Responding to bioterrorism: basics for physicians and allied health-care providers.(Disease/Disorder overview)

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Abstract

Bioterrorism has become a buzzword causing apprehension, fear, and confusion. Using biological agents to poison food and/or water supplies, precipitate outbreaks of disease, and disrupt and overwhelm the health-care delivery system is thought to be a likely possibility.

This article provides relevant, practical, and logical information regarding same of the agents biaterrorists may use. The first patient exposed to a biological agent in a deliberate attack, instead of presenting at an emergency department, may present at a physician or allied health-care provider's office. It behooves all health-care providers to understand the basics of food-borne biological attacks and the biological agents that could be used to precipitate a deliberate outbreak of disease. This article presents symptoms of the diseases, vaccinations, treatments, and how to limit risk of exposure. It also provides recommendations for decontamination and what to do if you think you, your staff, or your office has been exposed to a biological agent.

Key Words: bioterrorism, biological agents, Category A, decontamination

Bioterrorism Versus Emerging Naturally Occurring Infectious Disease

Some of the diseases caused by bioagents occur naturally and may be seen in relation to various occupational/recreational diseases. In determining whether a biological attack has occurred, physicians and public health specialists investigate whether the disease is a normal occurrence for the particular geographic area. Infectious disease specialists will define whether the disease has occurred out of the natural season for its presentation or if the age of the infected individual is unusual. The investigation will determine whether there are multiple dusters of patients with similar clinical symptoms. These factors will assist in determining if a biological attack has occurred.

Other indications of an intentionally released biologic agent include an unusual temporal or geographic clustering of illness (i.e. persons who attended the same event or gathering) and patients presenting with signs and symptoms suggestive of an infectious disease (i.e. numerous patients with unexplained fevers or flu-like symptoms; increased cases of pneumonias, respiratory failures, and neuropathic disorders; the onset of unusual skin rash occurrences, etc.).

Biological Food Contamination

Food supplies may be targeted by bioterrorists. In 1984, the Bhagwan Shree Rajneesh Cult in Oregon cultured Salmonella in a basement laboratory. Members of the cult contaminated salad bars in grocery stores and restaurants. The goal was to keep enough voters away from the polls to affect the results of a local election. Over 700 cases of Salmonellosis were reported, however no deaths occurred. In 1996 in Dallas, Texas, a disgruntled lab technician fed her coworkers pastries laced with Shigella bacteria obtained from work. Several of her coworkers got dysentery. In May 2006, muffins containing THC, the psychoactive ingredient in Marijuana, sickened 15 teachers and 3 support personnel at a Dallas high school. There have been several recent incidents of serious abdominal complaints on cruise ships, and the cause of these symptom clusters is still under investigation.

Many of our states do not raise a significant portion of the food the residents eat. Foodstuffs must be stored and transported for distribution. Centralized food storage and large distribution centers may provide an easy target for opportunistic bioterrorists.

Diarrheal Diseases

Food contaminations symptoms are generally non-specific, including abdominal cramping and pain, diarrhea, and nausea. The diarrheal diseases are contagious when good personal hygiene is not practiced. Many are transferred through fecal-to-oral route. Good hand washing after defecation is important in limiting the spread of these diseases. There are no vaccines available for these diseases. Care is often only supportive. The very young or old are susceptible to complications, which are potentially fatal.

Once cultured by a bioterrorist, these organisms could be covertly applied to food supplies at distribution centers, restaurants, grocery stores, and local markets to precipitate a significant outbreak of diarrheal disease. Something as simple as using a plastic spray bottle to spread a disease organism over food supplies could easily contaminate grocery or salad bar items. The health-care delivery system and public health resources would be required to respond to a large-scale outbreak. Panic and a disruption in food distribution are likely results the bioterrorist desires.

Salmonellosis. This common, naturally occurring diarrheal disease is caused by a bacteria called Salmonella. The bacteria live in the intestinal tracts of humans and other animals including birds. Transmission occurs by eating foods contaminated with animal feces. Contaminated food usually looks and smells normal. Most persons infected with the Salmonella bacteria develop diarrhea, fever, and abdominal cramps 12 to 72 hours after infection. If a definitive diagnosis is required, laboratory analysis of the patient's stool will identify the Salmonella organism.

Salmonella infections usually resolve within 5-7 days and often do not require treatment unless patients become severely dehydrated or the infections spread from the intestines. Dehydration is treated with intravenous fluids. If antibiotics are required, gentamicin, trimethoprim/sulfamethoxazole, or ciprofloxacin are recommended.

There is no vaccine to prevent Salmonellosis. Thorough cooking kills Salmonella bacteria. Animal products should be well cooked and individuals should not consume raw or unpasteurized milk or other dairy products. Cooking surfaces, knives, and hands should be washed regularly during food preparation of animal products to avoid cross contamination. Frequent and thorough hand washing after using the bathroom is essential.

Shigellosis (Bacillary Dysentery). Shigella are a group of bacteria that cause shigellosis. Shigella infections can be acquired by eating contaminated food. Infected food handlers who fail to follow sanitary measures during food preparation or after using the bathroom may contaminate food. The food may also be infected if harvested from a field containing sewage. Drinking or swimming in contaminated water can also cause Shigella infections. Incubation occurs 1-4 days after exposure.

Most persons infected with shigellosis develop diarrhea, fever, and stomach cramps within 1 or 2 days of exposure. The diarrhea is often bloody. The disease usually resolves in 5-7 days, although for some patients, it may be several months before bowel habits are entirely normal. In some, especially the young or elderly, the diarrhea can be severe, requiring IV hydration. If required, diagnosis is made on laboratory examination of the infected patients' stool. Shigellosis can usually be treated with antibiotics, most commonly ampicillin, trimethoprim/sulfamethoxazole, nalidixic acid, and ciprofloxacin. Some Shigella bacteria have become antibiotic resistant, so judicious use of antibiotics is suggested. There is no vaccine for Shigella. Hand washing, attention to basic food safety precautions, and avoidance of potentially contaminated drinking water can limit the potential for infection.

Experts have identified Shigella as a concern in the post-Katrina hurricane evacuation environment. Evacuation centers house large numbers of people in one area. This increases the person-to-person contact and the likelihood of an infected person being present in the evacuation center. If toilet and hand washing facilities are inadequate for the number of people, maintaining hygiene may be difficult.

Hemorrhagic Colitis. This illness results from the ingestion of the Escherichia coli bacterium (E. coli 0157:H7 antigen type). E. coli is a bacteria strain that lives in the intestines of humans and animals and is norreally found in lakes, streams, and canals. The vast majority of E. coli strains are harmless. E. coli 0157:H7 is commonly found in the intestinal tract of cattle and is found in ground beef. However, cooking over 165 degrees Fahrenheit destroys the bacteria. Transmission is fecal-oral and has been noted in naturally occurring instances among toddlers in diapers.

The incubation period for E. coli 0157: H7 is 2-8 days after exposure with patients experiencing significant abdominal symptoms. Treatment is usually supportive. The organism is sensitive to antibiotic therapy; however, the use of antibiotics does not seem to significantly improve symptoms. Basic food safety precautions and personal hygiene are important means to avoid infection.

E. coli bacteria were measured in flood waters after Hurricane Katrina. The E. coli bacteria detected were not the 0157 strain. However, individuals should be instructed to leave any areas contaminated with sewage.

Toxins

Toxins are naturally occurring poisons produced by living organisms such as bacteria, fungi, plants, and animals. These natural toxins can be more toxic and lethal than many synthetic toxins. They are usually odorless and tasteless, which makes them desirable to bioterrorists.

Botulinum Toxin. There has been a recent emphasis in the media on this very potent toxin and its associated benefits in the cosmetic surgery arena. Botulism toxin is produced from the anaerobic Clostridium botulinum organism. The toxin can be dispersed by ingestion, inhalation, or injection. There is a vaccine available through the CDC; however, it must be given prior to exposure. The known natural route of exposure is from the ingestion of improperly processed, canned, or smoked meats. Botulism toxin is a nerve toxin that affects the nervous system 12-36 hours after exposure; clinical features include headache, fatigue, dry mouth, and nausea if ingested. Experts note cranial neuropathies including blurred vision, diplopia (double vision), ptosis (drooping eyelids), weakened jaw clench, and difficulty speaking and swallowing.

Flaccid paralysis occurs, beginning with the eyes and progressing symmetrically downward, proximal to distal, leading to respiratory paralysis if the chest muscles and diaphragm are involved.

In cases of ingestion exposure, if the suspect food is still in the gut, induced vomiting may prove useful. Potentially exposed clothing and skin should be washed thoroughly with soap and water and decontaminated with a bleach solution. The CDC maintains a supply of antitoxin against Botulism. Treating progressive cases includes ventilator support. Death is usually a result of asphyxia.

Ricin. This toxin is made from Castor beans. In 1995, Canadian authorities arrested an Arkansas man who was trying to bring Ricin powder across the border. The man hung himself in his jail cell after his arrest. In 2003, employees at a South Carolina mail processing facility discovered an envelope with a threatening note and a sealed container. The note threatened to poison water supplies. An analysis confirmed the presence of Ricin in the container. Authorities intervened and the resulting investigation determined that no persons exhibited symptoms of Ricin exposure.

Ricin exposure usually indicates a deliberate act of bioterrorism. Ricin can be ingested, inhaled, or injected. As early as 4-8 hours post exposure, the clinical symptoms include weakness, chest tightness, and cough progressing to pulmonary edema and respiratory failure within 36-72 hours. There is no vaccine or antidote available. Treatment for inhalation cases would include pulmonary toilet, oxygen, and/or mechanical ventilation support. If a patient is suspected of ingesting Ricin, do not induce vomiting. Instead, use activated charcoal administration. Gastric lavage may be helpful if the patient presented within an hour of exposure. Vasopressors may be required.

A common geographic factor without a common dietary location may indicate an aerosolized contamination. An unusual number of sick or gravely ill patients presenting in a region could indicate a toxin attack. Patients suspected of being exposed to Ricin must leave the area of exposure immediately. Recommendations include removing clothing, washing with soap and water, and disposing of the contaminated clothing. Physicians must report any suspected cases of Botulism or Ricin poisoning to public health authorities within 24 hours.

Smallpox

Smallpox is caused by the variola virus and has two strains: variola major and variola minor. Variola major, the classic smallpox, was predominant in Asia and has a mortality rate of at least 30%. Variola major is considered to be the agent a bioterrorist would most likely use. Variola minor was predominant in North America and has less severe prodrome and rash than variola major, with a milder course of disease.

Infected persons transmit smallpox through close contact with others. Saliva contact can transmit the virus by droplet infection, cough, and so on. The virus is contained in the pustules and scabs of the rash that occurs. The virus can contaminate bedding and clothing, which can be transmitted from person to person. The patient is considered infectious and able to spread the disease from about 1 day before the rash occurs until the rash is crusted over. The patient may not be infectious during the incubation period. Smallpox can be aerosolized for surreptitious dissemination using spraying devices. Some hypothetical situations involve infected and contagious terrorists coughing and sneezing in public places to spread the disease.

There are three stages of disease progression: incubation, prodromal (pre-eruptive), and eruptive. Incubation stage is usually 12-14 days post exposure. This lengthy incubation period makes the agent difficult to track in the early stages of a bioterrorism attack.

The prodromal stage includes common flu-like symptoms such as high fever (above 101[degrees]F), prostration, headache, myalgia, lower back pain, and occasionally, abdominal pain, vomiting, and delirium. The high fever occurs 1-4 days prior to the development of the rash.

The eruptive stage involves the development of the characteristic smallpox rash. The rash appears in centrifugal fashion. The lesions first appear on the oral mucosa, palate, face, and forearms; it appears later on the palms and soles. Lesions appear sparingly on the trunk. The lesions are firm to touch. The lesions all appear to be in the same stage of development as they go from pustule to vesicle to crust.

The characteristic prodrome, high fever, very ill appearance, and the centrifugal rash with lesions on palms and soles, are the predominant telltale signs differentiating from other rash-type illnesses such as chicken-pox.

A single case of smallpox is a public health emergency. Physicians must immediately isolate a patient suspected of having smallpox and notify the local public health authorities. The patient will require treatment in a controlled environment with isolation precautions. Treatment is primarily supportive. An investigation will identify all recent close contacts with the patient to identify potentially infected individuals. Bedding and clothing suspected of contamination should be laundered in hot water with a bleach solution. Surfaces such as tables and sinks thought to be contaminated can be disinfected with a 1:9 bleach solution or a hospital-type disinfectant.

Smallpox Vaccination. Smallpox vaccination is accomplished using the vaccinia virus. Persons vaccinated in the 1970s are not likely to have any protection against smallpox. Currently, there are only about 15 million doses of smallpox vaccination, but recent studies may lead to expanding the dose number by dilution.

The vaccine is administered into the superficial skin with a bifurcated needle. Post-exposure vaccination--within 3-5 days of contact--can effectively prevent or decrease the disease's severity. CDC has recommended that the smallpox patient's close contacts all get vaccinated.

The undiluted Dryvax vaccine, produced in the 1970s, will initially be used to fight smallpox. The vaccine effectively prevents smallpox and has rare, but serious adverse reactions. Such adverse reactions occasionally occur in patients with Eczema, immunocompromised status, and moderate or severe illnesses. Recent vaccinations indicate that some vaccinees experience cardiac complications. The etiology for this reaction is under investigation. On receiving the vaccination, one must avoid transferring the virus from the vaccination site to other areas of the body. Abrasions or otherwise open skin areas can become infected with vaccinia virus. The vaccination site will be covered with gauze, but virus contamination to clothing and secondary contamination through contact with the clothing are possible. Other adverse reactions include a generalized vaccinia rash, necrosis at the vaccination site, and post-vaccination encephalitis.

Using historical data from previous smallpox vaccinations, researchers anticipate that per one million vaccinations the following will occur: A) 49-9000 serious but not life threatening events, B) 14-52 life-threatening events, and C) one to two deaths. A 2003 report defining the results of the civilian and military population vaccination programs indicates a possible relationship between the vaccine and development of myocarditis, pericarditis, and/or myopericarditis. The relationship is still under investigation.

Anthrax

The anthrax disease occurs naturally in grazing animals such as goats, cattle, and sheep. The gram-positive rod bacteria Bacillus anthracis causes the disease. Animal-handling industry workers, such as ranchers and sheep shearers, are at higher risk, especially in countries without public health regulations. Anthrax is a likely agent for terrorists to use. Anthrax is stable and spores can remain viable in soil and animal products for years. It can be processed into a powder or liquid for dispersal. Terrorists could use various spraying devices to spread the organism.

The fall 2001 anthrax attacks dearly show how easily this deadly agent can be dispersed. Using the postal service, the perpetrator was able to cause death, illness, panic, and disruption of our economic, political, and social activities for the price of a stamp. Anthrax is clinically identified in three forms: cutaneous anthrax, gastrointestinal antrax, and inhalational anthrax.

Cutaneous Anthrax. Cutaneous anthrax occurs when the bacteria is introduced through an open wound in the skin. This is the most common form seen in the occupational arena. The first sign of infection is a small reddish papule that forms within a week of the inoculation. The papule becomes a fluid filled vesicle with surrounding tissue edema. The vesicular fluid contains anthrax bacteria. The vesicle ruptures and a painless black eschar forms. Local lymphadenopathy, myalgia, headache, and fever may accompany cutaneous anthrax.

Gastrointestinal (GI) Anthrax. Naturally occurring GI anthrax happens when one eats undercooked meat from an infected animal. The bacteria may germinate in the mouth, esophagus, or upper GI, causing an ulcer. The infection produces toxins that may produce septicemia. The spores can further germinate in the lower GI tract. Mesenteric lymphadenopathy, acute abdominal pain, and bloody vomitus and stools are noticable. Post-mortem examiners usually make the diagnosis.

Inhalational Anthrax. Inhalational anthrax occurs when the bacteria are aerosolized and inhaled through the air. The spores reach the lung alveoli where white blood cells engulf the spores and transport them to the lymph nodes. Incubation period is commonly 3-4 days; however, it may extend up to 60 days while the spores germinate in the lymph system. The disease presents in two stages. The first stage is accompanied by non-specific flu-like symptoms for 2-5 days. The second stage reveals a markedly worsening condition with acute respiratory distress, sepsis, and shock. Diagnosis is made with appropriate laboratory studies. Data from the 2001 anthrax cases indicate that a widened mediastinum appears on chest X-rays within 48 hours of the appearance of symptomology.

Treating all anthrax forms includes aggressive antibiotic therapy with ciprofloxacin or doxycycline and one or two of the following: rifampin, vancomycin, imipenem, chloramphenicol, penicillin, ampicillin, clindamycin, or clarithromycin. Exposed persons should decontaminate with soap and water. Surfaces exposed to the bacteria require cleaning with hospital disinfectants. Some cases warrant post-exposure prophylaxis with antibiotics.

Plague

The plague, or Black Death, was first recorded in 541 AD during an outbreak that killed over half the population of North Africa. In 1855, a Chinese pandemic killed more than 12 million. Plague is actually Yersinia pestis--an acute bacterial disease caused by a gram-negative bacillus with a safety pin appearance. The disease occurs naturally and can be spread by a bite from an infected flea. The California ground squirrel, prairie dogs, chipmunks, rodents, wild rabbits, dogs, and cats can be sources of the disease.

Transmission occurs from animal-to-animal and animal-to-human by infected fleabite. Humans can contract plague by handling infected animals with the organism entering the skin through an open wound. A person may also inhale active plague bacilli from an infected person's cough or through inhalation of the bacteria that has been aerosolized, such as in a bioterrorism event. There are three types of plague: bubonic plague, speticemic plague, and pneumonic plague.

Bubonic Plague. This form is evident 2-8 days after a bite from an infected flea or an infection through an open wound. The patient develops a fever and swollen and painful lymph nodes, usually unilateral. The lymph node (bubo) may be hot to the touch. This form is common in the inguinal and femoral nodes (groin area) in the adult. The bacteria is present in drainage from an open bubo; however, the person is not otherwise contagious.

Septicemic Plague. This form occurs when the bacteria enters the bloodstream and may follow untreated bubonic plague. Easily palpable buboes do not form as the infection becomes generalized throughout the bloodstream. The patient experiences fever, chills, prostration, abdominal pain, shock, and bleeding into the skin and other organs. This form causes the characteristic blackening, gangrenous infections of the fingers, toes, and nose, which is likely the reason the plague is termed Black Death.

Pneumonic Plague. Primary pneumonic plague occurs when a patient inhales the plague bacilli. The incubation period is typically 2-3 days but may be as long as 10 days. The patient presents with flu-like symptoms and fever. Within 24 hours of prodrome, chest discomfort occurs and coughing and difficulty breathing develop. Hemoptysis (coughing up blood) and worsening respiratory distress follow. The sputum contains the bacteria and the cough is productive for infectious droplets, making the patient quite contagious. A chest X-ray will reveal patchy infiltrates bilaterally.

Antibiotic therapy is effective if given quickly, within 24 hours of presentation of symptoms. The plague is nearly 100% fatal if untreated and 20-60% fatal if treated rapidly. Antibiotics such as doxycycline, streptomycin, gentamycin, tetracycline, and chloramphenicol are effective therapies. Droplet precautions should be used in contact with these patients, at least until the patient has completed 72 hours of antimicrobial therapy. Standard hospital disinfectants are effective for cleaning. Currently, no effective vaccine exists.

Tularemia

Tularemia is a bacterial zoonosis caused by a gram-negative coccobacillus called Francisella tularensis. Tularemia is one of the most infectious pathogenic bacteria with potential biological terrorist use. It only requires inoculation or inhalation of as few as ten organisms to cause disease.

Tularemia is an occupational hazard for persons who handle animals; hunters, trappers, and skinners especially face risk. During the period 1990-2000, 44 states reported a combined total of 1,368 tularemia cases to the Center for Disease Control. Most persons acquire the infection from arthropod bites--particularly tick bites--or from contact with infected animals, mainly rabbits. Tularemia presents in three primary forms: ulceroglandular tularemia, typhoidal tularemia, and pneumonic tularemia.

Ulceroglandular Tularemia. Ulceroglandular tularemia arises from the handling of a contaminated animal or following the bite of an

infected tick. Incubation period for symptoms can vary from 2-5 days. A local cutaneous papule appears at the inoculation site and ulcerates within a few days. The patient will experience an acute febrile illness accompanied by headaches, chills, generalized body aches, back pain, and nausea. The regional lymph nodes may become enlarged and tender within several days of the appearance of the papule.

Typhoidal Tularemia. Typhoidal tularemia is used to describe the disease in patients who have systemic infections without signs indicative of a cutaneous or mucosal inoculation. These patients may have eaten contaminated meat or water. They present with flu-like symptoms, as described above, accompanied by prominent gastrointestinal manifestations such as diarrhea and pain. They may develop pharyngeal ulcers.

Pneumonic Tularemia. Pneumonic tularemia results from inhaling bacteria. The patient develops flu-like symptoms 3-5 days after exposure, typically including a nonproductive cough. Pulmonary radiographic signs include peribronchial infiltrates and bronchopneumonia of one or more lobes, and pleural effusions and hilar lymphadenopathy often occur as well. These signs may be absent, or the patient's chest X-ray may show small, discrete pulmonary infiltrates.

Following its use as a biological weapon, diagnosis of inhalational tularemia would be made by noting the abrupt onset of patient clusters with similar symptomology in a setting that is not known for tularemia outbreaks. A diagnosis is made by examining secretions and exudates and taking biopsies. Antibiotic therapy, including streptomycin, gentamycin, ciprofloxacin, doxycycline, or chloramphenicol, is considered effective. Exposed persons receiving antibiotics during the incubation period may be protected against symptomatic infection.

A tularemia vaccine is used to protect lab workers who routinely work with the bacteria. The vaccine is currently under review by the FDA, and its future availability is presently unknown. Exposed surfaces can be decontaminated with a 10% bleach solution. Soap and water can be used to flush away less hazardous contaminations. Francisella tularensis can survive months in water, soil, and rabbit meat, especially in a cold and moist environment. A short half-life for particles intentionally released is expected due to desiccation, solar radiation, and oxidation.

Protecting Yourself

If exposed to a biological agent, your health risks depend on several factors including how much of the agent you were exposed to and, in some cases, the length of exposure and whether you were shielded from direct contact with the agent. Your age, sex, overall health, and immune system response are also contributing factors to your response. Emergency responders are equipped with four levels of protective clothing. The levels for protective gear are as follows:

* Level D--Common street clothes. This level is appropriate when there is no skin or respiratory hazard, but provides no real protection against the bioterrorism agents discussed in this article.

* Level C--The military's battle dress over-garment is chemical resistant and includes an air purifying mask respirator.

* Level B--This level includes a splash resistant suit with a hood and a self-contained breathing apparatus (SCBA). The air tank is outside of the suit and can be used in low oxygen environments.

* Level A--This garment includes a totally encapsulated chemical resistant suit with a SCBA. Responders to a bioterrorism event will likely be wearing a Level A suit. The media commonly provides video footage of responders in this gear.

There are numerous emergency gear suppliers the average citizen can use to purchase protective clothing. However, one must use good judgment in purchasing military surplus-type gas masks or protective gear. Aging materials can make these items ineffective. Experts recommend a few easily obtained items for your home/office preparation kit.

You should purchase at least a couple of the low cost N95 or N100 facemasks for each person in your family or office. These masks provide a measure of respiratory protection as they filter out contaminants in the air. An occlusive seal around the mouth and nose must be produced when using these masks to avoid contamination. If a complete seal is not made, protection from airborne biological agents cannot be guaranteed. Many companies that sell the masks provide fit testing and instruction in mask use. You should obtain some type of rubber or latex glove. Surgical-type gloves can be purchased by the box and are relatively inexpensive. Finally, keep a supply of antibacterial soap, bleach, and laundry detergent containing bleach available for cleaning your clothing, your safe room, and yourself.

Safe Rooms

During a bioterrorist attack, the authorities will likely recommend that people stay in their homes. This is called shelter in place. It is recommended that a part of your home be designated as a safe area. This area will generally be a room that can be sealed off from outside air in the event that the disease is being spread by airborne contamination. Pick a room or two that have few windows and all openings can be sealed off with dear plastic sheeting, dear packing tape, or duct tape. Rolls of clear plastic, in various thicknesses, can be purchased at hardware stores, as can painting drop-cloths. A damp towel between the floor and the bottom of doors can seal the base effectively. You will want to consider including the bathroom in the safe room for extended stays. The safe room should contain the protective gear and food, water, and cooking supplies that you will need. Depending on the extent of the bioterrorism attack, quarantine could occur, and the stay in the safe room could be lengthy.

Food supplies should include non-perishables. Canned meats, fruits, and vegetables are options. Storage of whole-kernel grains that can be ground up in a home mill is also helpful. Stores of beans, sugar, salt, and powdered milk will make your stay more manageable.

Water is a necessity during these critical times. You should have at least one gallon of water per person per day. Two gallons per person per day would allow for cooking, bathing, and dean up. It is also a good idea to have water purification kits. These kits contain bleach or iodine and instructions on how to purify water. Boiling water for 1-10 minutes will kill almost all disease organisms.

Keep fresh, standard emergency supplies in your safe room. Items such as extra clothing, blankets, a first aid kit, prescriptive medication, extra eyeglasses, flashlights, a battery operated radio or television, cash, a telephone, and extra batteries will be very useful.

Decontamination

In the event of an attack with some type of biological agent, emergency teams will be dispatched to the area. You will receive instruction from the responding agencies as to what you are to do and where you are to go. In the event that you were potentially exposed to a bioterrorism agent, you may be washed down with volumes of water by fire department equipment. Personal decontamination is usually accomplished with generous use of soap and water. Equipment and property can be cleansed with a 1-part bleach to 9-parts water solution. Caution should be exercised in the use of bleach solutions, as they can be caustic in high concentrations. If you were not in the area of contamination, there will be informational radio and television bulletins advising the public what actions to take.

Forensics and Allied Health Care

A terrorism incident will rapidly deplete the health-care delivery resources in an effort to treat trauma victims and/or seriously ill patients. Physicians, nurses, hospitals, intensive care units, clinics, emergency services, and support services will be required to operate at capacity levels. Skill sets in health care and forensics will be in demand. Despite the problems associated with the response to Hurricane Katrina, disaster teams, volunteer health-care providers, and forensic specialists rose to the occasion. Responders' experience and skills were invaluable, and they will likely be called upon again. Numerous health-care disciplines, including medicine, dentistry, and podiatry, assist in the overall response to disaster. The addition of chiropractic physicians to the disaster/terrorism response plan is currently being discussed.

Chiropractic Physicians in Disaster Response

While the majority of chiropractic physicians cannot function in the critical care arena, there is a place for chiropractic physicians in the event of a terrorism attack. Chiropractors have provided service at nearly every major disaster and terrorism event in the recent past. DCs are sought to provide care to the first responders in field tents and offices, and they have been called upon for consultations with allopathic responders relative to musculoskeletal conditions.

With appropriate pre-event credentialing and identification procedures, chiropractors can provide service at disaster sites; field hospitals; temporary clinics, shelters, and morgues; and hospitals. The credentialing process will assure that the chiropractors' skills, abilities, and professional histories are commensurate with the service they may be called upon to provide.

As the role of chiropractics within the DOD and VA continues to expand, the opportunities for chiropractic physicians to become formally recognized members of the various federal disaster response teams may occur. Chiropractors and chiropractic colleges are untapped resources for disaster response and should be considered for inclusion in an overall response effort.

In this post- 9/11 era, there are legitimate reasons for our patients and our families to be concerned about international terrorism, domestic terrorism, and bioterrorism. As forensic professionals and/or health-care providers, we should remain cognizant of bioterrorism and other issues related to disaster response. Remaining in a ready state will help ensure our ability to respond.

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Definitions

Terrorism (FBI)--The unlawful use of force against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives.

Biological Attack--The deliberate use of microorganisms or toxins derived from living organisms to induce death or disease in humans, animals, or plants.

BioTerrorism--A terrorist activity that employs a biological agent as the means of force.

CDC Bioterrorism Agent Categories--In June 1999, the Center for Disease Control (CDC), the Department of Health and Human Services (HHS), law enforcement, military, and public-health experts met to define and categorize the various agents of potential use by bioterrorists. The agents were placed into categories A, B, and C, according to their ease of dissemination, potential for public-health impact, and potential for public panic and social disruption. Category A agents have the highest potential for damage and include anthrax, smallpox, plague, tularemia, botulism, and viral hemorrhagic fevers.

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Additional Resources

Centers for Disease Control and Prevention, Atlanta, GA 800-311-3435

Domestic Preparedness Information Line 800-368-6498

US Public Health Service 800-872-6367

Centers for Disease Control and Prevention Bioterrorism www.bt.cdc.gov

Hopkins Center for Civilian Biodefense www.hopkins-biodefense.org

Federal Emergency Management Agency www.fema.gov

Dept. of Health and Human Services. www.dhhs.gov

Association for Professionals in Infection Control www. apic.org

US Army Medical Research Institute of Infectious Diseases www.usamriid.army.mil

American Red Cross www.redcross.org

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About the Author

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