



Lightning Safety Training Program



Goal

The goal of this program is to teach individuals the protective measures to take when lightning is present.

Objective

This program aims to increase individuals' awareness of the dangers of lightning and teach them the steps to take to protect themselves.

Background

Lightning – surpassed only by flooding -- causes more deaths in the United States than hurricanes or tornadoes.¹ At any given moment around the world, more than 100 lightning flashes occur per second.²

With so many bolts of lightning, it is no wonder that people and structures are hit. According to the [National Aeronautics and Space Administration](#), about 100 people are killed each year in the United States by

lightning and about 245 more are injured. In addition, about 90% of those who survive lightning strikes will suffer lifelong, severe injuries.³ Most of those injuries are [neurological](#) and include a wide range of symptoms often challenging to diagnose.

Also, lightning-generated fires destroy more than 30,000 buildings annually at a loss of hundreds of millions of dollars. The average total economic impact of lightning is more than \$5 billion in the U.S. each year.⁴

However, the real tragedy of lightning's damage is that protecting people is simple with a few safety precautions. While sometimes inconvenient, the process requires diligence, continual reinforcement, and encouragement.

Lightning safety is a multi-step process -- with each step providing a decreasing level of protection – requiring planning around the weather and having a lightning safety plan:

1. Schedule outdoor activities to avoid lighting.
2. Know when and where to be in a safe place.
3. Avoid dangerous locations and activities.
4. Spread out from one another if in a group.
5. Know emergency first aid and cardio-pulmonary resuscitation (CPR).

Schedule Outdoor Activities

The most critical step in lightning safety is to know that **no outdoor space is safe when thunderstorms are in the area**. If you are planning to be outside, watch the weather forecast and know your local weather patterns. Plan around the weather to avoid lightning hazards. If you are outside when a storm approaches, stay near shelter and use the **30-30 Rule**: when you see lightning, count the seconds until you hear thunder. If you count 30 seconds or less, seek shelter immediately. Once you no longer see lightning, wait at least 30 minutes after hearing the last thunder before leaving your safe location.

Know When and Where To Go For Safety

During lightning, the safest shelter is a large, fully-enclosed building “substantially constructed,” meaning it has wiring and plumbing in the walls. Once inside, stay away from anything that could conduct electricity from the outside: corded telephones, electrical appliances, lighting, plumbing, and electric sockets. Likewise, avoid watching the lightning from windows or doorways. Inner rooms are generally safer.

If you cannot get to a secure shelter, a vehicle with a solid metal roof and sides is a reasonable second choice. As with a building, avoid

contact with conducting paths going outside: close the windows, lean away from the door, and put your hands in your lap. Do not touch the steering wheel, ignition, gear shifter, or radio. Convertibles, cars with fiberglass or plastic shells, and open-framed vehicles will not serve as safe lightning shelters.

MYTH: Cars are safe because the rubber tires insulate them from the ground.

TRUTH: Cars are safe because of their metal shells.

According to the [National Weather Service](#), the outer metal shell of hard-topped metal vehicles protects those inside when the windows are closed. Unfortunately, though, the vehicle might not always fare so well.

A typical cloud-to-ground -- or rather cloud-to-vehicle -- lightning strike will hit either the vehicle's antenna or along the roofline. The lightning will then pass through the vehicle's outer metal shell, then through the tires to the ground.

Although every lightning strike is different, damage to the antenna, electrical system, rear windshield, and tires is common. The heat from a lightning strike is sufficient to partially melt the antenna of a vehicle and cause what may seem like a small explosion of sparks as tiny fragments of metal melt and burn. A portion of the discharge may find its way into the vehicle's electrical system and damage or destroy electronic components, potentially leaving the car inoperable. The lightning may also find its way into the small defrosting wires embedded in the rear windows causing them to shatter. Finally, it is very common for lightning to destroy one or more tires as it passes through the steel belts to the ground. It is also possible for lightning to ignite a fire that could destroy the vehicle.

Places and Activities to Avoid

If you cannot get to a safe lightning shelter, avoid the most dangerous locations and activities, including:

- higher elevations;
- wide-open areas, such as those found in sports fields;
- tall, isolated objects, such as trees, poles, and light posts;
- water-related activities, such as boating, swimming (including indoor pools), and fishing;
- golfing;
- wide-open vehicles, such as farm tractors, open-cab construction vehicles, riding lawnmowers, and golf carts;
- unprotected open buildings, such as picnic pavilions, rain shelters, and bus stops; and
- metal fences and bleachers.



Last Resort Safety Measures

If lightning is imminent, it will sometimes provide a very few seconds of warning. Sometimes your hair will stand up on end, or your skin will tingle. Light metal objects may vibrate, or you may hear a crackling sound. If this happens and you are outside far away from shelter, rush to the safest known location. If you are in a group, spread out, so there are several body lengths between each person as you proceed. Then, if one person is struck, the other(s) may not be hit and can give first aid and CPR.

Once you have spread out – as a last resort -- use the lightning crouch: minimize your ground contact by putting your feet together, squatting down, tucking your head, and covering your ears. Do not lay down. When the immediate threat of lightning passes, continue heading to the safest spot possible.

Remember, this is a desperate last resort. You are much safer following the previous steps. Do not put yourself into this high-risk situation.

Emergency First Aid

All deaths from lightning result from cardiac arrest or respiratory failure. The recommended first aid treatment for cardiac arrest is CPR. The first aid treatment for respiratory failure is mouth-to-mouth resuscitation.

Giving first aid to lightning strike victims while waiting for professional medical attention can save their lives. It is safe to touch a lightning strike victim. People struck by lightning DO NOT carry a charge.

According to the Centers for Disease Control and Prevention, these four steps can help save the life of a lightning strike victim:

1. Call For Help

Call 911 immediately. Give directions to your location and information about the strike victim(s). It is safe to use a cell phone during a storm. The 911 dispatcher can assist you while getting the emergency help you need.

2. Assess The Situation

Safety is a priority. Be aware of the continuing lightning danger to both you and the victim. If the area where the victim is located is a high-risk location, such as by an isolated tree or open field, both you and the victim could be in danger. If necessary, move the victim to a safer location. It is unusual for a victim who survives a lightning strike to have any major broken bones that would cause paralysis or major bleeding complications unless they suffered a fall or were thrown a long distance. Therefore, it may be safe to move the victim to reduce possible further exposure to lightning.

3. Respond

Lightning usually causes a heart attack. First, check to see if the victim is breathing and if they have a heartbeat. The best place to check for a pulse is the carotid artery found on the neck directly below the jaw.

4. Resuscitate

If the victim is not breathing, immediately begin mouth-to-mouth resuscitation. If the victim does not have a pulse, start chest compressions. Hands-only CPR is as effective in the

first few minutes as conventional CPR. To perform hands-only CPR, push hard and fast in the center of the person's chest – about 100 beats per minute. Continue resuscitation efforts until help arrives. If the area is cold and wet, putting a protective layer between the victim and the ground may help decrease hypothermia (abnormally low body temperature).

Lightning may also cause other injuries such as burns, shock, and sometimes blunt trauma. Treat each of these injuries with basic first aid until help arrives. Do not move victims who are bleeding or appear to have broken bones.



MYTH: Lightning victims are electrified. If you touch them, you will be electrocuted.

TRUTH: It is perfectly safe to touch a lightning victim to give them first aid.

Review Questions

1. When counting time until you hear thunder, seek shelter if the count is ____ seconds or less.
 - a. 45
 - b. 15
 - c. 30
 - d. 60
2. It is not safe to talk on a corded telephone when lightning is present.
 - a. true
 - b. false
3. When lightning is present, avoid all of the following except:
 - a. water-related activities
 - b. metal fences and bleachers
 - c. substantially constructed buildings
 - d. trees
4. All deaths from lightning result from cardiac arrest or _____.
 - a. shock
 - b. burns
 - c. trauma
 - d. respiratory failure
5. The lightning crouch is the last resort for protection if you are caught outdoors when lightning is present.
 - a. true
 - b. false

Answer Key - 1. c; 2. a; 3. c; 4. d; 5. a

References

¹National Oceanic and Atmospheric Administration, "Thunderstorms and Lightning: The Underrated Killers!", Website. <https://www.weather.gov/media/grr/brochures/nwsthunderstorms&lightning.pdf>. Accessed July 14, 2021.

²NASA Facts: Lightning and the Space Program, pg. 6. Website. https://www.nasa.gov/sites/default/files/167417main_Lightning08.pdf. Accessed July 14, 2021.

³National Weather Service, "How Dangerous is Lightning? Website. <https://www.weather.gov/safety/lightning-odds>. Accessed July 14, 2021.

⁴NASA Facts: Lightning and the Space Program, pg. 7. Website. https://www.nasa.gov/sites/default/files/167417main_Lightning08.pdf. Accessed July 14, 2021.



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