Emergency Preparedness

Emergency Codes

Though healthcare organizations universally use emergency codes, there is no universally accepted standard for those codes. The Hospital Association of Southern California has made the following recommendations for standard coding. These may or not be the case at the organization at which you work, but all or most of these are commonly employed at most healthcare entities. Know the codes for your organization.

- RED for fire
- BLUE for adult medical emergency
- WHITE for pediatric medical emergency
- PINK for infant abduction
- PURPLE for child abduction
- GREEN for patient elopement
- YELLOW for bomb threat
- GRAY for a combative person
- SILVER for a person with a weapon and/or hostage situation
- ORANGE for a hazardous material spill/release
- TRIAGE INTERNAL for internal disaster
- TRIAGE EXTERNAL for external disaster

Types of Emergencies

Be prepared!

The hospital has specific plans to be followed for different types of disasters. When casualties begin arriving, do you know what your role is? What procedures should you be following during this crisis? The time to prepare is **before** a disaster occurs.

In order to be able to properly care for injured people while continuing to care for the patients already in hospital when a disaster strikes, the hospital needs to be prepared for any type of emergency or disaster.

- A disaster is any type of situation (event) that involves large numbers of injured people being admitted for emergency treatment.
- To prepare for a disaster, THE JOINT COMMISSION standards require health care facilities to conduct two disaster drills each year.
- At least one of these drills has to be an "external disaster" drill that includes patients coming into the facility from outside.
- While participating in a drill, everyone should treat it as if it were "real".

Types of disasters

Emergencies or disasters can be classified as either "internal" or "external."

An internal emergency is one that directly involves the facility and is a threat to the staff and patients, such as an in-house fire, a toxic chemical spill, or a natural disaster such as a tornado, earthquake, or hurricane that causes damage to the facility.

An external emergency is one that occurs outside of the facility and does not directly threaten the staff, patients and others inside the building(s). The indirect effect on the facility is the possibility of large numbers of casualties arriving for treatment. External disasters include such things as:

- Accidents involving buses, trains, airplanes or multiple vehicles
- Explosions
- Chemical spills
- Large fires
- Violent incidents involving a large group of people
- Natural disasters occurring outside the facility such as tornadoes or floods.

Weather watches and weather warnings

Staff can plan for potential emergencies by responding to weather service forecasts of severe weather. The weather service uses the terms WATCH and WARNING to describe the chance for a particular type of weather hazard to occur in the area. A weather WATCH is a forecast that weather conditions are favorable for a particular type of weather hazard to form. For example, a tornado watch means that the environmental conditions are favorable for the formation of tornados.

The term "WATCH" may also be used to describe severe thunderstorms, winter storms, heavy snow, and flash floods. When used to describe a hurricane or tropical storm, it means that there is a chance that a hurricane or tropical storm could strike the area within 24-36 hours. A tropical storm indicates a storm with sustained winds between 39 and 73 mph and hurricanes involve even stronger sustained winds:

- Tropical storm: sustained winds between 39 and 73 mph
- Category 1 hurricane: sustained winds between 74 and 95 mph
- Category 2 hurricane: sustained winds between 96 and 110 mph
- Category 3 hurricane: sustained winds between 111 and 130 mph
- Category 4 hurricane: sustained winds between 131 and 155 mph
- Category 5 hurricane: sustained winds over 155 mph

A weather WARNING is more serious than a weather WATCH. It means that a particular weather hazard has actually **been observed** and threatens the area over which the warning is issued. For example, a tornado WARNING means that a funnel cloud has actually been spotted. Warnings are used to describe hazards such as tornadoes, severe thunderstorms, winter storms, heavy snow, and flash floods.

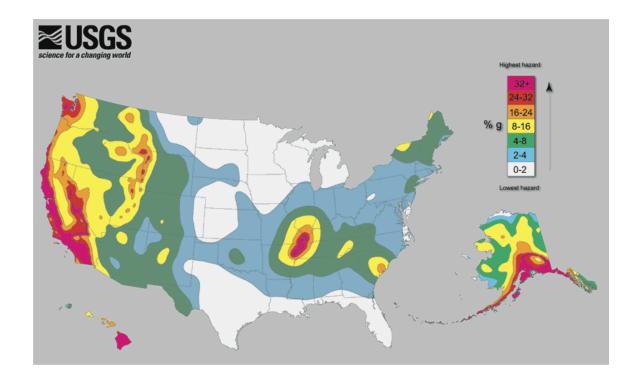
When a hurricane or tropical storm warning is issued, it means that the hurricane or tropical storm has been spotted is expected to strike the warning area within 24 hours.

Earthquakes

In 1994, in Northridge, California, a 6.7 magnitude quake killed 61 people and injured more than 8,000. Several area hospitals were evacuated. Every healthcare worker must know how to minimize risk to themselves and to their patients during an earthquake.

Risk, Magnitude, and Intensity

If you live in California, it's almost a certainty that you've experienced an earthquake. Southern California has an estimated 10,000 earthquakes a year, though only a few will do any damage. The map below shows the relative risk of an earthquake throughout the United States (click on the map to see a full-size version).



Click here if you'd like to explore more maps and information from the USGS.

The seriousness of an earthquake is dependent upon its magnitude and intensity.

The **magnitude** of an earthquake is a measure of the size of the earthquake and is not dependent on the location or the amount of shaking caused. Seismographs measure magnitude.

The **intensity** of an earthquake is a measure of the amount of shaking caused and is dependent on the location. The effects on people and property determine an earthquake's intensity.

Most earthquakes go unnoticed. However, depending on magnitude and intensity, damage can range from slight to devastating. As a worst case scenario example, it is estimated that an 8.3 magnitude earthquake in Southern California would:

- Cause severe damage as far as hundreds of miles from the center
- Collapse buildings, including tall and modern buildings, and buildings of importance such as schools, hospitals, and municipal services centers (though newer structures are built to withstand earthquakes, many are vulnerable to an earthquake reaching a magnitude of 8 or more)
- Disrupt communication, water, power, and transportation for more than 24 hours
- Cause landslides in vulnerable areas
- Cause tsunamis (tidal waves)
- Injure and kill thousands of people as a result of structural collapses (buildings, bridges, tunnels, homes)

Before the Earthquake

A disaster such as an earthquake, for which there is no early warning system, often causes more casualties because the victims have no time to prepare or to leave the area.

As a result, healthcare workers must **know their facility's disaster plan**. What will you do if an earthquake occurs while you are at work or at home? Disruption of utilities and communications will likely prevent you from using a phone to find out what to do. You must know and prepare in advance.

Healthcare workers in a high-risk earthquake area must also be aware of, and try to correct, any of the following potential hazards in the work area:

- Unanchored furniture and wall fixtures more than 42 inches high
- Stacked furniture
- Tall bookcases
- Unanchored computers and equipment
- Heavy items that are stored above floor level

During the Earthquake (until shaking stops)

Stay Calm

• If you know what to do, you will find it easier to stay calm.

Stay Put

- If inside, STAY inside.
- If outside, STAY outside. Most people injured in earthquakes moved more than 10 feet once the earthquake started.

Take Cover

- If inside
 - o Move the shortest distance possible to a place of safety
 - Take cover under a bed, desk, table, or chair; against a corridor wall; or between seating rows if in a classroom. If you've taken cover under a sturdy piece of furniture, hold on to it.
 - o Move away from windows, display shelves, and other falling hazards.
 - o If no cover is available, drop to the floor.
 - Stay in the building and on the same floor. Do not use the elevators.
- If outside
 - Move away from all falling hazards. The greatest risk of falling hazards is near the entrance and outer walls of buildings.
- If in a car
 - o Pull over and stop as soon as you can do so safely
 - $\circ\quad$ If possible, do not stop on or under a bridge or near power lines
 - Stay in your car

After the Earthquake

- Expect aftershocks of any magnitude and intensity
- Restore calm
- Assist others
- Report injuries
- If you are near the ocean, consider the possibility of a tsunami
- Follow your organizations disaster procedures! (for example, you may be required to proceed to an Emergency Assembly Point).

For More Information

Here are a few websites you may find interesting:

USGS Earthquake Preparedness Website

Wikipedia Earthquake Preparedness Website

Procedures for dealing with disasters

Hospitals have specific "disaster plans" to be followed for the different weather hazards that could occur in the area.

Here are some basic procedures to follow when these weather conditions occur.

High winds

During high winds, flying objects can break windows. Patients need to be moved away from any windows, possibly into hallways.

Power outage

If there is a power outage, generator power will come on automatically to ensure that power is maintained for essential services. To conserve power, use only those electrical appliances that are absolutely necessary such as life-support equipment and basic lighting. These essential appliances must always be plugged into electrical outlets that would be serviced by the hospital generator in the case of an emergency power outage.

Rising water

If rising water is a problem, move patients to higher floor levels, if possible. Depending on the situation, patients may need to be evacuated.

Emergency Response

Examples of disasters/emergencies

There are many different types of disasters and emergency situations. Examples include:

- Meteorological disasters such as cyclones, typhoons, hurricanes, tornados, hailstorms, snowstorms, and droughts
- Topological disasters such as landslides, avalanches, mudflows, and floods
- Disasters that originate underground such as earthquakes, volcanic eruptions, and seismic sea waves
- Biological disasters such as communicable disease epidemics and insect swarms.
- Accidents involving transportation (planes, trucks, automobiles, trains and ships), structural collapse (buildings, dams, bridges, mines and other structures), explosions, fires, chemicals (toxic waste and pollution), and sanitation.
- Civil disasters such as riots, demonstrations, and strikes
- Criminal/terrorist action such as bomb threats or incidents, nuclear, chemical or biological attacks, and hostage incidents
- Conventional warfare, including bombardment, blockade, and siege
- Non-conventional warfare such as the use of nuclear, chemical, and biological weapons.

Hospital preparation for disasters/emergencies

All organizations must have an emergency management plan or disaster plan so that patient care can continue if a disaster occurs.

Hospital disaster/emergency management plans must:

- Address both external and internal disasters
- Include general activities that will occur no matter what the emergency situation
- Allow specific responses to the types of disasters the facility might face
- Include a plan for evacuation of the hospital if all or part of the facility is damaged or non-functional.

A convenient way for a hospital to classify disasters is as:

- 1. Internal disasters
- 2. External disasters

Internal disasters

- Internal disasters are emergency situations in which only patients, visitors, and staff within the hospital are injured.
- Internal disasters involve taking care of injured victims and evacuation, if part of the facility is damaged or non-functional.
- Employees have to be flexible in making the best decisions under the circumstances.
- During an internal disaster, hospital workers have to limit casualties and limit damage.
- The hospital's main concern in all disasters is to save lives and restore normal conditions.

External disasters

- External disasters are emergency situations that involve the whole community.
- Victims are transported to the hospital for treatment while, at the same time, in-house patient care must continue.
- During an external disaster, community emergency organizations are responsible for limiting casualties and limiting damage.
- The hospital's main concern in all disasters is to save lives and restore normal conditions.

One important way that your facility learns about the effectiveness of its disaster plan is through drills. Your facility is required by THE JOINT COMMISSION (formerly, the Joint Commission on Accreditation of Healthcare Organizations) standards to conduct two drills every year. At least one of these drills has to involve patients coming into the facility. All drills should involve enough victims to adequately test the system and the organization's resources and reactions under stress.

Take disaster drills seriously. A realistic drill evaluates how well the hospital's disaster/emergency plan works. It also identifies problems or weaknesses that can be corrected before a real emergency/disaster occurs.

Your role in the hospital disaster plan

An effective response to an emergency situation involves planning:

- It is important to know as much as you can about the disaster plan in your facility and your role within the plan.
- Different facilities use different names for disaster/emergency situations make sure you know the name that your facility uses.
- If you hear a disaster announced over the hospital intercom or otherwise, activate the disaster plan and follow your role.
- If phone lines are down, your hospital may use the local radio station to notify employees.

If you are notified of a disaster, there are several thing to remember:

- Return to the facility if you are away from work. If it is not convenient for you to put on your normal work clothes wear what you have on. Be sure that you have your identification badge with you.
- Follow the telephone roster if it is one your duties. If the first person on the list is not home, go down to the NEXT person. Continue down the list until you reach another person.
- Carry out the tasks assigned to you even though they may not be the normal duties of your job.
- Come to work prepared to stay for a day or longer if severe weather is forecasted, such as a winter storm with heavy snow or an approaching hurricane. If the facility waits until the disaster actually occurs, staff may not be able to come in because of hazardous road conditions.

Patient treatment during a disaster

Triage is a process for sorting victims to determine the priority of medical treatment. All ambulances bring the injured to the triage area during a disaster/emergency. It is designated in advance for an external type of disaster. In an internal emergency, the triage area is moved to an area that is not exposed to danger but is close to the injured victims.

Treatment is not given in the triage area. As patients are triaged, they are identified, tagged, and sorted according to the seriousness of their injuries. They are then transported to a designated area where they will receive the appropriate care.

During triage, patients are assessed and categorized according to the level of treatment they need:

- Major or immediate treatment
- Minor treatment
- Morque

Major or immediate treatment

Patients who need immediate treatment or surgery to prevent loss of life or serious disability are transported to the major treatment area. Injuries that require care in this area include airway problems, internal bleeding, wounds with severe hemorrhaging, or pneumothorax.

Minor treatment

In the minor treatment area, patients with injuries that are not life-threatening, such as broken bones and cuts that need suturing, receive treatment. Generally, they can either walk or be transported in wheelchairs.

Morque

Patients who have already expired or whose injuries are so severe that they have no chance to live are transported to the morgue area.

Effects of disasters on non-treatment areas of the hospital

Triage and treatment areas are most affected during disasters and emergency situations but other areas of the hospital are affected as well.

Examples of the effects of disasters on non-treatment areas of the hospital are:

- In-patient areas need to record the number of empty beds and identify patients who can be discharged to make room for disaster victims.
- The kitchen will need to plan on preparing meals for extra employees, families, patients, and others involved in the disaster.

- Environmental services could be called on to quickly prepare the rooms of discharged patients for new patients.
- As long as the disaster/emergency exists, elective admissions and procedures will not occur.
- Waiting areas have to be set up for family members of the victims.
- Areas must be identified for press briefings so the community is informed about the status of the emergency.

Bioterrorism

What is bioterrorism?

Bioterrorism is the intentional use of biological agents to harm or kill civilian populations and cause fear.

Biological agents are bacteria and viruses that produce disease. These diseases are spread through person to person contact or through other mediums, such as:

- Powders
- Sprays
- Water or food.

Another type of terrorism you should be aware of is chemical warfare. Chemical warfare uses chemical agents, instead of biological agents, to harm or kill.

There is a real risk of terrorism

Although at least 11 different nations have experimented with biological and chemical weapons, we have traditionally thought that they would never be used. The reasons for this thinking were:

- 1. Countries have seldom used such weapons before
- 2. Use of such weapons is morally distasteful
- 3. Sophisticated labs are needed to produce and deliver such weapons
- 4. The destructive potential is too great.

It seems obvious in our post-9/11 world that this traditional thinking is false. Although most countries may hesitate to use biological or chemical agents, extremist terrorist groups of today may have an interest in obtaining such weapons. These groups may be willing to sacrifice themselves and any moral consideration for their cause.

Another problem is a lack of security at some labs, which could enable biological agents to be stolen. In 1997, for example, it was found that one lab in Russia was only loosely guarded. This lab contained a number of deadly viruses. Some of the Russian weapons stockpile, nuclear, biological, and conventional, is unaccounted for since the break up of the Soviet Union.

Mechanisms of bioterrorist activity

What are the chances of a bioterrorist attack? At this time, there is no clear answer. Although the threat is real, the risk of a large-scale attack is thought to be low. This is because of the difficulty of handling and spreading biological and chemical agents in large amounts.

There are three main mechanisms by which biological agents could be spread:

1. Through contact with skin, as in a powder or liquid

- 2. Through inhalation, if sprayed in a ventilation system or other manner so that the agents are suspended in the air and breathed in
- 3. Through ingestion of contaminated food or water supply.

If people are injured or become sick as a result of a bioterrorist attack, they will come to a medical facility for treatment. In many cases, the symptoms will not obviously be caused by terrorist activity. Hospital personnel must be very diligent in detecting the cause of a patient's symptoms. This will enable the correct treatment to be given and help to prevent further spread.

Agents of Bioterrorism

Biological agents

The agents of bioterrorism are disease-producing bacteria and viruses. The bacteria and viruses that are most likely to be used by terrorist groups can be divided into two categories, based on the way they are spread:

- 1. Only by direct contact with the biological agent
- 2. By contact with the agent or person-to-person contact.

Agents that can only be spread through direct contact with the biological agent and not through contact with the infected person include:

- Anthrax
- Botulism
- Tularemia.

Other agents can also be spread by person-to-person contact. These include:

- Smallpox
- The Plague (pneumonic form).

Anthrax

Anthrax is caused by bacteria called **Bacillus antracis**. It is usually found in hoofed animals and can be spread to humans who are exposed to infected animals.

There are three types of Anthrax:

- 1. Cutaneous
- 2. Inhalation
- 3. Intestinal.

For purposes of bioterrorism, intestinal anthrax is very rare. This would be more difficult than spreading by other means.

Cutaneous

This is the most common form of anthrax. Bacteria might be carried on a powder or on an infected animal. The bacteria are spread through contact with broken skin, such as a cut.

After an incubation period of 2 to 5 days, a papular (raised) lesion appears. After 2 to 2.5 days, this lesion becomes vesicular (filled with fluid). Eventually it becomes blackened and hard. Cutaneous anthrax is curable with antibiotics. If not treated, it can cause death in 5-20% of cases.

Inhalation

This form is caused by breathing in the anthrax bacteria. In bioterrorism, the bacteria might be carried on a powder or spray. The incubation period can be 60 days or more.

Inhalation anthrax begins with flu-like symptoms. This makes it difficult to diagnose in the early stages. One suspicious sign to watch for is an elevated white cell blood count, which is not seen in a viral illness like the flu.

After the initial symptoms, the infected person improves, and then becomes very ill with severe respiratory symptoms. Death usually occurs within 24-36 hours.

The inhalation form of anthrax can be treated, but requires early detection and treatment to be effective. This is difficult because of the flu-like nature of the early symptoms.

New screening tests for anthrax are being developed. A vaccine has also been developed, but is not on the market yet.

Botulism and Tularemia

Two other biological agents that are spread only by contact with the agent are botulism and tularemia.

<u>Botulism</u>

Botulism is caused by bacteria called **clostridium botulinum**. It is generally spread through food. The incubation period is 1 to 5 days. Symptoms include:

- Nausea
- Vomiting
- Weakness
- Dizziness.

Patients have no fever and remain alert and oriented. The illness progresses to affect the nerves and eventually paralyzes the respiratory muscles. Patients need to be on ventilators during recovery, which could be a problem if many people were affected at one time. After weeks to months of supportive care, most patients do recover.

<u>Tularemia</u>

Tularemia is caused by the bacteria **francisella tularensis**. It is primarily found in the Pacific U.S. and Midwest in rabbits, deer, birds, and other wildlife. It can be spread to humans through:

- 1. Contact with infected animals
- 2. Contaminated food or water
- 3. Breathing in the bacteria.

Symptoms of tularemia include:

- Fever
- Chills
- Weakness
- Fatigue.

Other symptoms depend on the mode of infection and can include:

- 1. Ulcer at infection site plus enlarged lymph nodes
- 2. Enlarged lymph nodes with no ulcer
- 3. Respiratory symptoms.

The respiratory mode of tularemia (known as Typhoidal) is the most serious and can be fatal 30-60% of the time if untreated. This is the type most likely to be used by terrorists.

Treatment of tularemia is symptomatic and includes antibiotics, such as streptomycin and tetracycline. People who have been exposed can be treated preventatively.

Person-to-person contact

Some disease-producing agents that may be used in bioterrorism cause illnesses that can also be spread from person to person. These include:

- 1. The Plague
- 2. Smallpox.

The Plague

The Plague, also known as Black Death, is caused by the bacteria **Yersina pestis**. It is most commonly spread through bites from fleas carried on infected rodents. It can also be spread from person to person.

Pneumonic (respiratory) Plague is the most likely form to be used by bioterrorists. The incubation period is 1 to 4 days. Symptoms include:

- Severe weakness
- Myalgia (muscle pain)
- Fever
- Cough
- Bloody sputum
- Bruising
- Headache.

These symptoms are followed by septicemia and pneumonia. Treatment can be given using antibiotics. The patient will die quickly without treatment.

Pneumonic Plague is very contagious. It requires both standard precautions and droplet precautions. Antibiotic treatment should be given to anyone who has potentially been exposed.

<u>Smallpox</u>

Smallpox is caused by the virus **variola major**. It is highly contagious. There is no treatment although research is being done on the effectiveness of new antivirals. It is fatal in 20-40% of cases and will likely leave scars, possibly very disfiguring scars.

Although smallpox only exists now in 2 labs, the possibility exists that it may have fallen into the wrong hands. Early symptoms are flu-like and include:

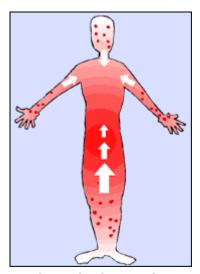
- High fever
- Headache
- Weakness
- Backache.

Symptoms may also include vomiting and abdominal pain. The fever disappears after 2 to 4 days.

The incubation period is 7-19 days. After the initial symptoms, a rash develops. The rash progresses from macules (small red area) to papules (raised rash) to vesicles (fluid filled) to pustules (open) to scabs in about 5 days. Diagnosis is made from scrapings of the vesicles.

For those who have been exposed to smallpox, the vaccine may help to prevent or lessen the severity of the illness. This is especially true if the vaccine is given within 3 or 4 days of exposure.

Once a person has contracted smallpox, there is no treatment. Only supportive care can be given. Strict isolation and airborne precautions are required. Waste and laundry must be burned. Precautions must also be maintained during post-mortem care and cremation is necessary.



The smallpox rash moves from the face and extremities inwards to the trunk.

The smallpox rash is different from the typical chickenpox rash. The chickenpox rash begins on the face, upper trunk, and shoulders and spreads to the extremities. There may also be different stages in one area at the same time. For example, an extremity may have some new lesions and some scabbed over.

The smallpox rash starts on the face and extremities and moves inward to the trunk. All lesions in one area will be at the same stage.

Responding to the Threat of Bioterrorism

Recognizing potential terrorist activity

People who are injured or who become sick as a result of biological or chemical terrorism will come to a medical facility for treatment. Initially, it might be that no one will know that a terrorist attack has occurred--even the victim.

The hospital, especially the emergency department, may be the first place to identify that an attack has occurred.

Hospital and emergency department staff should be alert to possible signs of terrorist activity. These include:

- Increase in the incidence of a particular disease
- Disease with unusual geographic or seasonal distribution
- Large number of cases of unexplained diseases or deaths
- Large numbers of persons with similar disease or symptoms.

If you suspect a problem

Healthcare workers in emergency departments and hospitals need to know what to do when faced with a potential bioterrorist situation. If you suspect a problem, you should tell:

- Your supervisor
- Physicians involved
- Infection control practitioner.

Law enforcement and your local public health department must also be informed of any potential or suspicious situations. The CDC (Centers for Disease Control and Prevention) has asked state health departments to have officials available 24 hours a day to investigate possible situations. Remember, time is very important in isolating the event and the persons involved.

If you suspect that a patient's symptoms could result from a bioterrorist attack, you should also take a careful history. Find out where the patient has been recently as well as complete details about the onset of the problem itself.

If people arrive at the emergency department who are obviously covered with an unknown substance or a known harmful substance, they must be decontaminated before entering. Allowing anyone to enter who is covered with a harmful chemical could contaminate the building and other people. Hospitals should have an outside decontamination area with proper showering equipment. You should know your hospital plan for dealing with this kind of situation.

Be sure that you know and use correct personal protective equipment, especially when dealing with an unknown situation. You should also know and implement your hospital plan for dealing with a terrorist incident. If your facility has a drill to practice this situation, treat it seriously. Treat it as though it were an actual event.

Suspicious packages

One known example of bioterrorism has been the sending of anthrax through the mail. Because of this situation, the CDC has given guidelines for recognizing and handling suspicious packages and envelopes. These include:

- 1. Inappropriate or unusual labeling
- 2. Suspicious appearance
- 3. Other signs.

Inappropriate or unusual labeling might include such signs as:

- Too much postage
- Handwritten or poorly typed address
- Common words misspelled
- Strange or no return address
- Incorrect titles or titles with no names
- Not addressed to a specific person
- Marked with restrictions, such as "Personal," "Confidential," or "Do not x-ray"
- Threatening language
- Postmark that does not match the return address.

Suspicious appearance of a package or envelope includes such signs as:

- Powdery substance felt through or seen on a package or envelope
- Oily stain, discolorations, or odor
- Lopsided or uneven envelope
- Excessive packaging, such as tape, string, etc.

Other signs of a suspicious package or envelope include:

- Heavy weight
- Ticking sound
- Protruding wires or aluminum foil.

If you do discover a package or envelope that is suspicious, do not open it. The CDC recommends the following steps:

- Do not shake or empty contents.
- Do not carry, show to others, or allow others to look at it.
- Do not sniff, touch, taste, or look closely at it or at anything that spills out.
- Tell others in the area.
- Leave area, close the door, and prevent others from entering.
- Turn off ventilation system if possible.
- Wash hands with soap and water.
- Get help if you or others have been exposed.
- At work, contact supervisor and security officer.
- At home, contact law enforcement.

You should also create a list of everyone who was in the room or area when the package was received. Also, list any others who may have been exposed. Give the list to public health officials and law enforcement.

End of Emergency Preparedness Lesson