rather easily manufactured and deployed. The first modern wartime use of chemical weapons of war occurred during World War I, when German forces used chlorine gas against Allied forces in April 1915 during the Second Battle of Ypres. British forces retaliated in September of that year, firing artillery shells containing chlorine gas against the German forces at Loos. Although they were certainly not known as ''weapons of mass destruction'' at that time, these forms of poison-gas dissemination were generally successful on the battlefield. They were not, however, perfect weapons: Although French and Algerian troops fled in panic when they

confronted chlorine gas at Ypres, shifting winds during the British action at Loos also caused numerous casualties among British forces (Duffy, 2002). The fact that the spread and the effect of poison gases and some biological agents can be so easily affected by the wind and by environmental factors makes them particularly unpredictable and especially dangerous to first responders, rescue personnel, and civilians in densely populated urban areas.

Other poison gases were developed for use during the war. Phosgene gas was used by both sides in the conflict, and it was seen as an improved weapon because it caused less choking and coughing than chlorine gas and was therefore more likely to be inhaled. Phosgene also had a delayed effect in which soldiers might suddenly die up to 48 hours after their exposure. Mustard gas, an almost odorless chemical, was developed by Germany and first used against Russian troops at Riga in 1917. The strategic advantages of mustard gas (also known as yperite) were that it inflicted painful blisters, was more difficult to protect against than chlorine or phosgene, and could remain potent in the soil for weeks, making it dangerous to recapture trenches infected with the gas (Duffy, 2002).

The use of chlorine, phosgene, and mustard gas continued throughout World War I, inflicting a terrible casualty rate. According to one estimate, there were almost 1,240,000 casualties from poison gas during World War I, including more than 90,000 deaths. Russia alone suffered nearly 420,000 gas casualties (Duffy, 2002).

The horrible potential of poison gases to bring about massive numbers of casualties and deaths had been recognized long before their use on World War I battlefields, but their actual use by combatants on both sides, along with a recognition of their terrible consequences, led in 1928 to passage by the Geneva Convention of the Protocol for the Prohibition of the Use in War of Asphyxiating Gas, and of Bacteriological Methods of Warfare. This protocol, which more specifically outlawed the use of poison gas and the practice of bacteriological warfare, was not ratified by the United States until 1974.

The decades following World War I saw continued development of poison gases as well as some use on the battlefield. During the 1920s, British forces used chemical weapons against Kurdish rebels in Iraq, and the 1930s saw the use of mustard gas by Italy during its conquest of Ethiopia and the use of chemical weapons by Japan in its invasion of China. The first nerve agent, tabun, was developed in Germany in 1938.

In the United States, the first known attempt by a terrorist or extremist group to use biological agents against the civilian population occurred in 1972, when members of a right-wing group known as the Order of the Rising Sun were found to possess more than 30 kg of typhoid bacteria. The group intended to spread typhoid through the water supply systems of several major Midwestern cities (Sachs, 2002, p. 3).

Another bioterrorism event occurred in the United States in 1984, when members of a religious cult known as Rajneeshee infected an estimated 751 people in Oregon with salmonella bacteria. The bacteria itself were easily grown from cultures purchased from a medical supply company, and cult members disseminated the strain by spraying it on restaurant salad bars. The cult's goal was to influence the results of an upcoming local election by making a large number of voters too sick to vote on election day (McDade & Franz, 1988; Sachs, 2002, pp. 4–5). Investigators considered the possibility of bioterrorism when the outbreak occurred, but it was deemed unlikely, and the source of the contamination became apparent only when the Federal Bureau of Investigation investigated the cult for other criminal violations. This incident highlighted

how difficult a bioterrorist attack can be to distinguish from a naturally occurring infectious disease outbreak (McDade & Franz, 1988).

Although the individual or individuals responsible have yet to be identified, the series of anthrax attacks that took place across America in 2001 certainly have all the hallmarks of a terrorism, and the attacks certainly spread alarm and fear throughout the population. In these incidents, anthrax spores were distributed—perhaps at random—through the U.S. Mail to individuals, corporations, and political figures, and at least ten cases of anthrax infection were documented by health officials (Jernigan, et al., 2001; Traeger et al., 2002).

Iraqi dictator Saddam Hussein used both chemical weapons (nerve agents) and biological weapons (anthrax) on Iranian forces during the 1980–1988 war between Iran and Iraq, and he also used cyanide against Iraqi Kurds in 1987 and 1988. In 1995, members of the Aum Shinrikyo (''Supreme Truth'') cult dispersed deadly sarin gas on the Tokyo subway system, killing a dozen people and injuring more than 5,500 others.

Aum Shinrikyo's 1995 Tokyo subway attack, which represents the first known use of poison gas or other WMDs by terrorists, had a tremendous impact on Japan and on Japanese society because it spread such fear and alarm among members of the public. The Japanese people, like the rest of the world community, were not well prepared for the possibility that a fairly small extremist group or religious cult would carry out such an attack, nor were they prepared for the possibility that either *could* carry out this type of attack. The fact that such a small group could marshal the resources necessary to kill and injure large numbers of people and spread panic across an entire nation had repercussions throughout the world, since it also demonstrated just how easy it would be for terrorists or extremist groups to manufacture and disseminate deadly WMDs.

Aum Shinrikyo was a doomsday cult centered around leader Shoko Asahara's apocalyptic philosophy and his twisted notion that only the true believers belonging to the cult would be saved once the world ended. Asahara's goal in undertaking the attack was to hasten the end of the world, a common ideological theme among apocalyptic extremist groups. Asahara's cult, which accumulated immense wealth from its members, recruited young scientists as cult members and put them to work producing biological and chemical weapons. It also began to stockpile hundreds of tons of deadly chemicals and acquired a helicopter to help distribute the gas over densely populated Japanese cities (Lifton, 1999; Kristof, 1995).

Sarin, a nerve agent that is several hundred times more toxic than cyanide, was first developed by scientists in Nazi Germany in the 1930s. Sarin, which is also known as GB, is a fairly complex chemical compound that can take either a liquid or gaseous form, and although its manufacture requires a fairly high level of skill, training, and knowledge of chemistry, it is made from widely used chemicals that are readily available to the public.

Once cult members manufactured a quantity of sarin, it was rather simple to disseminate it: Liquid sarin was sealed in paint cans and other containers that cult members carried into subway stations in shopping bags. They simply put down the bags, casually punctured the containers with the tips of their umbrellas, and walked away while the liquid evaporated into a gas and spread through the area. Experts concur that the 1995 subway attack was simply a test—a ''dry run'' in anticipation of and preparation for a much larger and much more deadly attack. Experts also concur that there would have been many more deaths and injuries had Aum Shinrikyo been able to manufacture a purer form of sarin or distribute it more effectively (Lifton, 1999; Kristof, 1995).

Perhaps one of the most frightening aspects of Aum Shinrikyo's attack on the Tokyo subway system was the relative ease with which the group obtained the necessary precursor chemicals and manufactured large quantities of deadly sarin. There are many other biological and chemical agents that are relatively easy to obtain, manufacture, and disseminate, making them very attractive to terrorist organizations. Depending upon the particular chemical or biological agent involved, a relatively small and readily transportable amount of the substance can easily spread throughout an area and contaminate or infect people coming in contact with it. Especially in the case of toxic biological substances with a prolonged incubation period (as some bacteria and viruses have), signs of illness may not be immediately apparent. Individuals infected with the toxic substance may act as a ''vector,'' spreading the substance to others with whom they have contact. Since it might be days or weeks before the first infected individuals become ill, they can spread the infection to literally hundreds or thousands of other people, many of whom will in turn become vectors spreading the disease.

Terrorism and the Use of Nuclear Material

While the likelihood remains small that a terrorist organization could obtain or manufacture a high-grade nuclear device capable of destroying a large area, much less transport it to the United States and detonate it, there is a much greater potential for terrorists to construct an improvised nuclear device (IND) or ''dirty bomb.'' Such an improvised weapon would nevertheless have a devastating physical and psychological impact by spreading radioactive contamination throughout a densely populated urban area.

A dirty bomb is essentially a conventional explosive device surrounded by radioactive material that, upon detonation, spreads this material within a relatively small fallout zone. Depending upon the size of the device and the type and amount of radioactive material involved, the immediate area surrounding the detonation might be uninhabitable for a long time, and those directly exposed to the radioactive fallout are likely to suffer radiation sickness. The possibility also exists that exposed victims might eventually develop cancer, leukemia, or other diseases related to radiation exposure.

The possibility that INDs or dirty bombs might be detonated in urban areas is particularly alarming, since the materials required for such devices can be obtained fairly easily, large amounts of radioactive material are not required for an effective device, and radiation cannot be detected through human senses. A seemingly ''ordinary'' small explosion in or near a large crowd of people could spread nuclear contaminants through the crowd with no immediately apparent symptoms. The low-grade nuclear materials required to construct such a device are used, transported, and stored in various locations including hospitals and medical facilities, research laboratories, and industrial manufacturing facilities across the nation. While these materials are more carefully guarded today than they have been in the past, it is probably not beyond the capacity of a determined terrorist organization to obtain them.

Biological Agents

Biological agents share some common characteristics with chemical agents, but some important differences can help distinguish this class of WMDs. One of the most important differences is that chemical agents typically produce symptoms relatively quickly, while biological agents may not produce symptoms for periods of up to several weeks. As a result,

there may be no early warning signs, and first responders to biological events may not easily or immediately recognize the fact that a biological WMD has been released. In contrast to the three categories of chemical agents, with few exceptions biological agents do not produce immediate symptoms in the skin or respiratory system. Because many biological agents are often living organisms—bacteria or viruses—they cannot be detected by any of our senses, and the scientific devices used to detect and/or identify them are complex and difficult to use. Detection generally occurs only after a person has been infected and an incubation period has elapsed.

Biological agents, which include anthrax, tularemia, cholera, plague, botulism, and smallpox, can be disseminated through a population in several ways. Although some biotoxins (such as anthrax) may be spread through contact with the skin (either through direct contact with the skin or through cuts and lacerations), the most effective means of dissemination in terms of WMDs and the terrorist goal of causing widespread casualties is to aerosolize the agent into a fine mist or powder that is inhaled, or to contaminate food or water that members of the public will ingest.

There are three categories of biological agents: bacteria, viruses, and toxins. Bacteria and viruses are living organisms, and so they require a host organism in order to survive and reproduce. After entering the body (usually through inhalation or ingestion), the organism establishes itself within the host and begins to reproduce and produce poisonous toxins. In some cases, they produce severe and often fatal illnesses.

The difficulties involved in detecting and diagnosing biological WMD attacks can be especially pronounced when the biological agents result in a slowly developing community health crisis or an epidemic of some sort. Because they often involve a prolonged incubation period before symptoms become apparent, they are difficult to trace back to their source and may not be easily recognized as part of a terrorist act. For example, we can recall the difficulties involved in detecting and diagnosing cases of anthrax infection across the nation in the fall of 2001, as well as in the 1984 salmonella event in Oregon. While a more focused direct attack, such as the rapid release of a large quantity of fast-acting biological toxin in an office building or mass transportation center, would probably be recognized and dealt with more quickly, both forms of attack can have a potent psychological impact on the public. Beyond the deaths and illnesses that may occur, they suit the needs and objectives of terrorists because they can generate substantial fear and public alarm.

Chemical Agents

A chemical event is likely to immediately produce dozens of victims, and first responders who lack adequate personal protection equipment may also become victims. All exposed victims must be decontaminated before leaving the scene, since hospital emergency rooms will not accept the victims of a biological or chemical incident until they have been properly decontaminated.

Chemical agents can enter the body in various ways. Some agents are disseminated as aerosols or gases and enter the body through the respiratory tract, while others are disseminated in a liquid form and enter the body through contact with the skin. Because the eyes and mucous membranes are particularly sensitive to many toxic agents, irritated eyes and nasal passages often indicate exposure. While other chemical agents can be ingested via contaminated food or liquid, inhalation and skin contact are the primary hazard for victims and emergency responders.

There are three basic categories of chemical agent: nerve agents, blister or vesicant agents, and choking agents.

Nerve Agents

Nerve agents (military designations are provided in parentheses) include the substances tabun (GA), soman (GD), sarin (GB), and methylphosphonothioic acid (VX), which compose an especially toxic class of chemical weapon that act upon the body by interrupting the central nervous system to prevent the transmission of nerve impulses, resulting in the twitches and spasms that are the characteristic symptoms of exposure to this type of WMD.

Symptoms of exposure to nerve agents typically include dilation of pupils (pinpoint pupils), runny nose and lacrimation (tearing of eyes), salivation (drooling), difficulty breathing, muscle twitches and spasms, involuntary defecation or urination, and nausea/vomiting.

Depending upon their purity, nerve agents generally take the form of colorless liquids, although some may have a slight yellowish tinge if impurities are present. Tabun and sarin may have a slightly fruity odor, soman may have a slight odor of camphor, and VX smells like sulfur. Nerve agents evaporate fairly quickly and can be taken into the body either through inhalation or absorption through the skin. Nerve agents vary a bit in terms of their toxicity and the amount of exposure necessary to bring on symptoms or cause death, but all are exceptionally deadly at exceptionally low dosages. Exposure to a fatal dose of a nerve agent, if untreated, will typically cause death in a matter of minutes. The typical treatment for nerve agents is an injection of atropine.

Blister or Vesicant Agents

Blister or vesicant agents act by producing burns or blisters on the skin or any other body part they come in contact with and can be fatal. They act quickly upon the eyes, lungs, skin, and mucous membranes, inflicting severe damage upon the lungs and respiratory tract when inhaled and resulting in vomiting and diarrhea when ingested.

Blister agents include mustard gas (also known as yperite or sulfur mustard), nitrogen mustard (HN), Lewisite (L), and phosgene oxime (CX). Mustard gas and Lewisite are particularly dangerous because they produce severe injuries for which there is no known antidote or therapy; a single drop of liquid mustard on the skin can cause serious damage and itching in only a few minutes, and exposure to even a slight amount of mustard in its gaseous state can cause painful blistering, tearing, and, eventually, severe lesions of the eyes. Depending upon weather conditions as well as the extent and duration of exposure, the effects of mustard gas can also be delayed for a period of up to a day. Several hours after the exposure, respiratory effects become apparent in the form of severe burning pain in the throat, trachea, and lungs. Although most mustard gas victims survive, severe pulmonary edema or swelling of the lungs may result in death. The only effective form of protection against mustard gas is the use of a full-body protective suit (level I protection) and the use of a gas mask or respirator.

Lewisite, which is typically colorless and odorless in its liquid state but may emit the faint scent of geraniums, causes symptoms that are generally similar to mustard gas but also include a drop in blood pressure and a decreased body temperature. Inhalation of Lewisite in high concentrations can lead to death in a few minutes, and the antidote for

skin blistering, dimercaprol, must be applied before the actual blistering begins to take place.

Phosgene oxime (CX) can exist as a white powder or, when mixed with water or other solvents, in a liquid state. Contact with phosgene oxime is extremely painful, and it quickly irritates the skin, the respiratory system, and the eyes, leading to lesions of the eye, blindness, and respiratory edema. Contact with the skin immediately produces an area of white surrounded by reddened skin and swelling. Because phosgene oxime is heavier than air, it can remain in low-lying areas for quite some time, and so it poses a particular danger for rescue workers. Phosgene oxime has a sharp and penetrating odor.

Choking Agents

These agents enter the body via the respiratory tract and often cause severe pulmonary edema. Because they are most effectively deployed as gases, they are typically stored and transported in bottles or cylinders prior to being disseminated into the air. As their name implies, choking agents quickly attack and cause severe damage to the lungs and respiratory system and can cause pulmonary edema and death. Choking agents include phosgene (CG), diphosgene (DP), chlorine (CL) in liquid or gaseous form. It should be noted that phosgene (CG) and phosgene oxime (CX) are chemically different substances that have different properties and different symptoms. Symptoms of choking agents include severe coughing, choking, nausea, lacrimation, difficulty breathing, and vomiting. The initial symptoms may subside for a period of up to a day but typically return when pulmonary edema takes place, and individuals exposed to choking agents may go into shock as their blood pressure and heart rate drop precipitously.

First-Responder Safety—Time, Distance, and Shielding

Generally speaking, the police and emergency workers who might be called upon to initially respond to a nuclear, biological, or chemical event are not adequately trained to deal effectively with those events. This is not to say that most police and emergency workers lack *any* training in this area, but rather that they lack the highly specific training and special expertise required to recognize and deal with many of the unique threats posed by such events. At present, many also lack the special tools, gear, and protective equipment that may be called for in these events. Patrol officers, firefighters, and EMS personnel who initially respond to an event involving WMDs should not be expected to undertake the specific duties and responsibilities that are better performed by well-equipped and more highly trained specialists. Their roles should be to recognize the threat, minimize additional exposure to chemical or biological agents, ensure the safety of victims, safeguard the scene, and report their findings to those competent to deal with these issues. Another primary responsibility is to minimize their own contact with the chemical or biological agent and to provide as much information as possible to ensure the safety and the effectiveness of other responding units. Police and emergency workers who rush into the scene are likely to become contaminated themselves, and may become victims. First responders who rush into a WMD event not only risk death or serious injury from secondary devices that may have been placed at or near the scene precisely to disable rescuers, but can also become a significant liability to other victims as well as to other responders if they become vectors and contaminate other rescuers. The first responder who rushes in and becomes

a victim may contribute to and exacerbate the overall problem, consuming time and resources needed by other rescuers.

As Gordon M. Sachs (2002) points out, responders must make some difficult decisions:

> The first instinct for emergency responders at any incident is always to rush in and save as many people as possible; however, in a terrorist-related incident, there are many factors to consider. Can the victims be saved? Will responders become targets? Was an agent of some type released? If it was, will responders have the means to detect it? Will their gear provide adequate protection? These are but a few of the questions that we must become accustomed to asking when responding to terrorist-related incidents. There is no reason to allow civilians to suffer needlessly; neither can there be any reason to send responders haphazardly into unknown and dangerous environments. (pp. vii–viii)

There are four types or levels of protective gear used by emergency workers during WMD events. *Level A* protection is a chemical-resistant suit that entirely encapsulates the emergency worker and includes a self-contained breathing apparatus (SCBA) or an independent air supply so that the worker is not exposed to fumes, biological agents, or other toxic substances that may be present in the environment. This level of protection provides maximum respiratory and skin protection and is typically used when the situation involves a high potential for liquid splashes or vapor hazards, or when the chemical agent is unidentified. Generally speaking, this level-A protection is used by workers who enter the ''hot zone,'' or the area closest to the WMD's point of dispersal.

Level B protection is a chemical-resistant suit and gloves that may not entirely encapsulate the rescue worker but does include an SCBA or independent air supply. This type of gear provides a high level of respiratory protection but less protection against liquids and gases that may have a topical effect upon the skin or be absorbed through the skin. This type of gear provides the minimum amount of protection that one should use in the hot zone, but it is not recommended for prolonged exposure or use there.

Level C protection is provided by hooded chemical-resistant clothing with gloves and an air-purifying respirator or gas mask. It is generally utilized when there is minimal or no hazard posed by the potential for liquid splashes or direct contact.

Level D protection is the type that most police, fire, and EMS responders typically have available to them: their uniforms and clothing. This type of protective gear provides minimal protection from chemical, biological, or nuclear hazards and should not be worn within or near the hot zone.

Perhaps the most important tools available to ensure the safety of first responders, though, have nothing to do with equipment or gear. They are the concepts of *time, distance*, and *shielding*—when properly applied and used, they can be the key to the first responder's self-preservation. In terms of **time**, emergency responders should keep the time they spend in the vicinity of the incident to an absolute minimum. Minimizing the time spent in proximity to a nuclear, biological, or chemical substance generally reduces one's chance of illness or injury because it minimizes exposure to the toxic substance. If emergency workers absolutely need to approach the scene to rescue someone or to inspect it more closely, they should not remain there a moment longer than is necessary. They should also be aware that if they do approach the scene, they may inadvertently become a vector to spread the substance, and they should take appropriate

steps to decontaminate themselves as quickly as possible. First responders who come in proximity to the scene should promptly notify their supervisors and medical personnel to ensure a proper decontamination; and until decontamination occurs, they should avoid contact with others.

Similarly, emergency workers should maintain a safe and appropriate **distance** from the hazard, and they should try to move uphill from the source if possible. Emergency responders must also bear in mind that many substances can be spread by wind currents, and they should consider the direction of the wind in determining a safe distance. We should note that there are different recommended distances for safety, depending upon the type and quantity of the substance involved. There are various charts and tables available to first responders to help them determine an interval of safety between themselves and a particular type and source of toxic substance; police, fire, and EMS workers should prepare themselves for the possibility of a WMD attack by obtaining these tables and consulting them before approaching the scene. An excellent source—and one that every emergency responder should obtain and carry in his or her gear bag—is the *North American Emergency Response Guide*. This guidebook was developed jointly by the U.S. Department of Transportation, Transport Canada, and the Secretariat of Communications and Transportation of Mexico for use by emergency services personnel who may arrive first at the scene of a transportation incident involving a hazardous material. The guide permits responders to quickly identify the type of substance involved and to protect both themselves and the public during the initial response phase.

First responders should also bear in mind that these charts and tables provide general guidelines, and that qualified experts who arrive at the scene are likely to evaluate the situation and adjust the distances of the ''hot,'' ''warm,'' and ''cold'' zones. In their initial establishment of these zones, first responders should remain flexible and, if necessary, err on the side of caution to extend the distance. First responders should also bear in mind that secondary devices or booby traps designed to injure and disable rescuers may be in the area, and they should proceed cautiously. The secondary device(s) might be as powerful or perhaps more so than the primary.

Shielding refers to any object that can be used to protect the first responder from a specific hazard and can include buildings, vehicles, and any personal protective equipment that may be available. The type of shielding responders should use will be determined by a number of factors, including weather, the physical environment, the geography, and the topography of the area—buildings in urban areas may, for example, provide shielding (as well as a better vantage point) that is not available in a rural area, where a hill or elevation may be present to perform much the same functions. Simply rolling up the windows of a police car, turning off the air conditioner, and putting on gloves can provide some degree of safety and protection to police officers approaching the scene of a potentially toxic event; and even if an officer's department does not furnish personal protective gear (as it should), it may be advisable for the officer to purchase an inexpensive and lightweight Tyvek jumpsuit for his/her gear bag.

We repeat that the most critical concern for first responders must be their own safety and protection, and they must avoid the compelling urge to rush into a situation to render help. This restraint or discipline can be very difficult for the dedicated police officer, firefighter, or EMS worker, but training and common sense must prevail. As noted above, the rescuer who becomes a victim exacerbates and complicates

the situation that other responders must confront.

The Private Sector's Role

The problems associated with preventing, deterring, responding to, and investigating terrorist attacks involving WMDs are enormously difficult and complex, as are their solutions. Besides developing effective first-response capabilities, we must recognize that an actual WMD terrorist attack will have a resounding impact and repercussions throughout the local (and possibly national) economy, the health care system, the corporate and business communities, public utilities, and government operations at every level. We must also recognize that depending upon the type, the quality, and the extent of the WMD attack, literally hundreds of public agencies and private-sector entities may be called upon to participate in initial response, in rescue and recovery, and in ongoing rebuilding efforts. We need look no further than the World Trade Center attack in New York City to realize that literally scores of organizations became involved in the overall recovery effort. While police, fire, and EMS personnel handled most of the first-responder duties in the first minutes and hours following the attack, they were very quickly joined at the scene by personnel from a host of other organizations.

These organizations included the American Red Cross and other relief organizations; the telephone, gas, and electric utilities operating in New York City; federal law enforcement agencies (the FBI; the Bureau of Alcohol, Tobacco, and Firearms; the Secret Service; and the U.S. Customs service, to name a few) and law enforcement from other states and jurisdictions (the New York State Police, the New Jersey State Police, and practically every local municipality in the region immediately dispatched officers to the scene); FEMA; every branch of the United States military and the National Guard; and a raft of others. Personnel from all of these organizations quickly converged on the scene, and while they were willing and mostly able to help out, the lack of central direction and focus created enormous confusion and duplication of efforts. Without for a moment diminishing the commitment and bravery displayed by these individuals, the area that became known as Ground Zero quickly degenerated to a state of near chaos as everyone tried to pitch in and help—in part because of the nature of the event itself, but also because the City of New York lacked adequate plans for an event of this magnitude.

Immediately after the attack, hospital emergency rooms within a hundred-mile radius of New York City were mobilized and put on alert. Medical personnel were called in to hospitals and medical facilities, and those in private practice showed up at hospitals to volunteer. Private ambulance services were mobilized for the transport of casualties, and buses from the Metropolitan Transportation Authority (MTA) were commandeered to bring police and other rescuers to the scene. Corporate facilities, office buildings, and college campuses went into a high security mode, often deploying their security personnel to evacuate and lock down the facilities or serving as staging points or support centers for the rescue and recovery efforts. The city's transportation infrastructure—the MTA, bridges and tunnels, roads and highways—quickly became overwhelmed by the effort to evacuate tens of thousands of people from lower Manhattan.

Communications systems were overwhelmed. Most cell-phone service throughout lower Manhattan ended when the Twin Towers fell and cellular repeaters were destroyed, and a main switching station for the city's hard-wire telephone system flooded and interrupted

most service in the area. There had been little or no interoperability between the police and fire radio communication systems to begin with, and the loss of radio repeaters made radio communications even more difficult.

In the days following the attack, help poured in from across the nation in the form of personnel, equipment, food, and medical supplies, and a complex logistical system of depots and distribution points had to be established and implemented. The work went on 24 hours a day for months, and workers required food, medical attention, and places to rest and recuperate between shifts. Heavy construction equipment, including some of the world's largest cranes, were rushed to New York City to aid in the removal of debris, and thousands of construction workers from dozens of companies were deployed to make the area safe. The rescue-and-recovery phase of operations continued for several weeks in the futile hope that additional survivors would be located, and fires burned at the World Trade Center site for 99 days. Given the fires and the smoke they produced, public health officials set up monitoring equipment to test air quality throughout the lower Manhattan area. As bodies and body parts were recovered, they were removed to a medical examiner's facility for DNA testing in hope of identifying the dead and bringing closure to surviving family and friends. Canine rescue teams were brought in to aid in the search for victims, and the animals required extensive and specialized veterinary care. Psychologists and psychiatrists arrived to provide crisis intervention and mental health therapy for those traumatized by the event, and a special center for family and friends of victims was established to help them deal with their loss and the legal, financial, and personal consequences.

Even before the rescue-and-recovery phase ended, the process of removing millions of tons of debris via truck and barge to a site on Staten Island commenced. The debris would be sifted by hand by New York Police Department (NYPD) detectives and other law enforcement officers to locate body parts as well as any personal effects or crime-scene evidence that might be recovered, and all recovered items had to be logged, vouchered, and forwarded to the morgue or to temporary storage facilities. Complicating the entire operation was the fact that the World Trade Center site became the world's largest and most difficult crime scene, and all of the precautions ordinarily undertaken to discover and preserve evidence were put in place. Providing security for the site was a monumental effort.

The list of actions and activities that took place in the aftermath of this horrific and devastating attack goes on and on, and without belaboring the point further, it should suffice to say that this was the largest and most complicated enterprise ever undertaken as the result of a terroristic WMD attack. Tens of thousands of individuals, hundreds of public agencies, and dozens of private-sector entities played a role in the initial response, in the rescue and recovery, or in the removal operations.

The recovery efforts involved in this monumental undertaking were all the more remarkable for the fact that, as a practical matter, the formal response plans previously developed by public-safety agencies were not adequately communicated to first responders. Not only were these plans developed with relatively little input from the many private-sector entities and organizations that ultimately became involved, but to a large extent they were developed by individual agencies that did not generally coordinate their plans with other agencies. The problems encountered in terms of the lack of interoperability of communications equipment between the police and fire departments is a kind of metaphor for the overall lack of coordination between and among the agencies

involved. To some extent, breakdowns in communications and in chain of command are to be expected in any crisis event, but it was the perception of many first responders at the scene of the World Trade Center disaster that command and control functions were entirely absent and that a coherent command structure did not emerge for several days or even weeks. The chaos and uncertainty that infiltrated the first-responders' working environment makes evident the need for more coherent and comprehensive plans, as well as for far-sighted and contemporary communication of those plans, well in advance of an actual terrorist incident.

Readers can well imagine how much more efficient and effective operations might have been had coordinated policies, procedures, plans, and protocols existed; had these plans accounted for the role of the private sector; and had they been adequately conveyed to the first responders at the scene. To explore or even list the organizational lessons to be learned from such an undertaking are well beyond the scope of this article, but even this brief recitation of some of the problems involved should highlight the compelling need for flexible and adaptable planning for future WMD events and terrorist acts. This planning process must rely upon and incorporate these lessons, just as it must involve representatives from each of the agencies and entities that might be called upon to participate.

Policies and Procedures, Protocols and Plans

One of the most critical considerations in preparing for potential WMD incidents is whether the public-safety agencies and private-sector entities that are likely to be called upon to respond to such events have developed and implemented comprehensive and realistic policies, procedures, and operational protocols to deal with terrorist incidents. The importance of developing effective policies, procedures, and operational protocols can scarcely be overstated: First responders cannot realistically hope to function with full effectiveness at the scene of a disaster, and agencies cannot realistically expect to maximize their effectiveness and the saving of lives, unless all the actors and agencies involved have a coordinated response plan in place. By their very nature, disasters and terrorist incidents tend to be exceptionally chaotic, confused, and disordered—especially during their initial stages. Without a plan or protocol in place, they can degenerate even further, putting lives and safety at unnecessary risk as rescue workers sort out their respective roles, organize themselves, and generally figure out what to do to begin addressing the myriad problems involved. When emergency responders (as well as the supervisors, experts, and managers who will respond later) are made more fully aware of these policies, procedures, and protocols, they can begin the task of saving lives much more quickly.

As illustrated by the opening vignette of this article, first responders who have been well trained to recognize and analyze various types of events and who are equipped and prepared to respond safety and effectively are the first line of defense against terrorist acts involving WMDs. The actions they take will have a tremendous impact on the overall success of the rescue and rebuilding efforts. Without diminishing the importance of their role in any way, we must however recognize that the process of preparing for terrorist, WMD, and other mass casualty events begins long before the first responders arrive at the scene. To ensure a safe, effective, and seamless response that does not unnecessarily endanger lives, all the public agencies and private entities that may be called upon to have a role in resolving the crisis must be involved in the process of

planning for the event. All must be involved in the development of coordinated policies and procedures to ensure that there are no conflicts and no duplication of effort once the event takes place, and everyone must be aware of not only their own roles and responsibilities, but those of other parties.

The process of planning for such events is an amazingly complex undertaking which is often further complicated by a host of organizational and jurisdictional issues, as well as by the difficulty of developing flexible plans that can be adapted to meet the particular circumstances present in a given incident. Agencies charged with the responsibility for law enforcement, firefighting, and emergency medical care generally have the primary role in developing coherent and effective response protocols, but given the realities and requirements of an incident, a host of other public agencies and private entities must also be involved in the planning process. More specifically, there is a compelling need for members of the medical/health-care community, the corporate community, and the private-security industry to be involved in planning for WMD events. The private-security industry, in particular, plays an essential role in preventing terrorism when it operates effectively to make so-called ''soft targets'' more resistant to attack. Terrorists, like other criminals of opportunity, are to some extent deterred when high security arrangements make it difficult to penetrate a potential target. We must not ignore the fact that a critical part of planning must involve activities to prevent or interdict terrorist acts, and because effective private-security entities play a critical role in this regard, they must be enlisted to assist police and public-safety agencies. The same need for additional training that applies to local law enforcement also applies to the private-security industry.

Typically, the problem is not that an agency has no response plan in place (most public-safety agencies, particularly in the aftermath of September 11, have developed some sort of response plan), but that agencies often develop their procedures and protocols in isolation. An agency response plan may well account for available personnel and resources, may consider the logistical needs involved in various kinds of events, and may fit well with the overall mission and function of the agency—but, developed in isolation, the plan often does not account for potential conflicts with the procedures adopted and followed by other agencies. The respective plans may not mesh well together, and therefore cannot achieve an effective and integrated multiagency response.

A case in point can be discerned in the response of the police and fire departments in New York City during and after the September 11 event. Historically, there has been a kind of competition between the elite NYPD Emergency Services Unit and the Rescue Units of the Fire Department of New York (FDNY), and under ordinary circumstances a bit of competition can be a good thing. Both units are comprised of specialized personnel who perform essentially similar rescue functions, and it is inevitable that they will compete for recognition and status. In a fairly substantial number of well-documented cases, though, this sense of competition—which extended to competition over budget appropriations and equipment—has resulted in outright conflict when both units have responded to the same incident.

Aside from the informal competition between personnel from different agencies, there can also be conflict and competition at the highest levels, even when the agencies serve the same municipality, and these turf wars preclude the development of effective, efficient, and integrated response protocols. These turf wars and the politics that go with them jeopardize public safety. Again, one need look no further than the NYPD and FDNY: As this article is written, more than 20 months after the

September 11 terrorist attack on the Twin Towers, the two agencies are still trying to iron out conflicts and establish a single, unified and predesignated command and control structure (Rashbaum, 2002; Gardiner, 2003; Haberman, 2003). Indeed, a set of studies commissioned by both agencies and conducted by the McKinsey and Company management consulting firm as a follow-up to the September 11 attack revealed a host of organizational difficulties and shortcomings that reduced the effectiveness of the agencies' respective responses. Prominent among these shortcomings were insufficient training of personnel in necessary skills and areas of knowledge, inadequate equipment, poor intra/interagency communication, and a lack of interoperability between the agencies' radio systems. The police and fire departments had set up separate command centers, for example, which had been unable to communicate with each other (NYPD, 2002; FDNY, 2002).

The point of this is certainly not to disparage the reputations of two fine agencies or to diminish the remarkable heroism displayed by their personnel, but to frankly acknowledge a persistent political and organizational reality that can and does exist in other municipalities across the nation and that can and does continue to pose a significant threat to public safety. The conflict, ''rivalry,'' and lack of communication between the police and fire departments of a major city is not unusual, but it is indicative of an even larger and more significant set of issues that affect national security and homeland defense. The problem, stated succinctly, is that far too often the federal, state, and local agencies responsible for ensuring public safety and reducing the threat of terrorism do not share information or resources and have not established structures that would permit them to do so. The FBI, for example, which plays a critical role in gathering and disseminating intelligence for homeland defense, has been criticized for failing to cooperate or share information with state and local law enforcement agencies (Oates, 2001; Van Natta & Johnston, 2002; MacDonald, 2001).

The fact that there are few structures and channels currently in place for law enforcement agencies to share intelligence information can be attributed to a number of causes. First, we must bear in mind that the American system of law enforcement is highly decentralized, stratified, and complex: There exist approximately 17,784 separate and relatively autonomous state and local law enforcement agencies in the United States and nearly 70 federal law enforcement agencies, and that these employ more than 700,000 sworn officers (Hickman & Reaves, 2001; Reaves & Hart, 2001; Reaves & Hickman, 2002). These agencies range in size from single-officer departments to an agency with nearly 40,000 sworn members, and they run the gamut in terms of their mandates, the size and complexity of jurisdictions, and the training and experience of their officers. The upshot of all this is that in the absence of a national network for sharing crime intelligence, the complexity of the system and the organizational barriers that exist between all these agencies effectively preclude the efficient sharing of information. To date there has been no coherent and cohesive formal system developed to share information and intelligence between and among these agencies, and the prospect of quickly establishing such a communication network is daunting.

Terrorism prevention and interdiction efforts begin with gathering, analyzing, and disseminating intelligence information. We typically conceive of the intelligence function as residing within the federal sphere—among such agencies as the Central Intelligence Agency, the National Security Agency, the Defense Intelligence Agency, the FBI, and a host of other semiclandestine agencies—and

in the aftermath of the September 11 attacks these agencies have been criticized for failing to develop, analyze, and share intelligence. This failure involves not only these competing agencies, but state and local law enforcement as well (Oates, 2001). Especially in an age of community policing, state and local law enforcement officers often have extensive relationships and sources within the communities where terrorists or terrorist sympathizers may reside. These relationships and sources cannot be fully exploited, nor can the potential intelligence value of their information be recognized, unless local officers are to some extent brought into the intelligence-gathering loop. With rare exception, though, there are no established structures or channels in place for information to pass between local agencies or, as importantly, across local, state, and federal jurisdictional lines. As a result, an essential resource with tremendous potential is being wasted. State and local law enforcement agencies and officers could conceivably possess essential bits of information that would help federal intelligence agencies ''connect the dots'' and identify terrorist activities, but they simply do not recognize the value of the information because they have not been briefed on the larger intelligence picture.

It is indeed unfortunate that such an information-sharing network has not been developed, since these 700,000 sworn law enforcement officers interact with literally millions of Americans each day and observe innumerable events and activities in the course of their daily duties. Every interaction and every observation is, potentially, a source of basic crime intelligence. Indeed, most law enforcement officers informally gather, analyze, and disseminate crime intelligence on a daily basis: They interact with the community, obtain information, analyze that information in some rudimentary way, and in many cases pass that information on to other officers or agencies in order to prevent, deter, or solve conventional crimes. Police officers generally know what to look for—what kind of information to gather and how to act on it—when it comes to conventional crime: That is their business, they know how criminals operate and are therefore attuned to criminal methods, and they are regularly alerted by their agencies and the community to emerging crime patterns and conditions. The same cannot be said when it comes to terrorism, however. In sharp contrast to their expertise in fighting conventional crime, most American police officers probably lack the training, expertise, and informational context to recognize behaviors and activities that may be indicative of terrorist activity (Henry, 2003).

At the same time, we must bear in mind that the same complexity and decentralization that makes it difficult for law enforcement agencies to share information and intelligence is an essential safeguard for American principles of liberty, and that there are legitimate practical and policy concerns with creating a law enforcement network that could be used improperly to deprive individuals of their civil rights. The authors do not suggest that local law enforcement agencies unilaterally engage in overt or covert surveillance or that they proactively investigate ''suspicious'' persons or organizations. The process of gathering, analyzing, and disseminating intelligence is a complicated business requiring particular skills, resources, and expertise that are, generally speaking, beyond the current capabilities of most local law enforcement agencies. In order to preserve the proper, delicate balance between the pursuit of public safety and the protection of civil liberties, intelligence activities must also be subject to a superseding layer of administrative and judicial supervision. In short, the complexity of the intelligence process, the level of skills and expertise it involves,

the resources it consumes, justifiable concerns for civil liberties, and the current absence of structures and channels for sharing information all militate against local law enforcement agencies unilaterally engaging in extensive intelligence operations.

The point here is that the American law enforcement community has a great deal of unexploited potential for gathering raw terrorist intelligence that might prove valuable to other agencies at the local, state, and federal levels. If organizational and structural barriers that exist to restrict the flow of information between agencies and across jurisdictional layers were erased or diminished, if the turf wars and petty conflicts that emerge between agencies were minimized, if formalized liaison and a communications infrastructure designed to maximize the flow of information were established, and if a formal process for gathering, collating, analyzing, and disseminating information were created, the threat of terrorism would be greatly reduced and public safety would be greatly enhanced. If a system or process designed to meet these goals were created in municipalities across the nation, and if each of the public-safety agencies and private-sector entities involved in preventing, deterring, responding to, and investigating terrorism within that municipality used the process to meet, discuss, and remain current on terrorism issues and threats, the enhancements to public safety would be tremendous. The same process could be used to develop integrated policies, procedures, and protocols that would help ensure the maximum effectiveness of a response to terrorist actions involving WMDs, just as it could be used to plan, carry out, and critique multiagency training exercises.

Fortunately, a viable model for such a system exists, and that model has been used very effectively by police agencies across the nation to maximize the effectiveness of their resources and reduce crime. The organizational management model or system known as Compstat has revolutionized American law enforcement and achieved drastic reductions in crime since it was first developed in the NYPD in 1994, and its principles have been applied to manage a host of other law enforcement functions (Henry, 2002a). An essentially similar model, called *network-centric warfare* and based in part on Compstat concepts and practices, is used by the U.S. military to prosecute wars (Cebrowski & Garstka, 1998).

Heather MacDonald (2001) was the first to suggest that the adaptation of Compstat principles could make a tremendous difference in reducing the threat of terrorism, although the theme was subsequently taken up by others (Henry, 2002a, 2002b, 2003). After outlining many of the intrinsic difficulties in collecting and sharing information across agency lines, MacDonald notes that major cities have joint terrorist task forces (JTTFs) that operate under the leadership of the FBI but include state and local law enforcement officers.

Insofar as the JTTFs are comprised of agents from several federal agencies as well as local and state law enforcement personnel, they would seem to be an integral part of an effective intelligence system, especially because local law enforcement officials might have better sources of information in the communities that could harbor terrorists. As MacDonald points out, though, the FBI's demand that intelligence cannot be disseminated to law enforcement officials who lack a proper security clearance often means that the same local detectives who collect and provide intelligence to the FBI are often precluded from sharing the same information with their own agencies. One of the dilatory tactics that federal law enforcement agencies have employed to limit the transmission of intelligence information to local law enforcement executives has been to delay their required security clearances. It is an ironic reality that local law enforcement officers can

be legally forbidden from sharing information with their own chief until the chief receives an FBI security clearance—a process that can take months or years. MacDonald cites this and a variety of additional sources and evidence to make a compelling case that turf wars and federal law enforcement's penchant for secrecy have severely hampered terrorist investigations.

To address these problems, she argues for the creation of an intelligence system similar in form, format, and structure to the NYPD's Compstat system (MacDonald, 2001). While the scope of this article does not permit a full explication of the Compstat management system, the Compstat process helps facilitate accountability and eliminate turf wars by bringing the commanders of various units together and requiring them to share information with commanders of other units and with the agency's top executives. The Compstat process is based on four key principles of crime reduction, but these principles apply equally well to other law enforcement functions as well. The four keys to effective crime control are:

- timely and accurate intelligence
- effective tactics and strategies
- rapid deployment of personnel and resources
- relentless follow-up to ensure that crime and other problems have been eliminated.

Compstat involves regular meetings at which police department executives question precinct commanders intensely about the number, type, and distribution of crimes within their precincts as well as about the strategies the commanders are employing to reduce them. In that respect, Compstat is a system to facilitate communication and the flow of critical crime intelligence up and down the organizational pyramid. Commanders are held highly accountable for their own and their personnel's activities, as well as for the tactics and strategies they implement to reduce crime and the results they achieve. Importantly, Compstat ensures that commanders of units throughout the agency are aware of what takes place in other units. The meetings also permit executives to identify those commanders who are team players and those who are not (Henry, 2002a, 2002b). In the ten years since it was developed and implemented in 1994, Compstat has been responsible for a more than 65% reduction in crime in New York City.

MacDonald (2001) suggests that biweekly ''Fedstat'' meetings should be convened in major American cities, to be chaired by the FBI special agent in charge, with all other relevant law enforcement agency heads attending. The purpose of these meetings would be twofold: to ensure that (1) every agency involved in terrorism response is aggressively pursuing its obligations and (2) intelligence is being shared between, among, and within the agencies. Security concerns would be addressed by requiring agency heads to obtain FBI security clearances—a highly subjective process that could, at the FBI's discretion, be easily expedited. Through liaison between ''Fedstat'' systems in various cities, intelligence information developed in one area could easily be passed along to affected agencies in other cities or regions, and local agencies could request specific items of intelligence information from each other.

It has also been suggested (Henry, 2003) that local law enforcement agencies in regions without JTTFs could organize their own regularly scheduled intelligence-sharing meetings along Compstat lines, and that other law enforcement and public-safety agencies within a region could participate. The composition of specific structures and constellations of the participating agencies is less important than the fact that some sort of intelligence network

(what we might call ''Terrorstat'') is required, and that Compstat provides an effective, well-documented, and easily implemented existing model to create that network. An important function of these meetings, beyond sharing intelligence and refining tactical and response plans in light of emerging threats, would be to identify training needs within the agencies as well as the public sector. A practical example of this kind of training is the program developed by the NYPD to train landlords to recognize terrorist activities and behavior patterns with regard to the rental of apartments and housing (Fries, 2002).

To address some of the critical lapses identified above—the paucity of coordinated procedures and response protocols, the absence of a system dedicated to the ongoing sharing of information, and the lack of awareness of other agencies' resources and capabilities—a separate structure devoted to the design, implementation, and testing of coordinated procedures and protocols would also be established. Within this structure, meetings would include representatives from federal, state, and local law enforcement agencies operating in the region, fire and EMS agencies, the medical/health-care community, private-security entities, public utilities, and all the other organizations that might be involved in responding to a terrorist event. Security concerns would be less pressing in these meetings, since their primary focus would be to bring all parties together to ensure mutuality of purpose and coordination of activities. Similarly, the responsibilities for leadership could be rotated among the chief executives of the public-safety agencies involved, or a single agency could be designated to chair the meetings on a permanent basis. Once again, liaison with other regions could be established to facilitate the flow of information.

Conclusion

The new realities of terrorism and WMDs presented in our contemporary world demand a new set of policies, practices, and relationships among and between a host of entities and institutions charged with the responsibility to ensure public safety and effective homeland defense. As illustrated by the experiences and lessons of the September 11 attacks on the World Trade Center and the Pentagon, and the attempted attack by the hijacked plane that crashed in western Pennsylvania, police, fire, and EMS personnel face unprecedented challenges in the future, and similar challenges confront virtually every institution in America.

In this article, we have outlined some of the issues, problems, and threats posed by the specter of terrorism and terroristic use of WMDs, and we have indicated some of the potential solutions that may help to prevent the inevitable attacks of the future as well as to respond to and recover from those we are unable to prevent. Most importantly, we identified the compelling need for highly coordinated response-and-recovery planning that integrates the resources, skills, personnel, and capabilities of a range of public-sector agencies and private-sector organizations. No plan can pretend to be perfect—there are simply too many unforeseen issues and exigencies that arise in specific events—and planning must therefore be flexible enough to adapt as the need arises. This involves nothing less than a new mindset that accepts, accounts for, and takes up the challenges posed by the realities of our world.

Recent history reveals the extent and dimension of the threat posed by WMDs, their availability to terrorists and extremist groups, and the massive casualties they can inflict on public-safety personnel and members of the

public. These threats are not likely to subside, and in fact may increase. There is a pressing need for more and better training for the first responders to such events so that they can recognize the indications of WMD use and can operate safely in order to minimize deaths, injuries, and damage. Similarly, there is a pressing need for more and better equipment to help first responders achieve their goals, but here again we see the need for a new mindset among emergency workers—a mindset of safety and preparedness that infiltrates all their duties and activities. Beyond the essential role played by first responders, issues of better training, better equipment, and better coordination apply as well to the broad array of secondary responders and institutions that will be called upon once the immediate crisis has passed.

In light of the terrorist threat posed by WMDs, institutions must find the means to achieve greater coordination of efforts and resources across organizational boundaries, and we must strengthen our nation's law enforcement function to make better use of intelligence that can help prevent, deter, and investigate terrorist acts. We must also achieve these goals without sacrificing the freedoms and liberties that have sustained our nation and defined its greatness. One way to achieve these goals is through the implementation of intelligence systems and planning mechanisms based upon the Compstat model.

In some respects this article has raised more issues and more questions than it has answered, but the reality of our contemporary world is one of uncertainty. The effectiveness of the solutions developed to resolve these problems, issues, and questions and to restore a valid sense of safety and security among members of the public will depend in large measure upon the commitment demonstrated by the police, fire, and EMS agencies that are our first line of defense in public safety and homeland security.

References

Cebrowski, A., & J. J. Garstka. (1998). Network-centric warfare: Its origin and future. *Proceedings of the Naval Institute, 124,* 28–35.

Duffy, M. (2002). *Weapons of war: Poison gas*. Web site: http://www.firstworldwar.com/weaponry/gas.htm. Retrieved December 20, 2003.

FEMA [Federal Emergency Management Agency] (2002). *Managing the emergency consequences of terrorist incidents: Interim planning guide for state and local governments*. Retrieved December 20, 2003, from the FEMA Web site: http://www.fema.gov/txt/onp/managingemerconseq.txt.

FDNY [Fire Department of the City of New York] (2002). *Increasing FDNY's preparedness: Report prepared by McKinsey & Company based on information provided by the Fire Department of the City of New York*. Author.

Fries, J. (2002, June 4). City landlords get a primer for spotting terrorist tenants.'' *New York Times*, B1.

Gardiner, S. (2003, June 27). Finest fight bravest over man stuck in chimney: Chimney-caught burglar sets off firefighter, cops battle. [New York] *Newsday*, 5.

Haberman, M. (2003, July 13). Bravest, finest map crisis plan. [New York] *Daily News*, 3.

Henneberry, O. (2001, December). *Bioterrorism information resources*. Paper presented at the New Jersey Hospital Association's conference ''Thinking the unthinkable-biochemical terrorism and disasters: Information resources for medical librarians,'' Princeton, NJ. Available online: http://www.njha.com/njresponse/pdf/bio-cdchandout.pdf. Retrieved February 5, 2004.

Henry, V. E. (2002a). *The Compstat paradigm: Management accountability in policing, security and the private sector*. Fresh Meadows, NY: Looseleaf Law Publications.

Henry, V. E. (2002b). The need for a coordinated and strategic local police approach to terrorism: A practitioner's perspective. *Police Practice and Research: An International Journal, 3,* 319–338.

Henry, V. E. (2003). Compstat: The emerging model of police management. In A. R. Roberts (Ed.),

Critical issues in crime and justice (2nd ed). Thousand Oaks, CA: Sage Publications.

Hickman, M. H., & Reaves, B. A. (2001). *Local police departments, 1999*. Washington, DC: Bureau of Justice Statistics, NCJ # 186478.

Jernigan, J. A., Stephens, D. S., Ashford, D. A., Omenaca, C., Topiel, M. S., Galbraith, M., et al., for the Anthrax Bioterrorism Investigation Team (2001). Bioterrorism-related inhalational anthrax: The first 10 cases reported in the United States. *Emerging Infectious Diseases, 7,* 933–944.

Kristof, N. D. (1995, March 25). Police find more chemicals tied to sect. *New York Times*, A5.

Lifton, R. J. (1999). *Destroying the world to save it: Aum Shinrikyo, apocalyptic violence, and the new global terrorism*. New York: Henry Holt.

Lynch, C. (2002, January 24). U.N. monitors warn of Afghan missiles; panel says Taliban, Al Qaeda remnants may pose conventional, chemical threat. *Washington Post*, A14.

MacDonald, H. (2001). Keeping New York safe from terrorists. *City Journal, 11*, 4 (Autumn), pp. 58–68.

McDade, J. E., & Franz, D. (1988). Bioterrorism as a public health threat. *Emerging Infectious Diseases, 4*, 493–494. http://www.cdc.gov/ncidod/eid/vol4no3/mcdade.htm. Retrieved December 20, 2003.

NYPD [New York Police Department] (2002). *Improving NYPD emergency preparedness and response: Report prepared by McKinsey & Company based on information provided by the New York Police Department*. Author.

Oates, D. J. (2001, November 5). The FBI can't do it alone. *New York Times*, A31.

Rashbaum, W. K. (2002, May 24) Commissioners seek closer ties for Fire Dept. and the police. *New York Times*, B1.

Reaves, B. A., & Hart, T. C. (2001). *Federal law enforcement officers, 2000*. Washington, DC: National Institute of Justice, *Bureau of Justice Statistics Bulletin* series, NCJ #187231.

Reaves, B. A., & Hickman, M. J. (2002). *Census of state and local law enforcement agencies, 2000*. Washington, DC: National Institute of Justice, *Bureau of Justice Statistics Bulletin* series, NCJ #194066.

Sachs, G. M. (2003). *Terrorism emergency response: A handbook for responders*. Upper Saddle River, NJ: Prentice-Hall.

Shenon, P., & Stout, D. (2002, May 21). Rumsfeld says terrorists will use weapons of mass destruction. *New York Times,* A1.

Traeger, M. S., Wiersma, S. T., Rosenstein, N. E., Malecki, J. M., Shepard, C. W., Raghunathan, P. L., et al. (2002). First case of bioterrorism-related inhalational anthrax in the United States, Palm Beach County, Florida, 2001. *Emerging Infectious Diseases, 8,* 1029–1034.

Van Natta, D., & Johnston, D. (2002, June 2). Wary of risk, slow to adapt, F.B.I. stumbles in terror war. *New York Times*, A1.