Preparing for and Responding to Disasters

Joseph T. Catalano

Learning Objectives

After completing this chapter, the reader will be able to:

- Discuss the changes in the environment that produce more and larger natural disasters
- Distinguish the characteristics that make an event a true disaster
- Identify the key elements in personal disaster preparation
- List and discuss the elements in preparing for a disaster
- Identify the nurse's role in preparing for bioterrorism events and natural disasters
- List the phases of a disaster progression and identify the key elements of each phase
- Identify resources that nurses can use during a natural disaster
- List and discuss at least five ways to identify and protect against postdisaster scams
- Identify ways in which nurses can participate in disaster relief in a state in which they are not licensed
- Identify the primary agents that can be used in a bioterrorism attack
- Discuss the nurse's role in a bioterrorism attack and the plan of care for exposure to the different biological agents
- Explain the differences in the mechanisms of action of the three types of chemical weapons
- Name and explain the three key factors for effective treatment of chemical injuries
- Define *decontamination* and identify the steps in the process
- Distinguish between the different classes of protective wear for chemical or biological contamination
- Discuss current issues in disaster preparedness, including intruder safety
- Identify the methods to respond to intruders and active shooter incidents

DISASTERS ON THE INCREASE

The United States has witnessed an increase in natural and terrorism-related disasters during the past decade. The vast majority of disasters are natural, ranging from the catastrophic failure of human-made structures, such as building collapses, to weather-related catastrophes, such as tornadoes, hurricanes, volcanoes, and floods.

Most credible scientists believe that because of climate change, natural disasters will become more frequent and more destructive for decades to come. These scientists note that the planet as a whole has warmed 1.8°F since the beginning of the Industrial Revolution in 1880. Satellite imagery from NASA and the German Aerospace Center's twin Gravity Recovery and Climate Experiment (GRACE) shows that between 2002 and 2016, Greenland's ice mass melted approximately 280 gigatons, or almost 3 percent per year. Similar melting of other large ice masses across the globe have also been documented. Since 1992, the world's oceans have risen by 3 inches, a rate of 0.67 inches per year. At this rate, the oceans will be 6 inches deeper in 10 years. The carbon dioxide level, which is the primary driver of global warming, has increased by 24 percent in recent years.[1]

Scientists also point to hurricanes and superstorms such as 2018's Hurricane Florence that submerged much of North and South Carolina; Hurricane Harvey (2017) that inundated Houston, Texas, and surrounding areas under feet of water; and Hurricane Maria (2017) that devastated Puerto Rico and wiped

out its power grid for almost a year. Hurricanes Harvey and Maria were both category 4 (out of 5) storms with winds in excess of 155 miles per hour. Florence was "only" a category 2 storm, but it produced rainfall measured in feet, not inches. More than a year after the storms made landfall, these areas were still recovering.

Weather scientists also study the tornadic events that took place in 2011 in Joplin, Missouri, and in 2013 in Moore and El Reno, Oklahoma, all of which were rated as EF-5 tornadoes. An EF-5 tornado is the most powerful windstorm on earth, with winds in the range of 200 to 300 miles per hour or more and the ability to uproot large trees, vacuum up pavement, and completely demolish a well-built house and remove it from its foundation.

Tornadoes in the United States and Canada are rated on a scale from 0 to 5, based on the amount of damage they produce. This scale was initially developed by Dr. Tetsuya Fujita in 1971 (the Fujita scale) and revised in 2007; it is now named the Enhanced Fujita (EF) scale. A portable Doppler radar truck monitoring the May 5, 2003, Oklahoma City tornado clocked the fastest winds ever recorded on earth at 319 miles per hour. In the past, EF-5 tornadoes were very rare, with one occurring only once a year; that's about one out of every 1,000 tornadoes that occur every year in the United States. The Moore and El Reno tornadoes occurred within weeks of each other. Moreover, the El Reno tornado was the largest tornado on record so far, measuring almost 3 miles wide. Just 4 months later, an EF-4 tornado struck Washington, Illinois, killing eight people and removing the town from the map.

Disaster Defined

Simply defined, a disaster is a catastrophic event that leads to major property damage, a large number of injuries, displaced individuals, and/or major loss of life. The International Federation of the Red Cross defines a disaster as "a sudden, calamitous event that seriously disrupts the functioning of a community or society and causes human, material, and economic or environmental losses that exceed the community's or society's ability to cope using its own resources. Though often caused by nature, disasters can have human origins."[1] Natural disasters include hurricanes, tornados, storms, floods, tidal waves, earthquakes, volcanic eruptions, droughts, blizzards, pestilence, famines, and wildfires. Human-made disasters include explosions, building collapses, commercial transportation wrecks, leakage and spills of toxic chemicals, radiation contamination, building fires, and other situations.

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Personal and Family Preparation for a Disaster

It is virtually impossible to make preparations to *avoid* disasters caused by acts of terrorism and catastrophic human engineering failures. Most natural disasters have a warning period ranging from a few minutes to several hours. However, the aftermath of all disasters is very similar, and preparations can be made to deal with those circumstances. Relief and rescue workers generally arrive quickly after a disaster, but they cannot take care of all the injured or trapped at the same time. During the time between the occurrence of the disaster and the rescue, individuals must rely on themselves to survive.

Extreme disaster preparedness is carried out by *doomsday preppers* or just *preppers.* These individuals usually build large, elaborate underground structures costing anywhere from a few hundred thousand dollars to several million dollars. Preppers typically make sure to have enough food, water, and other supplies to last up to 6 months without any contact with the outside world. They may have electrical generators and special air-filtration devices to keep out unwanted viruses and toxins. Preppers also generally arm themselves with a variety of powerful weapons to keep out individuals or groups who might seek shelter in the preppers' subterranean enclaves. However, even these strongly built structures can be destroyed by natural events such as earthquakes and floods or man-made devices such as large bombs.

Most U.S. residents cannot afford nor would they even want this type of extreme disaster protection. What can the rest of us do when faced with an impending disaster? There are a number of relatively straightforward measures that can be taken when coping with a disaster and its aftermath. These can be modified to some degree to accommodate the most common types of disasters that are likely to be encountered in a given area. For example, an underground storm shelter is great protection in an area that experiences tornadoes regularly, but it would not be appropriate in a coastal area, where hurricanes usually cause flooding.

As health-care providers, nurses need to make the same basic emergency preparations as the general public to ensure their safety during the emergency so that they can effectively aid those injured during the disaster. An injured health-care provider is just another victim who needs care.

The Federal Emergency Management Agency (FEMA), in conjunction with the Red Cross, recommends the following four steps in preparing for a disaster:

1. Get informed.
2. Make a plan.
3. Assemble a kit.
4. Update the plan and the kit.[2]

Get Informed

Knowledge is the best preparation for any kind of disaster. Before a plan can be formulated, a sufficient amount of information must be gathered about potential dangers and ways to deal with them. The local emergency management office or local American Red Cross chapter is a good place to start the search for information. Some areas are more likely to experience certain types of disasters than others. Find out what disasters the community has experienced in the past. Is it on a fault line and likely to have earthquakes? Is it located in “tornado alley”? Is it in the shadow of a dormant volcano? Is it along the sea coast where coastal flooding and hurricanes occur? When was the last time a wildfire broke out? There may be some potential human-made hazards associated with the community. Does it have large fertilizer or fireworks plants that may explode? Is there a large oil or natural gas pipeline that runs under the town? How old is the freshwater dam that is located upstream from the community?

All communities should have a written disaster plan that provides information such as how local first responders are to organize rescue efforts, where community emergency shelters are located, and which roads are designated as evacuation routes. These plans will probably be located at the local Red Cross office or at firehouses. Ask for a copy of it. Other valuable information includes mass transportation plans. In the event that personal transportation is unavailable or has been destroyed, are other means of transportation available to evacuate people? Also find out what types of internal disaster plans schools, businesses, and hospitals have to protect the children, employees, and clients.[2]

All communities should have some type of early warning signals. These are usually sirens or horns, but it is important to learn before a disaster event what these signals sound like and know how much time there is between when the signals sound and when the disaster hits. Most community disaster plans have some provision for how local authorities and rescuers will provide information to the public before, during, and after a disaster has occurred.

A commonly used method of notification is the National Oceanic and Atmospheric Administration (NOAA) weather radio system and the Emergency Alert System (EAS). Although emergency warnings can be broadcast over the network television system, purchasing an inexpensive NOAA alert radio can provide warnings 24 hours a day. The automatic alert system sends a signal that triggers the radio to turn on. The speakers and audio-visual alert screen automatically turn on to provide instant alerts of conditions that may affect life and property. These radios have Specific Area Message Encoding (SAME) technology, allowing the radio to be programmed to receive only information specific to a particular geographic area. Most cellular phones and tablets can access apps that announce warnings and provide instantaneous, location-specific weather-alert information from the National Weather Service, local TV stations, or The Weather Channel.

Make a Plan

After gathering sufficient information, sit down with all family members and develop a plan for possible disasters. The following sections discuss some key elements to be included in all emergency disaster plans.

An Out-of-Town Contact Person. A contact person should be a friend or relative who lives a considerable distance from the community and is therefore unlikely to be caught in the disaster. The person's phone number needs to be programmed into all family members' cell phones or memorized by everyone. After a disaster has struck, family members should call to inform this person where they are and what their condition is. Because of damage to the cell phone system or overload of the system by high call volume after a disaster, it is often easier to reach someone by a long-distance call than to reach a family member who may be only a few blocks away.[3] Also, the phone's texting feature uses a different system than the voice phone, and it is often less problematic to send and receive text messages than to make voice calls.

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A Preselected Meeting Place. Most of the time, disasters do not occur when everyone is together in one place. They are more likely to occur when family members are widely dispersed, such as at school and work, and family members may be unable to return home because of public transportation shutdowns, road closings due to damage and debris, and so on. Therefore, a disaster plan should include a preselected, centrally located meeting place that is likely to survive the disaster.[2]

A Family Communication Plan. All contact information for all family members, at all times, should be easily accessible. This includes work and school phone numbers. Other useful numbers can include the National Poison Control Center (1-800-222-1222), local hospitals, and close relatives. These numbers can be programmed into phones or, in case of damage or loss of the phone, listed on a card or a form that should be carried at all times by all family members. A sample of this type of form can be found at https://www.ready.gov or at https://www.redcross.org/content/dam/redcross/atg/PDF_s/Preparedness___Disaster_Recovery/General_Preparedness___Recovery/Be_Red_Cross_Ready/ECCard.pdf. These websites also provide blank wallet cards on which contact information can be recorded and carried in a wallet, purse, backpack, and so on, for quick reference.[4] It is probably a good idea to get the cards laminated to make them more durable and able to survive even if they get wet. You might want to obtain several so that they can be available in different locations. Children must be taught how to call the emergency phone numbers and in what situation it is appropriate to do so. Also post a copy of the communication plan near each landline house phone, if these are present.

Escape Routes and Safe Places. Draw a floor plan of the house that shows all the rooms and the location of stairways, doors, and windows that lead outside. The locations of the utility shutoff points, particularly gas and electricity, should also be shown. There should be at least two ways to exit each room, such as a door and a window or two doors.[2] Everyone in the family should know the best escape routes out of the house and where the safe places are in the house for each possible type of disaster (i.e., if a tornado approaches, go to the storm shelter or basement or the lowest floor of the home or to an interior room or closet with no windows). It is recommended that emergency evacuation drills be conducted at least two times a year and whenever any changes are made in the escape plan or the building's structure.

A Special Plan for Disabled Family Members. Items necessary for mobility, such as walkers, crutches, and canes, should be kept in the same place all the time so that they are easy to get to quickly. For bed-bound individuals who have caregivers, the caregivers need an alternate plan if no one else is at home. Power companies should be notified if the disabled person is dependent on life-support technology such as a ventilator.[3] Most of these devices have some type of battery backup system for short-term power outages,

but there should be a plan for an alternate power source for long-term outages. The plan may require moving the person to another location. Also have a several-day supply of important medications and other routinely used care items set aside so that it can be taken with the client.

A Plan for Pets. Pets can create considerable problems for rescue workers. Some people refuse to leave their pets when they are asked to evacuate; other times, pets, especially large dogs, become protective of their injured owners and will not allow rescue workers to approach them. If forced to evacuate, take the pet along if at all possible. Some individuals have many pets and taking all of them may not be possible. In the past, emergency shelters did not allow any animals other than service animals because of hygiene issues.[2] However, with the many disasters that have occurred in recent years, these rules have been relaxed to some degree. Some shelters are divided into no-pet and pet sections. Identify boarding facilities, veterinarians, and pet-friendly hotels that would be willing to accept pets when a disaster occurs.

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Actions to Take Before a Disaster

Check Key Utilities Locations. Learn how to turn off water, gas, and electricity at the main switches or valves. Show all family members where these are located and how to shut them off. If a special wrench or tool is required, buy a spare one and keep it near the valve or shutoff.[4]

Check Insurance Coverage. Most people tend to automatically renew their homeowner insurance coverage each year when they receive the renewal notification. It is a good idea to sit down with an insurance agent every 1 to 2 years and discuss what is actually covered in the policy. The worst time to find out that an insurance policy does not cover roof or siding damage is after a wind or hailstorm. Homeowner insurance does not cover flood damage. Special flood insurance is available from the U.S. government.[2] Most home insurance does not routinely cover earthquakes either. Special additional coverage must be purchased.

Take a First Aid/Cardiopulmonary Resuscitation (CPR) and Automated External Defibrillation (AED) Class. Contact the local American Red Cross chapter to find out when classes are offered. The American Heart Association also provides CPR classes and can be contacted for locations and times of classes. Most hospitals hold classes also, generally for their employees, but they often allow community members to attend.

Take an Inventory of All Home Possessions. In the past, this type of inventory required several written pages of information.[2] With the advent of cell phones and other digital devices with built-in cameras, it now is easy to inventory your belongings. Make a movie of the house inside and out, with particular focus on high-dollar items such as the 70-inch LED smart TV and computer equipment. Because the device also records audio, comments such as when it was purchased and particular additional features, such as 3D capability, is helpful in establishing its value.

Some policies have a total replacement value clause that will replace the item with a new one just like it no matter how old it is. These policies are more expensive, obviously. Most homeowner policies prorate the value of the item on its age. For example, if a computer cost $3,000 five years ago, it may be worth only $1,500 today. The $1,500 is all that the insurance company will reimburse the homeowner for this item. Also, make a movie of outbuildings, cars, boats, and recreational vehicles. Obtain professional appraisals of jewelry, collectibles, artwork, and other items that may be difficult to evaluate. Make copies of receipts and canceled checks showing the cost for valuable items. Store this information in a place safe from flood, fire, and other disasters. Paper documents can be safely stored in a safe-deposit box at a local bank. Electronic data can be stored on a flash drive that also can be kept at the bank. In addition, electronic data can be stored at off-site electronic data storage facilities or even in the cloud.

Protect Important Records and Documents. Important documents include photocopies of all credit cards, home titles, birth and marriage certificates, Social Security cards, passports, wills, deeds, and

financial information such a checking account numbers, insurance policies, and immunizations records. Ideally, these should be kept in a safe-deposit box, but fire- and waterproof home safes and strongboxes can provide adequate protection and are more convenient to access.

Assemble a Kit

A disaster-supplies kit is a collection of basic items a family would probably need to stay safe and be more comfortable during and after a disaster.[3] Store these items in plastic or metal portable containers kept as close as possible to the exit door or in a secure place such as a storm shelter. At least once a year, the kit should be opened and all items checked. Family members' needs may have changed, and certain items will have exceeded their expiration date. Smaller emergency kits can be kept in each vehicle and at work.

A well-stocked disaster supply kit should include the following:

- Three-day supply of boxed and canned ready-to-eat nonperishable food
- A manual can opener, knives, and other eating utensils (can be plastic)
- Three-day supply of water (1 gallon of water per person, per day)
- Portable, battery-powered radio, citizen band (CB) radio, or small television with extra batteries
- Flashlight, portable LED lantern with many extra batteries
- Well-stocked first aid kit with sufficient supplies to stop major bleeding injuries
- Sanitation and hygiene items (hand sanitizer, moist towelettes, feminine hygiene items [pads and/or tampons], and toilet paper)
- Matches or a lighter in waterproof containers
- Whistle, horn, or some other type of device that can be used for signaling if trapped
- Extra sturdy clothing and warm blankets
- Photocopies of identification and credit cards
- Cash (several hundred dollars if possible) and coins
- Special-needs items such as prescription medications, eyeglasses, contact lens solution, and hearing aid batteries
- If applicable, items for infants, such as formula, diapers, bottles, and pacifiers
- Basic tools (hammer, large pliers, screwdrivers, small pry bar) and, if applicable, pet supplies
- Jacket or coat
- Long pants and long-sleeve shirt
- Sturdy shoes and socks
- Sleeping bag or warm blanket[2]

Update the Plan and the Kit

Ideally, the plan should be reevaluated every 6 months. Ask family members about it and get their input. Check expiration dates on food and medical supplies and replace items that have expired; replace drinking water every 6 months.[4]

Even with every precaution and preparation in place, when a disaster strikes, it is going to be both physically and emotionally traumatic to the whole family. Keeping a cool head and knowing what to do enables all involved to make the best of a bad situation.

It is important to follow the instructions of the professional first responders who have trained and planned for a variety of disasters. If a radio or television is available, valuable information can be obtained concerning the location of emergency shelters, the estimated time for rescuers to respond, and the general condition of the surrounding community.

It is important to wear sturdy clothing such as jeans and particularly important to protect feet by wearing sturdy shoes or boots.[2] If attempting to evacuate an area, it is best to use only the travel routes specified by local authorities. Emergency routes are generally the first ones cleared after a disaster, while alternate routes and shortcuts may be blocked by debris or water and be impassable or dangerous. If at home after a disaster, only use flashlights if it is dark. There may be undetectable gas leaks or other dangerous fumes that can be ignited by matches or candles. Also, keep at least one general-purpose fire extinguisher in an easily accessible location.[5]

Downed high-voltage power lines pose a particularly lethal threat to those who are near them. Even if a downed power line is not sparking, it may still be live, and stepping on it or driving over it is a potentially deadly mistake. If water is present near the power line, it too can become electrified and cause a fatal shock several feet from the actual power line.

Issues in Practice

The 10 Commandments of Disaster Preparedness

Nurses and the general public should take the following preparation steps well before a disaster strikes:

1. Discuss the type of hazards that could affect your family. Know your home's vulnerability to storm surge, flooding, and high winds.
2. Locate a safe room or the safest areas in your home for high wind hazard. In certain circumstances, the safest areas may not be in your home but in your community.
3. Determine escape routes from your home and places to meet.
4. Designate an out-of-state friend or relative as a single point of contact for all your family members.
5. Make a plan now for what to do with your pets if you need to evacuate.
6. Post emergency telephone numbers by your phones and make sure your children know how and when to call 911.
7. Check your insurance coverage—flood damage usually is not covered by homeowner insurance.
8. Stock nonperishable emergency supplies and a disaster supply kit.
9. Purchase and know how to use an NOAA weather radio. Remember to replace its battery every 6 months.
10. Take first aid, CPR, and disaster preparedness classes.

Sources: L. Gelinas, What I learned during the 2017 hurricane season, *American Nurse Today,* 12(10):4, 2017; B. Mitchell, 10 Commandments of emergency planning, 911 Consulting, retrieved April 2018 from http://www.ctrims.org/Emergency%20Planning.pdf.

Many people have purchased portable generators in recent years as a backup source of power after a disaster. These pose their own set of dangers. The biggest one is carbon monoxide poisoning.[3] Some people think that running the generator in an attached garage is safe because the fumes go out the big open door. This is false! Generators should be run only outside in a well-ventilated area. In addition, refueling a generator while it is still hot or while it is running can cause a serious fire. Electricity is dangerous, and there is always the potential for electrical shock or fire if the wiring is not connected correctly.

> *"Even if a downed power line is not sparking, it may still be live, and stepping on it or driving over it is a potentially deadly mistake."*

There are many resources for dealing with all types of disasters. FEMA's Community and Family Preparedness Program and American Red Cross Community Disaster Education are available online. Almost every agency that deals with disasters has written information that is available.[5]

Health-Care Professional and First Responder Preparation for a Disaster

The preceding information is general information that all citizens, including health-care providers and first responders, should know in preparing for a variety of disasters. However, by the very nature of their work, health-care providers and first responders require additional knowledge and preparation in dealing with disasters. People look to them for help during their time of need. Although some of the knowledge overlaps, a higher level of preparation is expected of professionals. The information that follows focuses on this specialized knowledge.

Disaster Phases

Although there is a considerable amount of overlap, all disasters can be divided into three basic phases: the preimpact phase, the impact phase, and the postimpact phase. Nurses should learn what they need to do to provide care in all of the disaster phases.

The Preimpact Phase

Certain types of natural disasters are preceded by a warning period. For a tornado, this may range from a few minutes to as much as an hour; for hurricanes, it may be as long as several days. During the warning stage, also called the *preimpact phase*, the focus is on preparation for the aftereffects of the event. This preparation is primarily at the local community level.[6]

Even before a catastrophic event is predicted, first responders and health-care professionals in disaster-prone regions practice with disaster drills. These drills provide valuable training in a low-stress environment and identify the types of resources that may be needed during a disaster. This type of training helps identify unique risk situations for the community and builds the skills and knowledge disaster responders must have to meet the needs of the population. When the disaster becomes imminent and a warning is issued, preparations such as evacuations are put into operation by the local emergency response unit. Since Hurricane Katrina in 2005, FEMA, the Red Cross, and other government agencies have begun the practice of stockpiling essential supplies to be used after the disaster somewhere close to the disaster target area where they can be reached quickly and easily for distribution.

Communication Is Critical

One key improvement in recent disaster response is the ability of the various agencies involved to communicate with each other. The lack of efficient communication between agencies became painfully evident after the terrorist attacks on September 11, 2001. Fire and rescue, law enforcement, and other first responders; public health and government agencies; and health-care services were using radios all set to different frequencies and were unable to exchange essential information with each other. President George W. Bush's administration authorized the government to spend large sums of money to correct this problem so that victims could receive the best possible care in a timely manner. Efficient communication leads to a well-coordinated response. All agencies must have agreements in place and understand the role that each agency is to serve in the disaster. This preparation helps to eliminate the arguments sometimes seen among agencies.[7] In rural areas, agreements with nearby communities also become important for obtaining mutual aid.

The news media plays a large part in disaster reporting; however, planning for the news media and the flow of information is often overlooked in disaster preparations. Nurses are likely to hear about a disaster from breaking news reports before they learn about it through official channels. One fear that can become real is group panic. Generally, all information released from a health-care facility should go through the facility's public relations representative or designated spokesperson. Before any information is released, it should be determined how the news will affect particular populations. Families of victims often cling to every word and may misinterpret what is being said. Social media sources may not provide reliable information. Avoid using these sources as your primary basis for action.

Persons designated to speak for the health-care facility should have experience with public speaking and be able to convey the information clearly and in terms that the general public can understand. They should also be able to think on their feet when responding to questions. However, question-and-answer sessions should be limited, especially when national media is involved. Reporters ask the same questions repeatedly, even when there is no new information about the subject.

When people are under stress or have high levels of anxiety, communication must be direct, honest, and to the point. Long technical explanations will only confuse the facts. The public should also be calmed by reassurances that everything possible is being done. Regular updates every 30 to 60 minutes, even if there is little new information, are helpful in reducing anxiety levels.

Who to Contact

The following agencies can help with planning during the preimpact phase:

- *Disaster Medical Assistance Team (DMAT).* A group of frontline medical personnel, including nurses, who provide health care after a disaster. These may include terrorist, natural, or environmental disasters.
- *Medical Reserve Corps.* Part of the USA Freedom Corps, which was developed in 2002 in response to Americans' desire to volunteer and serve their communities in the wake of the 9/11 terrorist attacks.
- *American Red Cross.* Registered nurses (RNs) can join their local Red Cross and receive specialized training in disaster and bioterrorism preparedness.
- *Commission Corps Readiness Force.* Deploys teams to respond to public health emergencies.[7]
- *National Disaster Medical System (NDMS).* Mobilizes comprehensive disaster relief and works closely with local fire, police, and emergency medical services. NDMS also uses volunteer disaster response teams called International Medical/Surgical Response Teams (IMSuRTs), of which nurses are an essential component. IMSuRTs provide emergency medical services at any place in the world where there is a lack of resources.

The Impact Phase

When the actual disaster strikes, the impact phase begins. The goal during the impact phase is to respond to the disaster, activate the emergency response, and reduce the long-term effects of the disaster as much as possible.[6] Activation of the emergency response plans developed during the preimpact phase mobilizes all agencies involved. Because fire, rescue, and police are usually the first on the scene, they provide and establish the command post from which all other efforts will be coordinated. Their goal is to identify and remove victims from dangerous situations, deal with unstable structures, and provide first aid to those who have been injured.

> *"Although most nurses have some familiarity with the role of nurses when they provide aid in a disaster, they may assume many other roles and function outside their usual practice setting in meeting the needs of the disaster victims."*

Because of concern about terrorism, law enforcement may initially take control of the disaster scene until it can be determined that the cause was not a criminal act such as a bombing or arson. Even with natural disasters such as tornadoes or floods, law enforcement is often first on the scene and, because of their training, tend to take control. Nurses working in the early stages of disasters sometimes feel frustrated by law enforcement officers, who may limit nurses' ability to provide care. It is important to remember that law enforcement is concerned with identifying a crime, catching criminals, and preserving evidence that may be used later in criminal prosecutions. The whole disaster area is considered a crime scene until released by law enforcement, and everyone there is considered a potential witness who may be questioned.

The incident management system (IMS) is an effective tool in bringing some order to the confusion that always surrounds any disaster event. Based on a military model, IMS is a hierarchy with a well-defined chain of command. At the top is the incident commander or manager, who is responsible for coordinating all rescue efforts. A *job sheet,* really a vertical organizational chart, lists all the key people from all the essential agencies involved. It also outlines the responsibilities of each person and agency and must be followed throughout the disaster event for the best coordination of emergency services.[8] Most IMS plans now include hospitals within the service area. Information flows freely from the commander down to paramedics and from the street level back to the top.

Medical assistance is provided in hospitals, in local clinics, or at the disaster site itself. Deployable Rapid Assembly Shelters (DRASHs) are mobile shelters that can be used by the IMSuRT as a small, independent hospital. The DRASH is designed with triage emergency care, intensive care units, and surgical rooms.

Protection for First Responders

Nurses and other first responders must always be aware of the potential dangers of any disaster. If the health-care providers become injured during rescue attempts, they can no longer provide care to the victims and instead become another victim who needs care. As a result, protecting the lives and health of the first responders takes priority over rescue efforts. Because of the wide range of potential hazards, including chemicals such as nerve gas, biological substances, radioactive agents, and explosive devices, care providers must wear appropriate protective equipment.[7] Images of rescue personnel wearing bulky yellow or blue biohazard suits have become ingrained in the public consciousness. Biohazard suits, otherwise known *as personal protective equipment*, come in different types and have a range of protective abilities against many types of substances (Box 26.1 and Fig. 26.1).

Most nurses have not received training in donning, wearing, or performing procedures in biohazard suits. If nurses find themselves in situations in which they may be required to wear such protection, it is important to recognize some of the limitations. The heavy gloves significantly reduce manual dexterity, and even routine procedures, such as starting IV lines or dressing wounds, become extremely difficult if not impossible. The hood restricts peripheral vision, and the plastic view plate may distort the visual field. Even cursory physical examination, including the ability to use a stethoscope, becomes more difficult. Nurses may also find that the suit itself causes claustrophobia. The unusual taste and smell of the self-contained breathing equipment can sometimes cause nausea.

After exposure to any type of chemical, biological, or radioactive agent, personnel must go through a decontamination procedure. These procedures vary widely, depending on the type of agent. They range from simply removing clothes and showering with water to extensive treatment with various neutralizing agents. Most emergency response teams have a decontamination tent that provides some privacy (however, personal privacy is low on the list of priorities) and contains the equipment necessary for thorough decontamination.

Box 26.1

Protective Levels of Biohazard (Hazmat) Suits

Level A: Resistant to all types of chemicals and biological and radioactive substances and is used in situations in which splashing or exposure to unknown agents is possible. Totally encapsulates personnel and has its own internal air supply.

Level B: Has a hood but does not totally encapsulate personnel. Is splash resistant to most chemicals. Has its own internal air supply.

Level C: Has a hood but does not totally encapsulate personnel. Is less resistant to chemical penetration than previous levels. Equipped with a respirator that can filter out most chemical contaminants and biological and radioactive substances.

Level D: Used when there are no chemicals or agents that can affect the respiratory system or penetrate through the skin. Generally consists of a jumpsuit or scrub suit.

Figure 26.1 Hazmat suits come with different levels of protection depending on the potency of the agent.

The Postimpact Phase

The postimpact phase may begin as little as 2 hours after the disaster and in some cases may last considerably longer.[6] It may continue for years, as in the aftermath of Hurricane Harvey in Texas, Hurricane Katrina in New Orleans, and the attacks on the World Trade Center in New York. Postimpact activities focus on recovery, rehabilitation, and rebuilding. One vital step during the postimpact phase is the evaluation of the disaster preparations and of how rescue and recovery efforts could be improved.

Many Roles for the Nurse

Every disaster poses its own unique challenges. The role of the nurse in a specific disaster depends on its nature and on the type and numbers of injuries. Although most nurses have some familiarity with the role of nurses when they provide aid in a disaster, they may assume many other roles and function outside their

usual practice setting in meeting the needs of the disaster victims.[6] Nurses must be able to perform under stressful and sometimes physically dangerous conditions.

After the hurricanes in Florida in 2005, large numbers of disabled and elderly clients who had been living in nursing homes and extended care facilities were displaced to schools and shelters. Nurses assumed the primary responsibility for caring for these individuals who, because they could not care for themselves and lacked essential medications, needed care at a level above what rescue workers could provide.

Triage Nurse

When the number of injured is very high, more than 1,000, the incident is classified as a mass casualty, and multiple agencies, from local to federal, become involved. Nurses also can provide direct treatment, which may be brief, or they may be involved in more complex roles, such as providing care in mobile surgical units (Box 26.2).

Box 26.2

Responsibilities of the Disaster Nurse

Short Term

1. Performs triage at the scene or in the emergency department.
2. Provides emergency medical assistance at the scene or in the emergency department. Special attention is given to vulnerable groups, such as people with disabilities, children, and elderly persons.
3. Provides assistance in the mobilization of necessary resources such as food, shelter, medication, and water.
4. Works in collaboration with existing disaster organizations and uses available resources.

Long Term

1. Provides assistance with resettlement programs and psychological, economic, and legal needs.
2. Partners with independent, objective media; local and national branches of government; international agencies; and nongovernmental organizations.
3. Warns clients to be aware that many scam artists are present after any disaster and advises clients of factors to consider in detecting a scam.

However, in the early stages of many disasters, nurses may find a lack of essential resources both in the field and in the emergency department (ED). Nurses have a long history of being able to improvise and get by with what is available, and a disaster will certainly challenge their creativity. When there are large numbers of victims in major disasters, nurses are often responsible for triage (from the French word meaning “to sort”), assessing victims and prioritizing care for the best use of resources. Mass casualty situations require a different type of thinking than is usually used in everyday health care. The traditional classification of victims into low risk, intermediate care, and immediate care is reordered. The overriding goal in a disaster is to provide the best care possible for the greatest number of victims. Often, this involves providing only palliative care to those with critical injuries, allowing more resources to be used for those with a better chance of surviving the disaster.

Triage is performed either in the field or in the ED. In the field, few medical resources are typically available, quick evacuation is not possible, and no one knows how soon higher-level medical care will arrive. Standard triage systems were developed for fewer numbers of victims who could be moved quickly to a health-care facility; however, they fall short when there are many victims who must remain in the disaster zone for a longer period of time.

The medical disaster response (MDR) system is designed to quickly evaluate and classify victims immediately after a disaster who cannot be evacuated for a substantial period of time. It requires the specialized training of local health-care providers, particularly nurses and first responders. It relies on a dynamic triage methodology that allows for ongoing triage that may last for hours or even days. The goal is to maximize victim survival and make the best use of existing resources.

"When the number of injured is very high, more than 1,000, the incident is classified as a mass casualty, and multiple agencies, from local to federal, become involved."

Classification Systems

The MDR system is based on the traditional simple triage and rapid treatment (START) method but is modified to use palpation of the radial pulse in place of the more difficult capillary refill assessment along with respiratory rate and basic neurological assessment (i.e., Can the victim respond to commands?). MDR can also be combined with the secondary assessment of victim endpoint (SAVE) system of triage that was developed to better use limited resources for victims who were most likely to survive and recover. Trauma statistics serve as the basis for the SAVE system, which attempts to determine which victims will best survive with the various types of injuries they have suffered. The formula used is
Probability of survival (%) = benefit ÷ available recourses

If it is determined that a victim has a 50 percent or greater chance of surviving, he or she receives treatment. Basically, the person conducting the triage makes a cost-benefit analysis in deciding which victims will benefit most from the limited resources on hand. The system places all victims into one of three categories:

Category 1: Those who will die anyway, no matter what resources are used to help them
Category 2: Those who will survive whether or not they are treated
Category 3: Those who can be helped and will gain long-term benefit from intervention and use of resources

The key to the success of the system is to identify and treat those who fall into category 3 as quickly as possible. The first and second category victims will receive only palliative care. Colored tags are also affixed to the victims according to their physical condition and injuries:

Green (category 2): Victims who are able to get up and walk around and require minimal or no treatment to save life or limb.
Red (category 3): Victims who require help breathing or assistance with their airways or whose respiratory rate is greater than 30 breaths per minute. Also included in this group are clients who are breathing but have no pulse at the wrist (radial pulse) and victims who are unable to respond to commands. Some of these victims can be saved and require immediate intervention, but they require the use of a large quantity of already scarce resources.
Yellow (category 3—nonurgent): Victims who do not meet the criteria for the red category but are not able to walk. These individuals require intervention but usually can tolerate some delay in treatment.
Black (category 1): Victims who are so severely injured that they have no chance for survival—fatalities.

Other factors that enter into the decision-making process include the victim's age and severity of any preexisting conditions. For example, an elderly victim with a head injury and a Glasgow Coma Scale score of 5 (out of a possible 15—unresponsive to all stimuli) who is wearing a MedicAlert bracelet that says he is on anticoagulant medications would require the use of significant medical resources and would still not likely survive the injury. He would receive a black tag and be placed in the "expectant" area. However, a middle-aged adult with 20 percent second-degree burns of the legs that require minimal treatment with dressings and pain medications and who has an excellent chance of surviving with full recovery would receive a yellow tag and be moved to a "treatment" area. Victims need to be reassessed frequently because conditions change, and they may need to be moved to another area. The MDR-SAVE methodology is a systematic approach to use triage as a tool to maximize victims' survival in the immediate aftermath of a catastrophic disaster.

BIOTERRORISM

Biological weapons include any organism (e.g., bacteria, viruses, or fungi) or toxin found in nature that can be used to kill or injure people. Toxins, such as the botulism toxin, are poisonous compounds produced by organisms. **Bioterrorism** is the use of microorganisms with the deliberate intent of causing infection to achieve military or political goals.[10]

An Acute Health Issue

Biological weapons are one category of weapons of mass destruction because of their ability to disable or kill large numbers of people at one time. Unfortunately, biological weapons are relatively easy and inexpensive to produce. Biological agents can be spread through the air, through water, or in food. It is also possible to use robotic delivery of agents by remote-control devices such as drones. Biological agents can also be spread by "suicide coughers" who have purposely been given the disease and who spread it from person to person in a crowded space such as a subway or an airport. After being released, microorganisms can go undetected for an extended period because their effects are not immediate and the initial symptoms are often nonspecific or flu-like. Person-to-person transmission may continue for days or even weeks before the source is detected and a specific disease-causing organism is identified.

The vulnerability of the United States to a biological attack became painfully apparent with the delivery of anthrax spores through the postal system as an infective agent in 2001, after the 9/11 attacks. In addition, the biological weapons programs of the former Soviet Union produced some deadly weaponized biological agents that cannot be located; this knowledge has increased national anxiety concerning bioterrorism in the United States. Since 1998, the American Nurses Association (ANA) has worked in conjunction with the American College of Emergency Physicians (ACEP) to develop strategies for health-care providers to use in responding to nuclear, biological, and chemical incidents.

Early Recognition

For nurses and other clinicians, the key to an effective response is early recognition of a bioterrorist attack. Some biological agents can be detected in the environment using high-tech detection devices (sniffers). Portable sniffer models include the **Biological Aerosol Warning System (BAWS),** which was first used widely in the Iraq War in 2003, and the Portable Biofluorosensor (PBS). Newer technology is even more sensitive and can detect a wider range of substances. These devices include the Fiber-Optic Bio-Sniffer, which may also be used in the future as a breath analyzer to detect respiratory and other infections, and metal–organic frameworks, thin, film-coated optical-fiber sensors that can detect everything from biotoxins to nerve gas.[12] Even newer technology is in the development phase and can play a key part in the future of early detection of biological agents. The latest research is focused on developing tiny electronic chips containing living nerve cells that could be worn like a radiation-detection badge. They would warn of the presence of a wide range of bacterial and viral organisms. Another experimental device that would help identify specific pathogens such as botulism and smallpox consists of fiber-optic tubes coated with antibodies. Light-emitting molecules would shine through the antibodies, and the different colors produced would indicate which organism is present.

However, biological agents are most often identified by specific blood tests and cultures or the report of a health-care provider of a particular set of symptoms indicative of a particular disease. Another early warning sign is an unusually large number of ill or dead animals, particularly birds, found throughout the community. They are often the first to catch lethal illnesses. Health-care providers must be able to identify victims early and recognize the patterns of the disease. If there are a large number of people with the same unusual symptoms, reports of dead animals, or other inconsistent findings, a biological warfare attack should be suspected. Early detection of a biological agent in the environment allows for early and specific treatment and enough time to treat others who were exposed. Currently, the U.S. Department of Defense is evaluating devices to detect clouds of biological warfare agents in the air at higher altitudes.

Are Nurses Ready?

Studies conducted over the past decade provide data indicating that nurses are still not as well prepared as they should be to respond to biological warfare agents.[10] Nurses have been and will remain among the frontline first responders to all emergency situations, including a biological attack. Nurse preparedness can increase only through improved education and training in early recognition, detection, and treatment of

infected persons. To help achieve this goal, several computerized education programs have been developed to raise the knowledge level of nurses and other first responders.

To educate nurses about bioterrorism, the Centers for Disease Control and Prevention (CDC) have produced online teaching and learning modules. A more comprehensive education program has been developed by the University of California–Los Angeles in conjunction with content experts. It consists of six interactive case studies that require participants to use their knowledge to identify each biological agent. Pretest and post-test results indicate a marked increase in participant knowledge and ability to detect and distinguish among various biological agents.[10]

Recognizing and treating outbreaks as early as possible is critical for rapid implementation of measures to prevent the spread of disease. Response to bioterrorist attacks is similar to the traditional public health response when communicable disease outbreaks occur naturally, but the focus is on early detection. However, early recognition is challenging because terrorists may use weaponized biological agents that have extremely short incubation periods or produce unusual initial symptoms or symptoms that are ignored until they become debilitating.

Clinical Presentation

Nurses and other clinicians must be familiar with the specific symptoms and clinical syndromes caused by bioterrorism agents (Box 26.3). One of the first indications of a biological attack is an increase in the number of individuals seeking care from public health agencies, primary care providers, and EDs. Because many of these agents are viruses, the early symptoms often look like a case of the flu. Hospitals, health-care providers, nurses, and public health professionals will be on the front lines of any attack. A heightened level of suspicion, plus knowledge of the relevant epidemiological clues, should help in the recognition of changes in illness patterns.[6]

Box 26.3

Epidemiological Clues to a Biological Attack

- Many clients with the same disease, indicating the sudden development of a large epidemic
- Multiple clients with unusually severe symptoms or diseases with unusual routes of exposure
- Diseases occurring where they normally do not, or during the wrong season, or at a time when the normal vector is absent (e.g., West Nile virus in the winter—no mosquitoes)
- Multiple simultaneous epidemics of different diseases
- Outbreak of zoonotic disease (diseases transferred from animals to humans)
- Larger than normal numbers of sick, dying, or dead animals in the community
- Unusual strains of contagious organisms or large numbers of antibiotic-resistant organisms
- Higher rates of disease than would normally be seen in persons exposed to the organism
- Reports of a credible threat of a biological attack by official authorities
- Direct evidence of biological attack

Biological Agents

The CDC has developed a list of biological agents that are considered most likely to be used in a bioterrorist attack (Table 26.1). Infective agents were included for their ability to produce widely disseminated infections, high mortality rates, potential for major public health impact, and ability to cause panic and social disruption. Those that require special action for public health preparedness were also included. Category A agents possess the highest immediate risk for use as biological weapons; category B agents pose the next highest risk. Category C agents have a potential for use but are not considered an immediate risk as biological weapons.

Table 26.1 **Critical Biological Agent Categories for Public Health Preparedness**

Category	Biological Agent	Disease
A: Highest	*Variola major*	Smallpox

immediate risk		
	Bacillus anthracis	Anthrax
	Yersinia pestis	Plague
	Clostridium botulinum (botulinum toxins)	Botulism
	Francisella tularensis	Tularemia
	Filoviruses and arenaviruses (Ebola and Lassa viruses)	Viral hemorrhagic fevers
B: Next-highest risk	*Coxiella burnetii*	Q fever
	Brucella species	Brucellosis
	Burkholderia mallei	Glanders
	Burkholderia pseudomallei	Melioidosis
	Alphaviruses	Encephalitis (VEE, EEE, WEE)
	Rickettsia prowazekii	Typhus fever
	Toxins (e.g., ricin, staphylococcal enterotoxin B)	Toxic syndromes
	Chlamydia psittaci	Psittacosis
	Food-safety threats (e.g., *Salmonella* species, *Escherichia coli* 0157:H7)	Salmonellosis, diarrheal illness, sepsis, HUS
	Water-safety threats (e.g., *Vibrio cholerae, Cryptosporidium parvum*)	Cholera, cryptosporidiosis
C: Potential, but not an immediate risk	Emerging-threat agents (e.g., Nipah virus, hantavirus)	

EEE = eastern equine encephalitis; HUS = hemolytic uremic syndrome; VEE = Venezuelan equine encephalitis; WEE = western equine encephalitis.

Effective Response

In the event of a widespread bioterrorism attack, nurses in all levels and types of health-care settings will likely become involved. To develop a prompt and effective response, nurses and other health-care providers must know the modes of transmission, incubation periods, symptoms, and communicable periods of these diseases, as outlined by the CDC.[11]

Identification and Management

Once a potential outbreak is detected, it must be brought to the attention of the appropriate health-care agencies or specialists in infective diseases. The CDC is always called in and may commandeer the hospital to prevent further spread of the biological agent. In cases of suspected bioterrorism, the CDC is given the authority of federal law enforcement personnel.

All nurses should have accurate around-the-clock information on the resources available for their geographic area. Once appropriate notifications have been made, nurses will use their skills of clinical evaluation and history taking to identify the infective organism, mode of transmission, and source of exposure. In addition, nurses have a critical role in managing postexposure prophylaxis and its complications, as well as psychological and mental health problems brought on by the event.

What Do You Think?

Have you received any specialized training in disaster or bioterrorism preparedness? If you have, how does it make you better able to care for victims of disaster or bioterrorism? If you do not eventually receive this

training, is it something that you think is important enough to seek out on your own? Do you feel prepared to care for these victims?

Response Training

The ACEP, in alliance with the ANA, submitted a list of recommendations to the U.S. Department of Health and Human Services (DHHS) Office of Emergency Preparedness in April 2001. One of the recommendations is that all basic nurse education programs include information on how to respond to mass casualty events. The task force also recommended that self-study modules and other types of specialty programs be developed for ED nurses to provide more in-depth information on the detection and management of bioterrorism.

> *"Since 9/11, the need to protect a vulnerable American population from further terrorist attacks has become an acute public health issue."*

The ANA is actively involved in developing ways to better prepare nurses to respond to bioterrorist events. In collaboration with the DHHS, it established the **National Nurses Response Team (NNRT).** This joint effort was unveiled at the ANA's 2002 biennial convention. These teams have been deployed to numerous disaster sites over the past decade, including Hurricane Harvey in Texas and Hurricane Irma in Puerto Rico in 2017.

Activation and Deployment

In the event that the president declares a bioterrorism state of disaster, the NNRT will be activated to respond by providing mass immunization or chemoprophylaxis to a population at risk. The NNRT, under the auspices of the DHHS, will be quickly deployed in response to a major national event.

The goal of the ANA and federal officials is to recruit 10 regional teams of 200 nurses. The ANA is working to recruit these nurse teams and will provide ongoing education to the NNRT in disaster response. The DHHS is responsible for the screening and processing of potential nurse team members after they have been recruited by the ANA.

When the NNRT is deployed, the members become "federalized," and the federal government pays their salaries, reimburses them for travel, and covers their housing costs during the duty period. In case of a terrorism disaster, the deployment is limited to 2 weeks to minimize the impact on the nurses' employers.

The public depends on nurses to be the frontline responders and to protect them from the effects of bioterrorism. Nurses must be able to communicate medical information and educate the public quickly after a crisis. It is imperative that the nursing profession train nurses in appropriate, effective responses to ensure the best outcome in a frightening, unfamiliar event.[13]

MEDICAL RESERVE CORPS

Nurses interested in working with disaster victims might want to consider joining the **Medical Reserve Corps (MRC),** sponsored by the office of the Surgeon General of the United States. The MRC is a national network of local response units of volunteers committed to improving the health, safety, and resiliency of their communities, and anyone can join. The largest single group of volunteers in the MRC is nurses. Each MRC unit is organized and trained to address a wide range of challenges, from public health education to disaster response. The training is specific for the types of disasters that are seen in the units' communities and range from setting up aid stations and administering immunizations to the aftercare of displaced elderly victims. After a nurse volunteer has been trained and certified, he or she can respond to a variety of different types of disasters, including those that are out of state. Normally, nurses are not allowed to practice nursing in states in which they are not licensed, but because MRC certification is national, states have agreed to allow certified nurses who are unlicensed in a state to practice within their boundaries during disaster events. State boards of nursing also have the power to allow nurses not licensed in their

states to practice in case of disasters, and the State Compact Law allows nurses to practice in other states if they belong to the agreement.

CHEMICAL WEAPONS

Although the Chemical Weapons Convention (CWC) of 1993 banned, under the legal threat of punishment, the worldwide production, stockpiling, and use of chemical weapons, a number of countries, including the United States, maintain large, aging stockpiles of these horrific weapons. Their storage and use is generally rationalized as a means of defending the country against attack from a hostile aggressor.

Definition

Chemical weapons (CW) are generally defined as devices that use any one of a number of chemicals mixed in such a way as to inflict death or harm to human beings. CWs, along with biological and nuclear devices, are generally known as *weapons of mass destruction* (WMDs). CWs take many forms, including gases, liquids, and solids, that often kill or destroy targets other than the one intended.[14]

Toxins are poisonous chemicals usually produced by living organisms and as such might be considered biological. However, toxins are addressed by the CWC because they act and are treated like chemicals and because they can be and have been used as chemical weapons. Two toxins, ricin and saxitoxin, are in fact explicitly listed in Schedule 1 and are among the deadliest CW agents available. In addition, a large number of toxins can be synthesized in laboratories without resorting to the organisms or plants that produce them in nature. A number of toxins are also synthetic dual-use chemicals, meaning that under the CWC, amounts needed for legitimate activities are permitted.[14]

There are two general classes of CWs—unitary and binary agents. Unitary chemical agents are effective by themselves and do not require any other substances to be mixed with them to make them lethal. These agents are highly volatile (unstable and return to a gas state quickly) and are the types of agents most commonly stockpiled by nations in their weapons arsenals and preferred by terrorists.

Binary CWs become lethal only when two relatively nondangerous chemicals are mixed together to create a third dangerous chemical. These are more difficult to manufacture and more complicated to activate. Binary CWs were primarily developed by the Soviet Union during the Cold War but are now available to most countries on the black market. These chemical agents often have Russian names such as Novichok or letters and numbers such as M687, GB2, or A234. These CWs are almost always potent nerve agents, some five times more potent than VX. Although difficult to weaponize to produce mass casualties, this type of CW has been used in recent years to assassinate North Korean leader Kim Jong-un's half-brother Kim Jong-nam in 2017 and to almost kill Sergei Skripal and his daughter Yulia Skripal in England in 2018. Quick treatment saved the Skripals' lives; however, they had a long recovery period and have residual neurological damage. A234 is so toxic that two hotel workers became sick from its residue months after the Skripals were initially poisoned.[14]

The reason airline passengers must limit the liquids they carry on board to 3-ounce increments is also related to CWs. Terrorists in Great Britain in 2006 plotted to use binary agents poured into shampoo bottles and then mixed when they were on the plane with the intention of bringing down international flights.[15]

Horrific Results

The first widespread military use of CWs was in Europe during World War I. The injuries caused by them were so horrific that, although most major countries now have stockpiles of these weapons, they have been very reluctant to use them. The Japanese used CWs against the Chinese at the beginning of World War II, but after seeing the effects, they decided to discontinue their use. The Aum Shinrikyo cult used sarin, a deadly colorless, odorless nerve gas, on a Tokyo subway in 1995, killing 12 people and injuring more than 5,500.[13] In addition, Saddam Hussein used CWs against the Kurds in the northern part of Iraq, killing thousands of people. Parts of the country became a chemical desert because CWs annihilated all living things and made the area uninhabitable for decades due to contamination of water and food supplies. The half-life of certain CWs is decades.[13]

In 1997, the U.S. Senate ratified the United Nation's CWC, a global chemical-weapons ban treaty signed by more than 80 nations. However, terrorist groups do not abide by treaties and, because of the horrific effects and great fear generated by CWs, may wish to obtain and use them.

> *"Many CWs kill in a matter of minutes; others can take hours or even days, providing the victims with a chance of survival if quickly decontaminated and treated with the appropriate antidote if one is available."*

Letters sent to the U.S. president and several high-ranking government officials in the spring of 2013 were laced with ground castor beans, the key ingredient in the deadly poison ricin; however, they were intercepted before they could cause any harm. More recently, CWs were used in Syria in 2018 by the Russian-backed Syrian government against a rebel group in Douma. More than 50 people were killed and an unspecified number injured.[14]

Since the September 11, 2001, terrorist attacks on America, the threat of chemical weapons has become a concern for both citizens and the government. The government has made preparations to protect the population against CWs and has created a plan for action in response to a CW attack. However, the technology used to produce CWs is widely available, and key chemicals are available at tens of thousands of chemical-manufacturing plants throughout the world.

Types of Chemical Weapons

The three major groups of CWs are nerve agents, blister agents, and choking agents. They are generally dispensed as aerosols, liquids, or vapors that enter the body through the eyes, lungs, or skin. There are also blood agents, which are inhaled. The overall effectiveness of any CW depends on how old the agent is, its purity, weather conditions such as temperature and humidity, the strength and direction of the wind, the size of the environment where they are released, and how they are introduced into the environment.[13]

Many CWs kill in a matter of minutes; others can take hours or even days, providing victims with a chance of survival if they are quickly decontaminated and treated with the appropriate antidote if one is available. Although symptoms vary depending on the class of agent, some general symptoms to look for include immediate failure of the respiratory or nervous system (paralysis), severe skin irritations and blisters, headaches, irregular heartbeat or palpitations, vomiting, and convulsions (Table 26.2).

Table 26.2 **Classes of Chemical Agents**

Nerve Agents	Blister Agents	Respiratory Agents
Tabun (GA)	Sulfur mustard (Yperite) (HD)	Phosgene (CG)
Sarin (GB)	Nitrogen mustard (HN)	Diphosgene (DP)
Soman (GD)	Lewisite (L)	Chlorine (Cl)
Cyclosarin (GF)	Phosgene oxime (CX)	Chloropicrin (PS)
Methylphosphonothioic acid (VX)		

"G" or "G Series" stands for gases developed by Germany during WWI and WWII. The second letter seems to be associated with the relative order of development (A before B). "V" or "V Series" stands for gases in the "venomous" category (no relation to snakes). The "X" has no particular significance. The "V" gases were developed in Great Britain. "H" in the H Series gases most likely stands for "Hun Stuff" (Hun as a slang term for German). "C" or "C Series" stands for chlorobenzalmalonitrate, which is one of the cyanocarbon or cyanide related poisons. The second letter doesn't seem to have any significance. "P" in PL is just a military designation for the substance.

Nerve Agents

Nerve agents are among the most toxic of all CWs. They are particularly deadly when released in an enclosed area such as a subway train or an airplane. These agents were initially developed just before World War II for the purpose of controlling insect infestations on farms. Chemically related to the organophosphorus insecticides that are in wide use today, they work by inhibiting the production of acetylcholinesterase throughout the nervous system and causing paralysis of smooth muscles. German scientists of the 1930s soon recognized the lethal potential of these chemicals and began producing concentrated, weaponized forms of these substances that could be used on the battlefield and in the gas chambers of the concentration camps.[15]

Causing an excessive accumulation of acetylcholine in the nerve endings of the parasympathetic system, nerve agents inhibit the smooth muscles all along the vagus nerve (cranial nerve X), including the iris of the eye, ciliary bodies in the bronchial tree and gastrointestinal tract, bladder, and blood vessels. They also paralyze the salivary glands and secretory glands of the gastrointestinal tract, the respiratory tract, and eventually the cardiac muscle tissue. Although respiratory symptoms are generally the first to appear after inhalation of nerve-agent vapors, gastrointestinal symptoms are usually the first to appear if the agent is ingested. The early symptoms often mimic a heart attack, manifesting with tightness in the chest, shortness of breath, elevated blood pressure, and abnormal heart rhythms. As the effect of the toxin becomes more systemic, the victim experiences increased fatigue and generalized weakness, which increases with activity. Soon after, involuntary muscular twitching, scattered involuntary muscle contractions, and intermittent muscle cramps develop. The skin may be pale due to vasoconstriction. Left untreated or treated too late, nerve agents lead to organ failure, complete shutdown of the nervous system, and death.[13]

The primary treatment is immediate decontamination and the administration of atropine sulfate IV as soon as possible. Atropine blocks the effects of the parasympathetic system and helps breathing by drying secretions and dilating the airways. Atropine also suppresses other symptoms of nerve agents, including nausea, vomiting, abdominal cramping, low heart rate, and sweating. Atropine, however, does not prevent or reverse paralysis. Another medication, pralidoxime chloride, may also be given. It belongs to a family of compounds called *oximes* that bind to organophosphate-inactivated acetylcholinesterase, thereby "regenerating" or "reactivating" acetylcholinesterase and allowing the synapses to function again.[14] Unfortunately, if it is not given soon after exposure, it may not be able to break the molecular bonds in the synapse, and it will be ineffective. The combination injection DuoDote (administered via an antidote treatment nerve agent, auto-injector [ATNAA]) includes both atropine and pralidoxime chloride. If treated early, the serious signs and symptoms of nerve-agent toxicity rarely last more than a couple of hours.

Generally, if the victim survives the initial exposure and peak toxic effects, the symptoms disappear within 1 day, and the survival rate is excellent. Victims who were exposed but show no symptoms are usually observed for at least 18 hours because some signs and symptoms can present later.

Blister Agents

Blister agents, sometimes called *vesicants*, burn and blister the exposed skin on any part of the body they contact. With enough exposure or if inhaled in large quantities, they can kill people, but they are more often used to produce large numbers of serious casualties that need extensive care, thus diverting resources needed for fighting. These agents also force the enemy to wear full protective equipment, making their ability to fight more cumbersome and less effective. When thickened and applied to land, ship decks, or the surfaces of aircraft or vehicles, blister agents become a persistent hazard that makes it challenging to defeat enemies.[15]

Although exposed skin is usually the first area of the body affected, blister agents also can cause major damage to the eyes, mucous membranes, linings of the lungs, and blood-forming organs (thymus, bone marrow, spleen, lymph nodes). In addition, when ingested, they cause vomiting and diarrhea. The most feared and oldest of the blister agents is mustard gas. It is easily made, very stable chemically, and remains dangerous on surfaces almost indefinitely; there is no effective treatment for it even today, making it hard to decontaminate.[13] Mustard gas was first used in World War I, and the gruesome burns it produced frightened even the soldiers who released it.[15]

Exposure to mustard gas is not always immediately evident because of the latent and symptom-free period that may occur after skin exposure. This may result in delayed decontamination or failure to

decontaminate at all. However, this agent must be removed from the skin quickly and efficiently. After even as little as a 2-minute exposure, a drop of mustard gas on the skin can cause serious blisters and burns.

Initial treatment, as with all chemical agents, is immediate decontamination. Chemical chlorination has proven somewhat effective in disabling mustard gas and several other of the blister agents. There is no practical drug treatment available for preventing the internal effects of mustard gas. Infection is the most serious complication after exposure to blister agents. Although there is little agreement on the best way to treat exposure to blister agents, most mustard gas victims survive but have protracted and painful recovery periods with the need for multiple skin grafts.

Choking Agents

Choking or respiratory agents work by attacking the tissues of the lungs and produce massive pulmonary edema. The most dangerous of this group of toxins, phosgene, is the one that terrorists are most likely to use. Phosgene was used for the first time in 1915, and it accounted for 80 percent of all the deaths attributed to CWs during World War I. Initial symptoms include coughing, choking, a feeling of tightness in the chest, nausea and occasionally vomiting, headache, and excessive tear production.[16]

> *"Decontamination of the victims as soon as possible is essential to reducing their exposure to the toxins, as is providing appropriate medical treatment, such as specific antidotes, that will increase their chances for survival."*

When phosgene is delivered in very high concentrations, a painful and agonizing death can occur within several hours. With lower concentrations, death usually occurs in 12 to 24 hours. There is no specific antidote or treatment. Respiratory support by ventilation with positive end-expiratory pressure (PEEP) can usually maintain adequate oxygenation of the body. Use of osmotic diuretics can reduce the fluid load in the lungs. Other supportive measures commonly used for persons in pulmonary edema may be helpful. If the victim survives the initial exposure, he or she will usually begin to recover within 48 hours, although there may be permanent lung damage. Respiratory infection is the major complication. If victims survive longer than 48 hours, they usually make a full recovery.[16]

General Principles of CW Preparation

In reality, many of the measures used by nurses and first responders for preparation and protection for bioterrorism are also effective with CWs. It is imperative that nurses and emergency personnel wear personal protective suits when dealing with chemical contamination due to the persistent nature of some of the agents. Decontamination of the victims as soon as possible is essential to reducing their exposure to the toxins, as is providing appropriate medical treatment, such as specific antidotes, that will increase their chances for survival.[13]

Personal Protective Equipment

First responders and ED personnel are at serious risk for exposure to chemically contaminated areas (known as *hot zones*). The victims themselves automatically become hot zones, and the hot zones can move if the victim is not completely decontaminated. If first responders are unprotected, direct contact with the CW or inhalation of vapors automatically makes them victims as well. If a liquid chemical agent was used, handling the skin and clothing of victims exposes rescue personnel to the same chemical.[13]

Full level D hazardous material (hazmat) suits should be worn until the source of contamination has been completely eliminated. A hazmat suit is an impermeable whole-body garment that is worn as protection against a variety of hazardous materials. To protect against chemical exposures, these suits are made of barrier materials such as Teflon, heavy PVC plastic, corrosive-resistant synthetic rubber, or Tyvek (a brand name for cloth made from flash-spun high-density polyethylene fibers). These suits can cost anywhere from $150 to $1,500 each and are almost always destroyed after use.[17]

High-level suits have self-contained, filtered breathing systems to eliminate any exposure to airborne toxins. These are similar to the suits used for bioterrorism, except that they are more resistant to the corrosive effects of some chemical agents. Also, biological protective suits must have fully sealed systems and positive-pressure breathing systems to prevent entry of the biological agent, even if the suit is punctured or torn. Although hazmat suits are used primarily by firefighters, researchers, personnel responding to toxic spills, specialists cleaning up contaminated facilities, and workers in toxic environments, most health-care facilities have them available for personnel who are likely to come into contact with hazardous chemicals.[17]

Decontamination

Decontamination is the physical and chemical removal of toxic agents from people's skin, clothing, equipment, and any environmental surfaces where the agents were disseminated. Hazardous chemicals remaining on clothing, skin surfaces, and even in the respiratory system can be a source of exposure to others.[13] This is called *secondary exposure* and is the most common type of exposure experienced by first responders and ED personnel. Immediate decontamination is a major treatment priority for those with CW exposure. It should include the following:

- Removing all contaminated clothes and jewelry from the victim and washing the unclothed body thoroughly with warm water and soap.
- Avoiding the use of very hot water and vigorous scrubbing because these may actually force more of the chemical into the skin.
- Decontaminating all victims who have been exposed, even if it is unknown whether the agent was a vapor or liquid. Vapor exposure alone may not require decontamination; however, some vapors cling to clothing and skin and can be inhaled from these surfaces.
- Decontaminating victims as close as possible to the site of exposure. This minimizes the time of exposure and prevents moving the hot zone to another area. Most hospitals that are certified to treat chemical exposures have policies and procedures about where victims may be decontaminated. Usually, it is an area outside the ED, where a tent is erected to perform initial decontamination before people and equipment are allowed entry into the hospital. Portable decontamination equipment with showers and runoff water collection systems are commercially available. Some larger facilities have in-house decontamination areas with showers, special ventilation, and various decontamination rooms. All hospitals should have the capacity to safely decontaminate at least one person at a time.[18]

> *"It is more likely that any individual would be exposed to a chemical agent from an industrial or vehicular accident."*

Supportive and Specific Therapy

Health-care providers should follow the ABCs of emergency care: airway, breathing, and circulation. Keeping the airway open and making sure victims are able to breathe or are well oxygenated is always the first priority. Intubation and oxygen delivery equipment must be available. Until the specific agent is identified, health-care providers should treat the most serious and life-threatening symptoms first. However, laboratory tests used to identify specific chemical agents are not available in all hospitals. Confirmation of the chemical agent may take several hours or even days. Once the agent has been identified, specific antidotes known to be effective should be used.

The CDC is the authority on chemical weapons and their treatments. It has information on treatment options and a decision tree that can be used for determining what treatments are most likely to be successful.

The Odds Are Good

Realistically, the chances of being exposed to CWs or chemical agents in the United States is miniscule. Although some terrorist organizations have been successful in obtaining and releasing chemical agents, the

reality is that making effective delivery systems is extremely difficult. It is more likely that an individual would be exposed to a chemical agent from an industrial or vehicular accident. Numerous chemical factories across the nation are creating chemical toxins that are more deadly than any ever used in weapons. Because of the volatile nature of the chemicals they make, these chemical factories can explode from time to time and spread the toxins over wide areas. In addition, toxic chemicals are regularly shipped by trains and tractor-trailers to all parts of the country. It is not unusual to see a train accident where the large black tank cars lie broken on their sides near a populated area. The chemicals these cars contain are often highly toxic.

Dangerous Aging Weapons

More concerning are the aging stockpiles of chemical weapons owned by the U.S. military. Many of these weapons were manufactured more than 70 years ago and put into containers made to last only a few years. Binary weapons become even more dangerous with age because the barrier separating the two chemicals is designed to rupture either on impact or as a result of a detonator. Because of the corrosive nature of these chemicals, many of the containers are developing leaks, exposing personnel to the toxic agents. The only sure way to dispose of these toxins is to burn them at extremely high temperatures, 2,500°F to 3,000°F, reducing them to their basic elements and rendering them harmless. Unfortunately, only a few disposal plants for chemical weapons exist in this country. Disposal of the many aging chemical warheads would require shipping them cross-country by rail or truck to the disposal sites. The dangers of accidents and widespread contamination make this method of eliminating them very dangerous. Some companies have developed large “indestructible” stainless steel tanks located in stable underground salt caves that can theoretically keep these weapons in safe storage for centuries. Unfortunately, no one knows for certain how safe these tanks and salt caves really are.

Nurses must be prepared to deal with all types of disaster. Education for disaster preparedness needs to start in nursing school and continue throughout each nurse’s career. It is highly unlikely that a nurse would not experience some type of disaster during his or her career. Knowledge and skills development are the best preparation.

Issues Now

Disaster Preparedness for … Scams?

After disasters, scam artists show up like flies at a picnic, and there are as many different scams as there are flies. The Better Business Bureau has dubbed these scam artists “storm chasers” because they show up after every major storm or disaster. (By the way, scammers like to use business cards that say “Approved by the BBB.” Although BBB *can* stand for Better Business Bureau, unless the name is spelled out, the letters probably stand for something else—Big Blue Buttons, Big Best Barbeque, or maybe Bob’s Best Bikes).

There were so many scams after Hurricane Katrina in 2005 that the Department of Justice created a new agency, the National Center for Disaster Fraud, a central information clearinghouse for more than 20 federal agencies where people can report suspected fraudulent activities tied to disasters of all types. If you are the victim of a disaster, here are some things to keep in mind to avoid being scammed:

- There are *never* fees to apply for FEMA or Small Business Administration (SBA) assistance or to receive property damage inspections. If someone is asking for money, it is a scam.
- Utilities do not charge for turning *off* services. Some charge a small fee for turning them back on, although in disaster situations, they often waive the fees.
- If someone claims to be from the government, always ask to see a government-issued photo ID and take a picture of it with your cell phone. In fact, they should volunteer to show you an ID.
- Business cards *are not* official IDs. With all the online, do-it-yourself business card companies these days, it is very easy to make professional-looking business cards that say just about anything.
- Government workers or people associated with government agencies will *never* ask for payment to perform their duties or offer to increase your assistance grant for a fee.
- If private insurance adjusters and local building code inspectors visit your property, they too should provide identification on demand. They do not charge fees.

- *Never* hire a laborer or contractor on the spot; good ones do not need to solicit work door to door. Also, check with your neighbors to see if they suffered damage similar to what is being cited at your place.
- For major repairs, get at least three estimates based on the same specifications and materials. Check the references, licensing, and registration information of all contractors with the National Association of State Contractors Licensing Agencies (NASCLA), and read reviews posted by the Better Business Bureau.
- Require written contracts that specify work to be done, materials to be used, start and end dates, responsibility for hauling away debris, and costs broken down by labor and materials. Verify that the contractor's name, address, phone number, and license number are included, as well as any verbal promises and warranties.
- *Never* sign a contract that contains blank spaces. Unscrupulous contractors sometimes enter unacceptable terms after the contract is signed.
- *Never* give out Social Security numbers, credit card numbers, bank account numbers, or personal information about your finances. Employees of legitimate organizations will never ask for them.
- Read the fine print. Some shady contracts include clauses allowing substantial cancellation fees if you choose not to use the contractor after your insurance company has approved the claim. Others require you to pay the full price if you cancel after the cancellation period has expired.
- Ask your contractor to provide proof of his or his company's current insurance that covers workers' compensation benefits, property damage, and personal liability. Depending on the size of the job, you may want a performance bond, which protects you if work is not done according to the contract. Contractors do not like to get these.
- You will probably be asked to pay an upfront deposit to cover initial materials—one-quarter to one-third is reasonable upon delivery of materials to your home and once work begins. Get a signed receipt for the money you paid.
- Never pay in full in advance, and do not pay cash. Have the contract specify a schedule for releasing payments, and before making the final payment, ask the contractor to provide proof that all subcontractors have been paid—if they have not been paid, you could be liable for their fees.
- If you suspect anyone—whether an inspector, contractor, disaster survivor, or someone posing as one—of fraudulent activities in relation to a natural or man-made disaster, call FEMA's toll-free Disaster Fraud Hotline at 866-720-5721 or local law enforcement officials.
- If it sounds too good to be true, it probably is.
- If someone uses high-pressure sales tactics, requires full payment up front, asks you to get necessary permits, or offers to shave costs by using leftover materials from another job, it is a scam.

We generally think of older people as being most susceptible to scam artists, but these crooks are so slick that anyone can fall for their sales pitches. They know that people who are under stress are much more vulnerable to scams than those who feel secure. Many postdisaster victims have a mild form of posttraumatic stress disorder (PTSD) that may last for many months or even years after the disaster. Making people aware of scams, although not usually thought of as a nursing function, certainly falls into the category of caring.

Sources: T. Jackman, Fraud inevitably follows disasters, so authorities in Texas, Florida prepare for post-storm scams, *Washington Post*, 2017, retrieved from https://www.washingtonpost.com/news/true-crime/wp/2017/09/08/fraud-inevitably-follows-disasters-so-authorities-in-texas-florida-prepare-for-post-storm-scams/?utm_term=.7d918a33f; S. Kirchheimer, Post-disaster scams: Fallout fraud from Hurricane Harvey (and future catastrophes) [blog post], AARP, 2017, retrieved May 2018 from https://blog.aarp.org/2017/08/29/post-disaster-scams-fallout-fraud-from-hurricane-harvey-and-future-catastrophes.

Issues Now

Intruder Safety

It is a sad commentary on the status of our society that we even have to have this topic in a nursing text. However, the reality of today's life is that unstable and extremely dangerous individuals have relatively easy access to a wide range of deadly weapons. What can you do to help keep yourself and others safe?

Be Aware of Suspicious Activity or Persons

Situational awareness involves, *at all times,* looking around you where you are, being observant, and noticing any unusual or suspicious objects, people, or behavior. What might make someone or something suspicious includes, but is not limited to, the following:

- Unusual items or situations:
  - A strange vehicle is parked in an unusual location.
  - A package is left unattended in a strange place.
  - A window or door that is usually closed is open.
  - Other out-of-the-ordinary situations.
- Eliciting information:
  - A person unknown to you asks questions at a level beyond normal curiosity about a building's purpose, operations, security procedures, and/or personnel.
- Observation or surveillance:
  - A stranger seems to pay unusual attention to facilities or buildings beyond a normal interest.
  - A person loiters for a lengthy period of time without explanation (particularly in concealed locations).
  - Unusual, repeated, and/or prolonged observation of a building or personnel (e.g., with binoculars or video camera).
  - Someone is taking notes or measurements, counting paces, sketching floor plans, and so on.

Types of Intruders

There are several different types of intruder situations, and each one requires a somewhat different response on your part. These include the unarmed intruder outside a building, the unarmed intruder inside a building, the armed intruder inside a building who wants to commit robbery only, and the active shooter either inside or outside a building.

Unarmed Suspicious Person Outside a Building

This is a person who is just walking around the property, maybe trying doors to see if they are open or looking in or pushing on windows.

- Evaluate the situation:
  - How big is the person?
  - How big are you? (Size really does matter here!)
  - How threatening does he or she look?
  - How comfortable are you with approaching him or her and asking questions?
- If you feel uncomfortable at all approaching the person:
  - Call security or 911 right away.
  - Tell security or 911 who or what you saw, providing as much detail as possible:
    - Description of the person (approximate height, weight, and age; clothing; hat; facial hair; distinguishing marks)
    - The time when you saw him or her
    - Where the suspicious person was
    - What he or she was doing/why the person seemed suspicious to you
    - Whether the person is still there
    - If not, in what direction he or she went
- If you feel comfortable approaching the person:
  - Approach him or her slowly.

- Keep a safe distance (at least his or her arms' length) away
- Ask nicely, "Is there something I can help you with?"
- Do not be confrontational.
- If the person says something such as "I need to talk to …," or "My car is out of gas," direct him or her to the person he or she is looking for or to the nearest gas station.
- Do **not** give the person money.
- If you can approach the person from inside your car, it is much safer.
- If the person runs away as you approach, call security or 911.
- If they are threatening, hostile, or aggressive, back away and call 911.
- If he or she is still hanging around after a period of time, call security or 911 and report a suspicious person. The police will come and investigate.

Unarmed Intruder Inside a Building

- Your response will depend somewhat on what building you are in, the time of day, and whether any other people are with you.
  - If you are by yourself and it is after the usual hours for the building to be open, call security or 911 immediately. The intruder should not be in there.
    - Provide the information listed previously.
    - Seek a safe place or room that can be locked from the inside and barricaded.
    - Wait quietly until police arrive.
    - Do not argue with, try to talk to, or chase the intruder. He or she is trespassing, and that is a crime.
  - If you find a suspicious stranger in a building during normal operating hours, use the process outlined under Unarmed Suspicious Person Outside a Building.
    - If the person has a legitimate reason for being there, direct him or her to the appropriate location for help.
    - If you encounter any type of resistance or hostile response, leave the area immediately and call security or 911.
  - Because colleges can be open at unusual hours for night and weekend classes and other events and because we actually want people to attend these, it may be more difficult to identify an unwanted intruder on campus.
  - *Security personnel:* If there are security guards, they are the frontline responders in identifying suspicious individuals, but it is everyone's responsibility to be vigilant.
- Look for any unusual behavior that might indicate the person has issues, including pacing, shaking, twitching, uneven or unsteady gate, crying, angry or loud outbursts, temper tantrums, swearing, or emotional language. If you are by yourself:
  - Stop the person near the doors if possible and ask if he or she needs help.
  - If the person responds aggressively, call security or 911 immediately.
  - Do not argue with the person.
  - Do not attempt to restrain or force the person out of the building.
  - If the person is walking around in the building, follow him or her at a safe distance until the police arrive.
  - Remain calm and in control—confrontation always increases anxiety.

Armed Intruder Inside a Building Who Wants to Commit Robbery Only

- In general, these intruders do **not** want to hurt anybody. They want to get money or loot and then get out.
- They will use their weapons if they encounter resistance or if any attempt is made to overtake them.
- The goals in dealing with these people are to prevent the injury or death of anyone and to get the intruders out of the building as quickly as possible.
  - Remain calm. These people are already anxious because of what they are doing. Your nervousness will only escalate their feelings.

- Follow their directions.
- Do not talk to them at all.
- Do not stare at them or look them directly in the eyes—these actions can be interpreted as acts of aggression.
- Do not argue, threaten, or try to reason with them.
- Give them what they want. Are the contents of your wallet worth your life?
- Try to memorize what they look like, what they are wearing, and other details.
- Call security or 911 when they are gone—calling when they are still present may cause them to discharge a weapon or may produce a hostage situation if law enforcement arrives before they leave.
- Try to observe what the vehicle they are driving looks like and which direction it goes when they leave.
- If you have your own weapon, *leave it where it is!* Nothing precipitates gun violence more than another gun.

Active Shooter

- This is a relatively new phenomenon in society and one of the most lethal ever.
- An average of 16.4 active shooter incidents occur each year in the United States.
- These intruders seek to kill as many people as possible.
- They will likely keep shooting until they are out of ammunition or are stopped.
- Many are suicidal and want to die themselves, often committing "suicide by cop."
- Active-shooter incidents are unpredictable and can occur at any time or place, although they are more common when a group of people is gathered together in one place, such as a church service, a lecture hall, or a movie theater.
- Dealing with active-shooter incidents requires a radical shift in thinking and acting that may seem counterintuitive at first.
- The reality is that people are going to die, and the goal is to reduce that number as much as possible.
- The one and only goal is your personal survival.
- The goal of law enforcement is to neutralize (disarm or kill) the shooter as quickly as possible.

How to Respond to an Active Shooter Incident

- An active-shooter incident at college is most likely to occur in an area where a large number of people are congregated (cafeteria, meeting room, etc).
- Active-shooter incidents are often over within 10 to 15 minutes, which may mean they are over before law enforcement arrives on the scene.
- All individuals must be prepared both mentally and physically to deal with an active-shooter incident and do whatever it takes to survive.

Actions for Responding to an Active Shooter Situation

- Be aware of your environment and any possible dangers.
- Note where the two nearest exits are located in any facility you visit.
- When an active-shooter event begins, you will hear gunshots (people describe it sometimes as the sound of firecrackers going off or of a car backfiring). You may hear the shooter yelling and the screams of the victims.
- If someone has already been shot, do **not** listen to or follow the shooter's commands. This person is there only to kill people. If he or she tells you to freeze and you do, you become an easy target.
- Try to determine as quickly as possible the shooter's location and run in the opposite direction toward an exit.
- **GET OUT OF THE BUILDING** is the golden rule for survival of an active-shooter event. When you are out, do not stop—just keep going.

- If law enforcement is present when you are coming out, raise your hands over your head and spread out your fingers.
- Leave your belongings behind. The shooter does not want them.
- Do **not** try to drag wounded persons out of the building. You both become slow-moving targets.

- The first person out the door should call security or 911. Tell them your location and use the term "active shooter." All police agencies have had some type of training in active-shooter situations, and the term will trigger a rapid response.

  Never go back in the building while the shooter is still active.
  - Hiding in-place has been shown to be the *least effective* action for survival. You just become a stationary target if you are under a desk or behind a table. You are much harder to hit if you are running.
  - Do not try to hide in a closet or bathroom unless the door can be securely locked and barricaded with something besides a person's body.
  - Stay away from the door. An AR-15, the weapon of choice for active shooters, can easily shoot through a 2-inch-thick solid wood door. It can also shoot the lock off with little difficulty. A 9mm semiautomatic handgun, the second-most favored weapon of active shooters, may or may not be able to shoot through a solid wood door depending on the type of ammunition being used. Hollow-core doors barely stop the pellets from BB guns.
- Make noise, scream, and create as much confusion as possible while running out of the building. This is exactly the opposite of what you do in the other intruder situations. The noise and motion may help disorient or distract the shooter.
- Fight back if you are relatively close to the shooter and cannot get away. Throw any objects you can get your hands on at the shooter's head. Hard or sharp items are best, such as textbooks, phones, and purse items. It is hard to shoot when you are dodging objects coming at your head.
- Run away from the shooter while throwing things.
- **If you are armed AND**
  - have a clear shot without risk of hitting other people,
  - are proficient with the weapon,
  - are close enough for a sure shot, **shoot to kill.**
- Keep shooting until the intruder is down and not moving or you are out of ammunition.
- Remember that if you miss, you will automatically become the shooter's primary target.
- The weapon the shooter is using must be reloaded periodically with a new magazine. This process takes a few seconds, but that is the best time to attack.
- As a *last resort,* attempt to physically take the active shooter down.
  - When the shooter is at close range and you *cannot* flee, your chance of survival is much greater if you attack and try to knock down and incapacitate the shooter.
  - Attack the shooter from behind—hit the back of the legs at the knee level. The shooter is focused on what is in front of him or her.
  - Swarm the shooter with one or two or more people, grabbing each of the intruder's arms and legs. Numbers increase the chance of success.
  - At least one person should grab the weapon with both hands, push the muzzle toward the floor, and yank it will all their strength.
  - Act as aggressively as possible against the shooter. Yell, scream, and growl—try to instill fear.
  - Be fully committed in body, mind, and soul to this action, or it will not work.
- If you do manage to incapacitate the shooter,
  - Remove the weapon and put it in a place out of reach and out of sight. **Do not hold it.**
  - Do whatever it takes to keep the shooter down until the police arrive—tie or tape the shooter's hands or legs, sit on the shooter, or render him or her unconscious.
- **When the police arrive, NEVER, NEVER, NEVER be holding a weapon!**
  - In an active-shooter incident, police are trained to shoot the person who is holding the gun.

    - Put your hands up, spread your fingers, and keep them visible at all times. Do not make any quick or sudden moves.
    - Follow the instructions of any police officers. Do not ask them questions, just follow directions.
- After the police have the shooter restrained and in custody and have finished their initial questioning of the bystanders, try to help the wounded.
- Nurses, health-care providers, and other emergency personnel can lead the way and direct others on what to do.
- By the mere fact that you were in the building at the time of the shooting, you are a witness. Law enforcement will want to question you and obtain your name and address. This may be completed later.
- Do not leave the site until the police say you can leave.

Sources: Active shooter preparedness. Homeland Security. Retrieved July 2019 from https://www.dhs.gov/active-shooter-preparedness; Active shooter. Ready.gov Retrieved July 2019 from https://www.ready.gov/active-shooter; Active shooter preparedness and response training for schools. AEGIS Security and Investigators. Retrieved July 2019 from http://www.aegis.com/active-shooter-preparedness-response-training-schools; Mass casualty shootings, National Center for Victims of Crimes, 2018, retrieved from https://ovc.ncjrs.gov/ncvrw2018/info_flyers/fact_sheets/2018NCVRW_MassCasualty_508_QC.pdf.

Conclusion

Nurses need to be prepared for all types of disasters, including bioterrorism, natural disasters, and chemical weapon exposure. The terrorist attacks of September 11, 2001, in New York City, Washington, DC, and Pennsylvania revealed how poorly prepared the United States was to deal with disasters. In response, legislation was enacted at federal and state levels that began to address the many issues associated with terrorist acts. Large sums of money were expended to purchase equipment and train healthcare workers to be better able to deal with a variety of potential disasters.

Collaboration between emergency-response groups has improved dramatically since 9/11. DHHS and the ANA have worked closely together to educate nurses in disaster and bioterrorism responses, and their efforts have been rewarded. Better preparation was demonstrated in the aftermath of the EF-5 Oklahoma tornadoes of 2013 than was evident after the EF-5 tornado of 2005, and the postdisaster phase of Hurricane Harvey in 2017 has been managed significantly better than the aftermath of Hurricane Katrina in 2005. However, there is still room for improvement, as the delayed, fragmented, and insufficient response to 2017's Hurricane Maria in Puerto Rico showed.[19] Nurses have dealt with disasters for many years in EDs and as first responders in the field. Most of their knowledge was accumulated on the job after years of experience. Nowadays, it is essential that the principles of disaster preparation and emergency aftercare be taught to nurses before they graduate from nursing school.

Critical-Thinking Exercises

- Obtain the policy and procedure manuals from your nursing school and your primary clinical location. Try to find the procedures for disaster preparedness (note that they are sometimes separate documents). Compare the school's and the facility's policies with each other and with the plan in this chapter. How do they compare? Where are the areas that need improvement?
- If you do not have a disaster plan or kit yet for your family, start putting one together. Involve your family in this activity so that everyone knows the plan and is aware of what is in the kit.
- Volunteer to work with your local Red Cross chapter. Write a report about what it does and how it is funded.
- Look up the word *acetylcholinesterase.* Prepare a short presentation to the class about how nerve agents affect the sympathetic and parasympathetic nervous systems. Explain why atropine is an effective antidote.