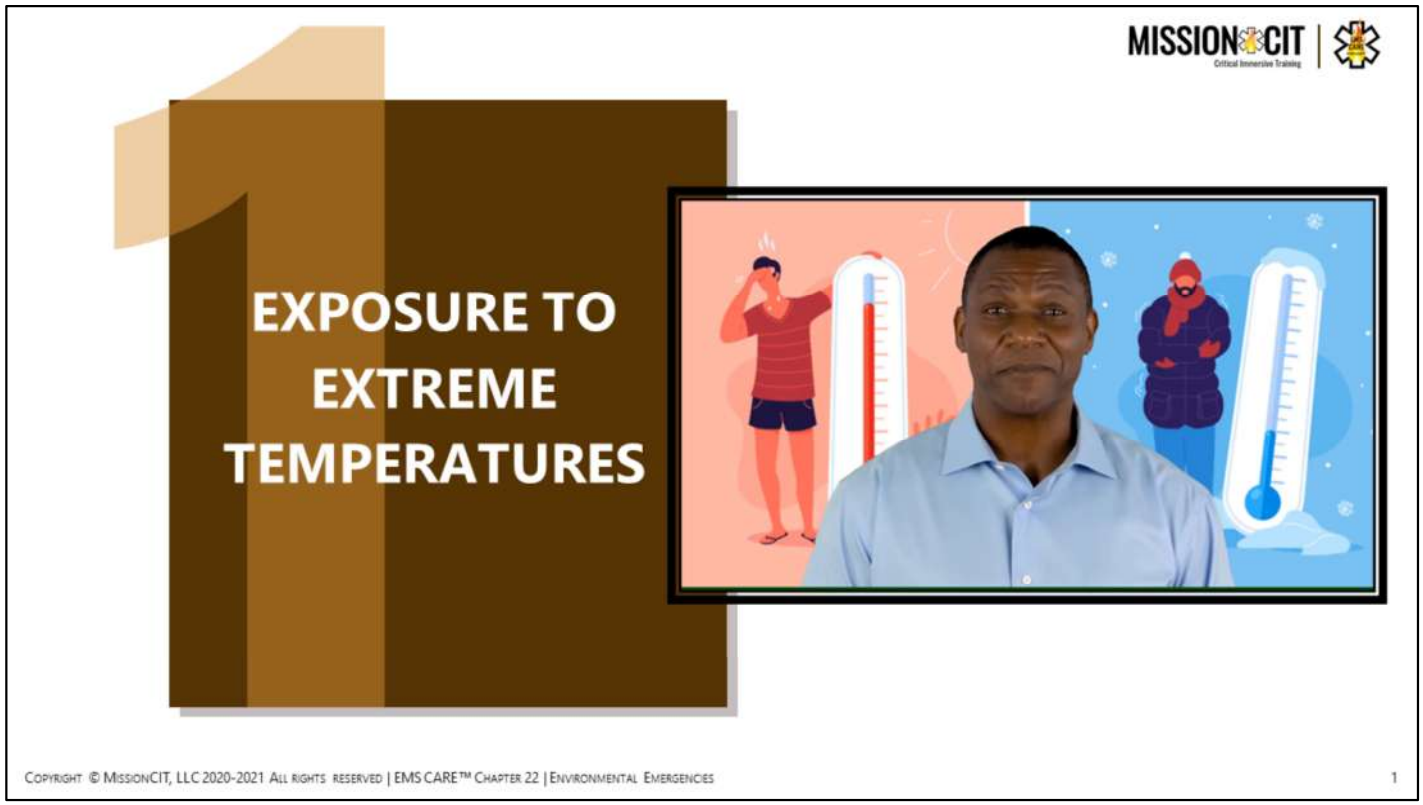
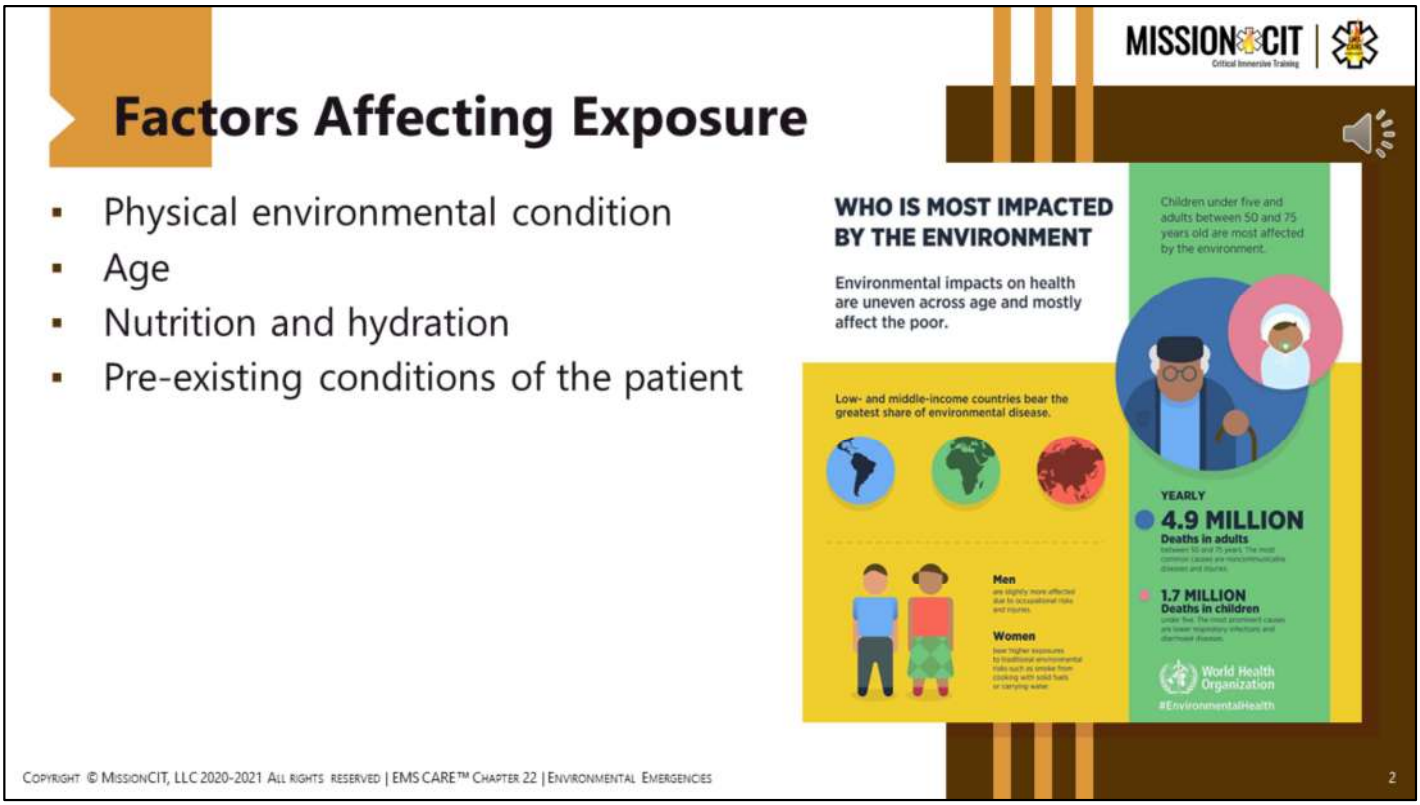


Hello everyone. Welcome to this lesson where we talk about exposure to extreme heat and cold and the consequences that come with it.

Do you know that many medical emergencies result from environmental factors? This is because our bodies are designed to live and thrive only within a certain range of temperature, and exposure to temperatures outside this acceptable range can result in injuries.

Some populations are at higher risk such as children, older people, people with chronic illnesses, and young adults who overexert themselves.

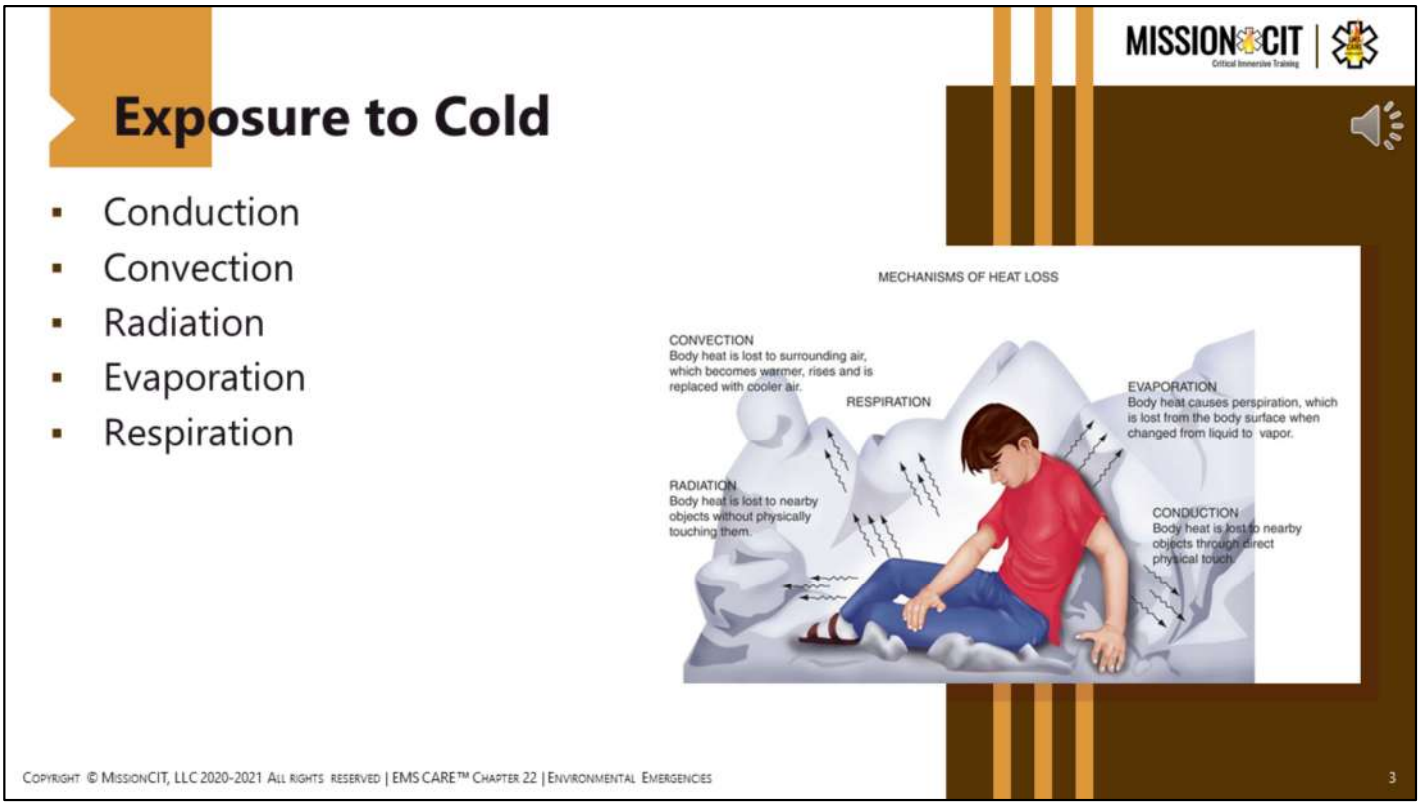
With this in mind, let's get started.



As we mentioned earlier, some people are at a higher risk than others for injuries due to environmental exposure.

Some of the factors that result in such injuries are:

- Physical condition
- Age. Children and seniors are more likely to experience temperature-related illnesses
- Nutrition and hydration. Lack of food or water will aggravate the stress of heat or cold as the body does not have enough energy to regulate the temperature
- Environmental conditions that are out of the range that human bodies are designed to handle. These emergencies can happen in any setting such as wilderness, rural, suburban, and urban
- Pre-existing injuries. Environmental exposure can exacerbate pre-existing injuries



Exposure to extremely low temperatures can cause injury to feet, hands, ears, nose, and even the whole body.

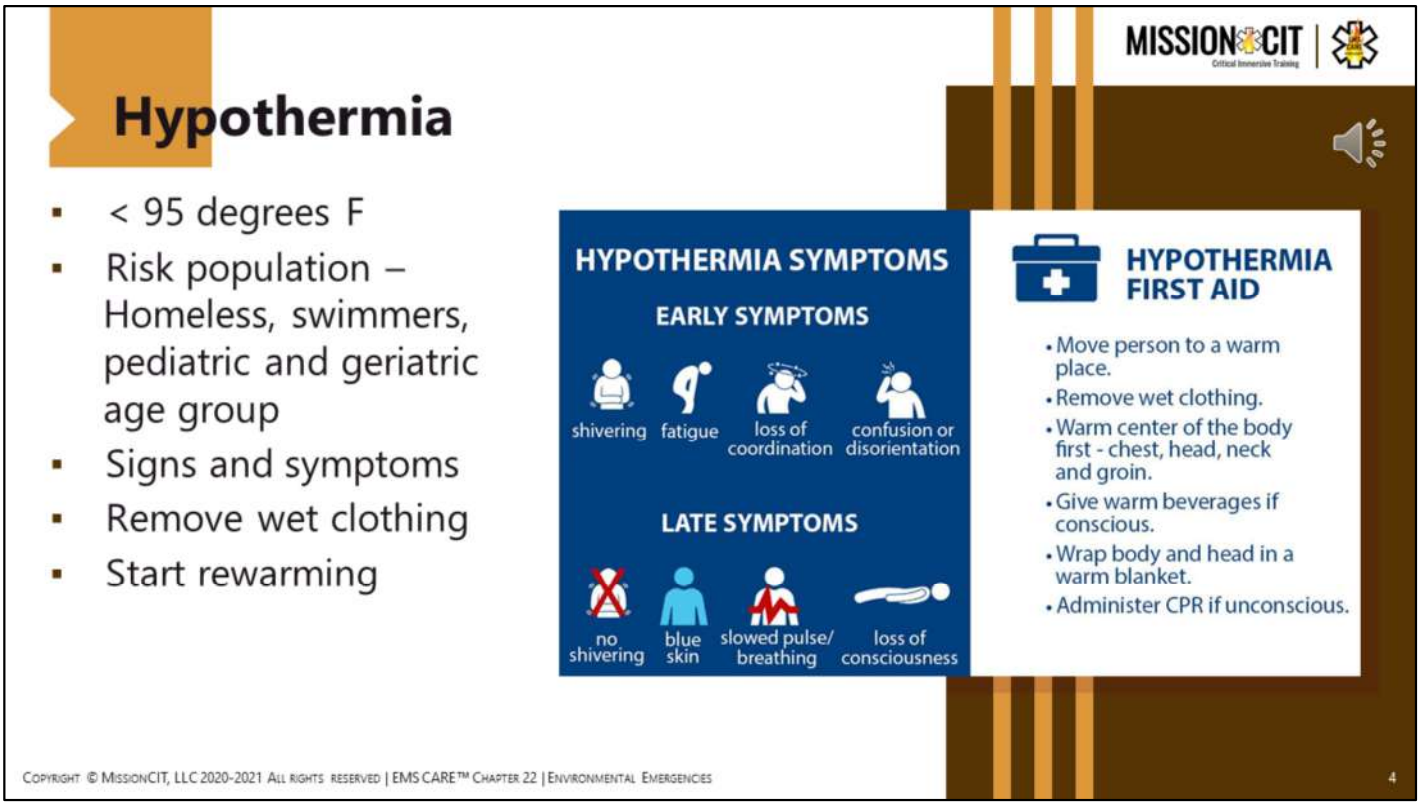
These injuries occur because the body loses heat rapidly and is unable to provide the necessary resistance and blood flow to different parts of the body.

The body loses heat in five ways, and they are:

- Conduction – The chillness of water or ice comes in direct contact and lowers the temperature of the body.
- Convection – The wind chill present in air or water carries away the body's heat
- Radiation – The body's heat is absorbed by the surrounding air or water
- Evaporation – The body loses heat when it perspires or gets wet
- Respiration – The body loses heat through exhaled air.

This rate of heat loss can be controlled by,

- Increasing heat production
- Moving the patient to an area where the temperature can be regulated
- Providing appropriate clothing



Hypothermia is a condition where the core temperature of the body falls below ninety-five degrees Fahrenheit. As a result, the body loses its ability to regulate its temperature and generate body heat.

Eventually, key organs such as the heart begin to slow down, and the mental status deteriorates as well. There is a possibility for death too.

Note that low temperatures are subjective, so air temperatures don't necessarily have to be below zero for hypothermia to occur. For example, if a person's body has a low threshold for cold tolerance, then even temperatures of ten degrees Fahrenheit can impact.

In general, some of the people who are at risk are:

- Homeless people and those whose homes lack heating
- Swimmers
- Geriatric, pediatric, and ill patients

The signs and symptoms become more severe as the core temperature falls. Hypothermia goes through four distinct stages.

- Body temperatures of 93 to 95 degrees Fahrenheit experience shivering, foot stamping, constricted blood vessels, rapid breathing, and withdrawn levels of consciousness

- Body temperatures of 89 to 92 degrees experience loss of coordination, muscle stiffness, slow pulse, confusion, lethargy, and sleepiness
- Body temperatures of 80 to 88 degrees experience coma, weak pulse, dysrhythmia, slow respirations, and unresponsiveness
- Body temperatures of less than 80 degrees experience cardiac arrest and death

A good way to assess this temperature is to remove your gloves and touch the patient's abdomen to gauge the temperature. However, never assume that a cold or pulseless patient is dead.

Start rewarming the patient after removing the wet clothing. Provide care for shock, give warm liquids, and transport the patient.

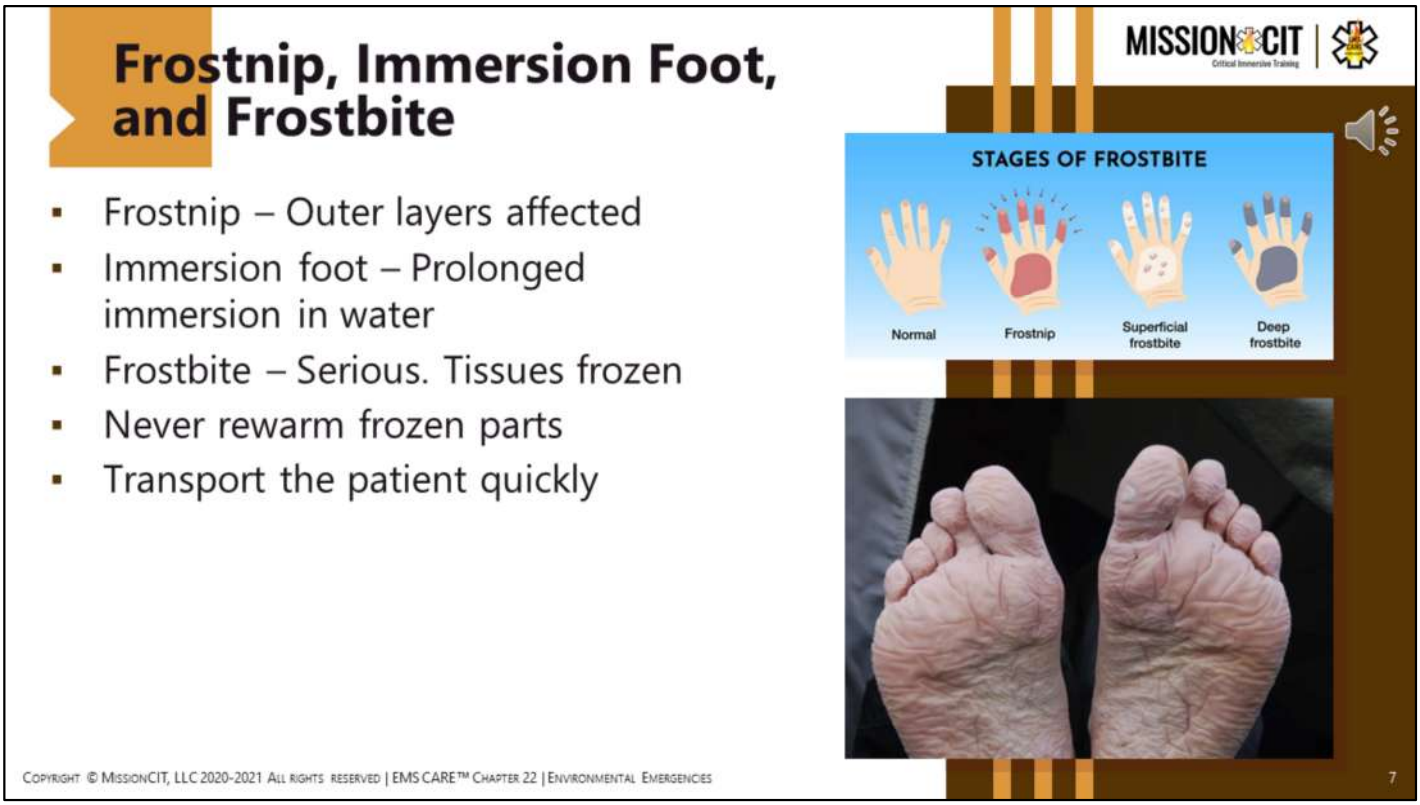


This video from CDC answers important questions about Hypothermia.



Most injuries from cold are confined only to the exposed parts of the body like the feet, hands, and face. Some of the factors that determine the severity of the injury are:

- Duration of the exposure
- Temperatures to which the body part was exposed
- Wind velocity during exposure
- Inadequate insulation from the cold or wind
- Exposure to wet conditions
- Restricted clothing due to tight clothes or shoes
- Fatigue and poor nutrition
- Alcohol or drug abuse
- Diabetes or cardiovascular diseases, and
- Age



After prolonged exposure to the cold, the outer layers of the skin can freeze. But the deeper issues will remain unaffected. This kind of injury is called frostnip.

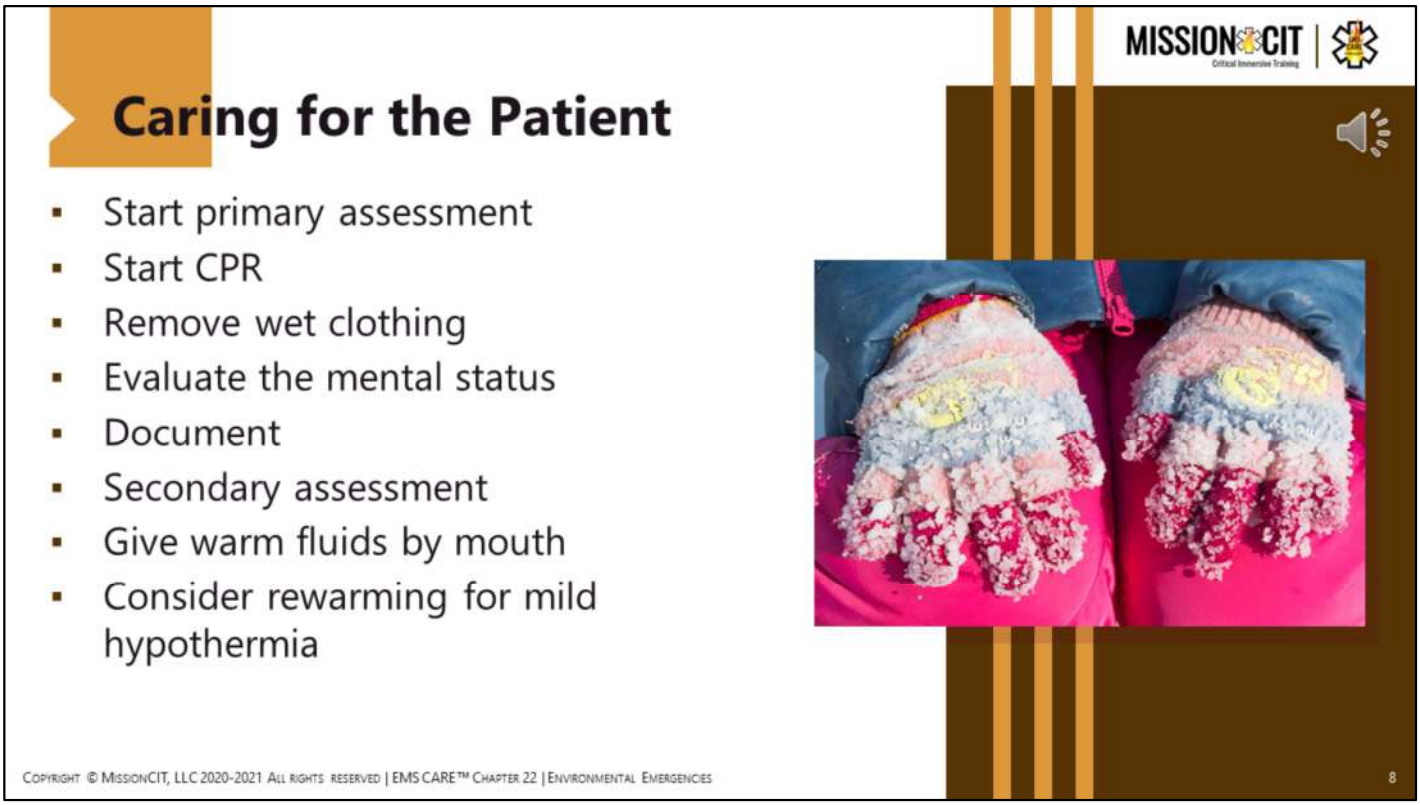
It mostly affects only the ears, nose, and fingers. Since the patient doesn't feel the pain due to numbness, it can get dangerous.

Immersion foot, on the other hand, occurs due to prolonged immersion in water, and tends to be common in hikers and hunters.

Both these conditions are not life-threatening but have to be addressed at the earliest to prevent the complications that can come with longer exposure. Also, remove the exposed part from cold, cover, and provide heat if needed.

Frostbites are far more serious because the tissues also get frozen, and most times, require the surgical removal of the dead tissue. The care for such patients includes administering oxygen after covering the frostbitten part.

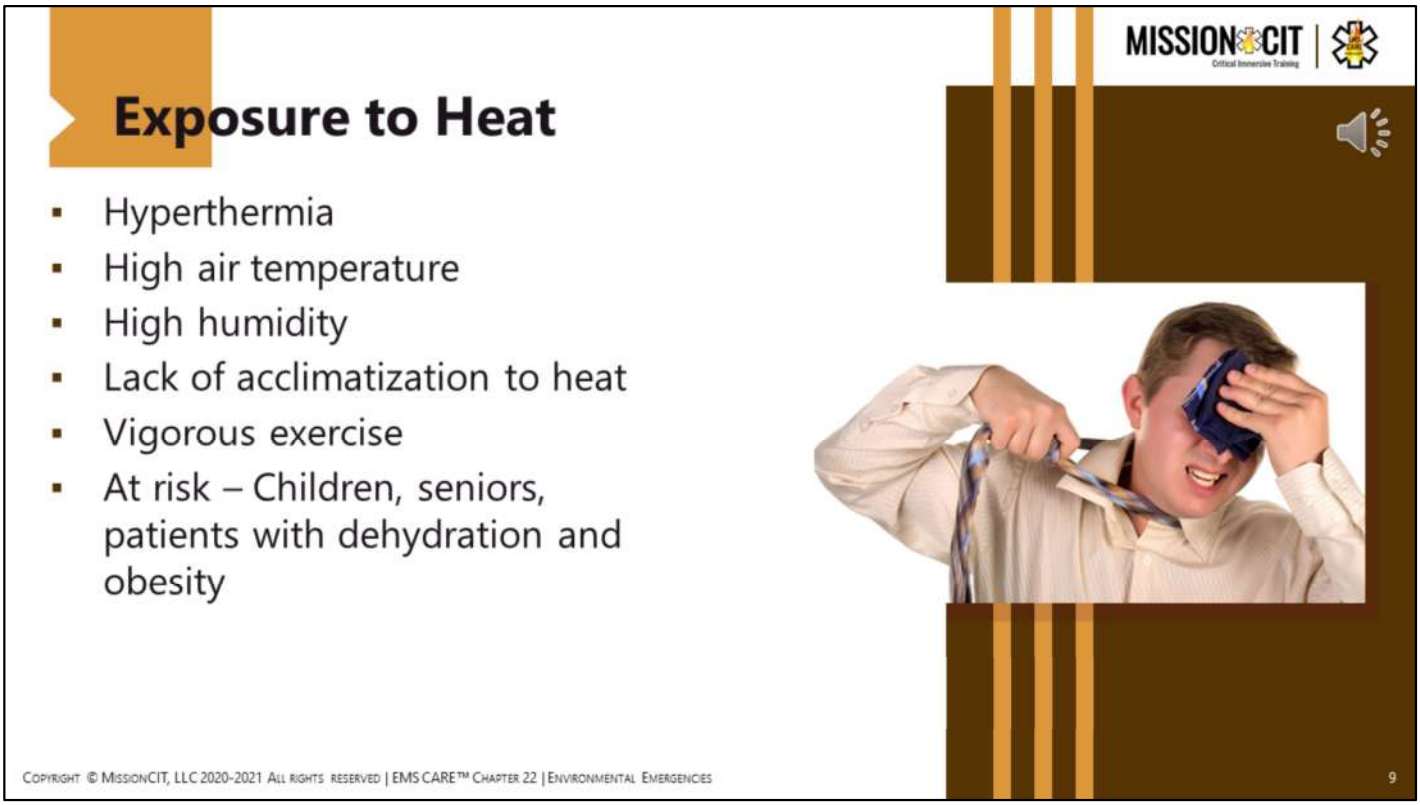
Never rewarm the frozen parts as it can lead to permanent injury. Simply transport the patient and provide something warm for the patient to drink.



Exposure to cold can be dangerous for the patients. After assessing the scene for your safety, start the primary assessment and ensure that the airways are open. Move the patient away from the cold and start CPR if the patient is in a cardiac arrest. Remove any wet clothing and place dry blankets to cover the patient. Evaluate the mental status and transport if there's a life threat.

If the patient is not in a life-threatening condition, document the patient's history, and start the secondary assessment where you assess the different parts of the body for damage. Provide warm and humidified oxygen if available and handle the patient gently. Never massage the extremities and prevent the patient from consuming any medications, stimulants, or alcohol.

If the patient has mild hypothermia, give warm fluids by mouth, and apply heat packs or bottles to the groin and cervical regions. Consider rewarming if transportation is likely to be delayed. For rewarming, heat the water between 100 to 105 degrees Fahrenheit and fill it in a large container. Place the exposed part fully into the container and ensure that the exposed part doesn't touch the sides or bottom of the container. Continuously stir the water and monitor the patient.



If exposure to cold is dangerous, so is exposure to heat. This is because, in a hot environment, the body tries to shed the excess heat by sweating and dilating the blood vessels. In such situations, remove the clothing and relocate to a cooler environment.

Hyperthermia is common with heat exposure, and this is when the body temperature is higher than 101 degrees Fahrenheit. The risk factors associated with heat illness are:

- High air temperature
- High humidity
- Lack of acclimatization to heat
- Vigorous exercise that leads to a loss of electrolytes

People who have the highest chances for heat-related illness are children, especially newborns and infants, geriatric patients, patients with illnesses such as COPD, diabetes, dehydration, and obesity, and patients with limited mobility.



The three common heat-related illnesses are heat cramps, exhaustion, and stroke.

Heat cramps are painful muscle spasms that occur with vigorous exercise. Remember, they occur not just when the outside temperatures are hot, but also when the body's internal temperature becomes too hot due to exercise. These cramps tend to occur only in the leg or abdominal muscles.

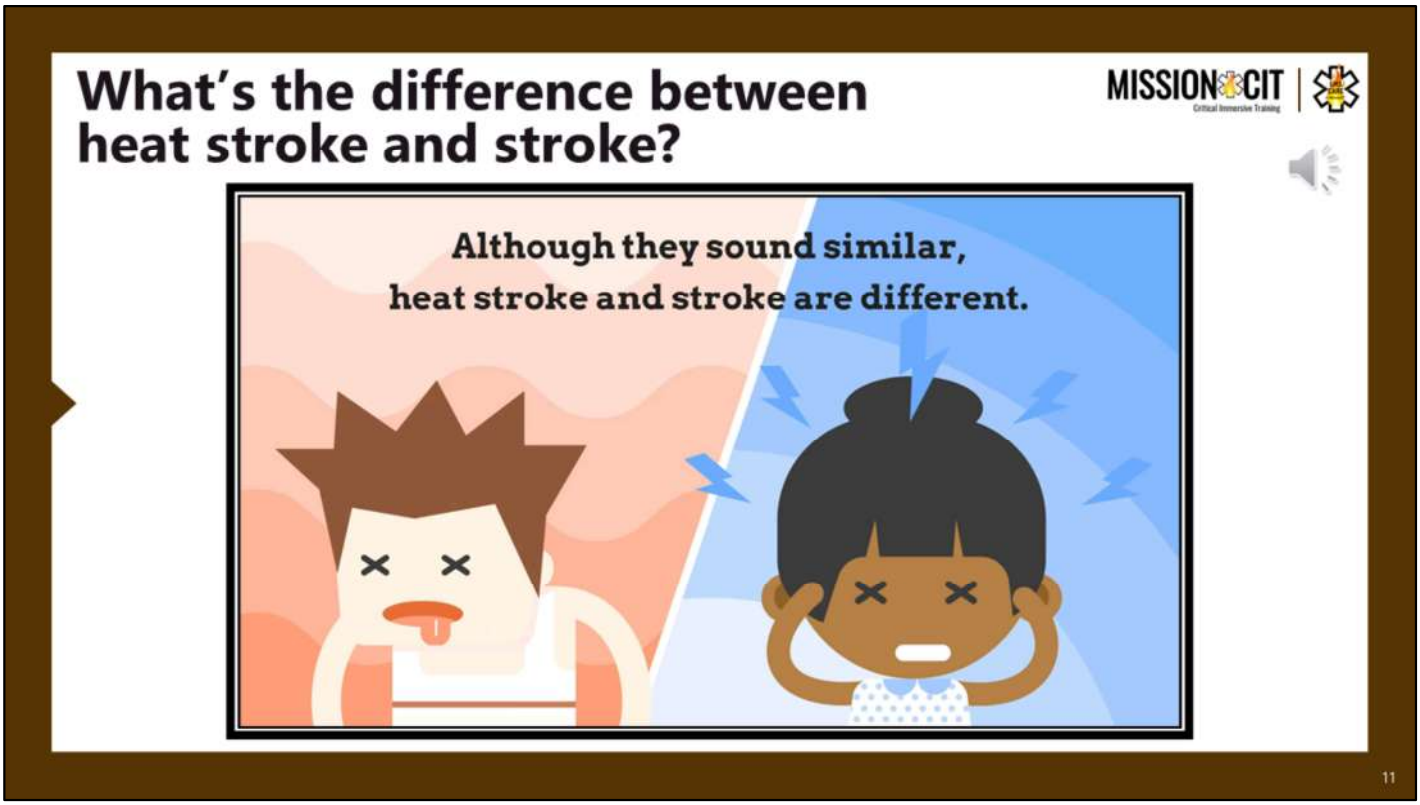
The most common heat-related illness is heat exhaustion, that occurs when the body loses vital salts due to excess sweating. This results in moist, pale, and cool skin, and is more common during the hot summer months. Healthy individuals can also experience a form of shock due to the rapid depletion of these salts. This exhaustion is often accompanied by muscular cramps, weakness or exhaustion, rapid and shallow breathing, weak pulse, heavy perspiration, and possible loss of consciousness.

Heat stroke is another heat-related illness that is least common, but the most serious of the three. It occurs when the body is subjected to more heat than it can handle, and the normal working mechanisms are too overwhelmed. When the heat stroke is untreated, it always results in death.

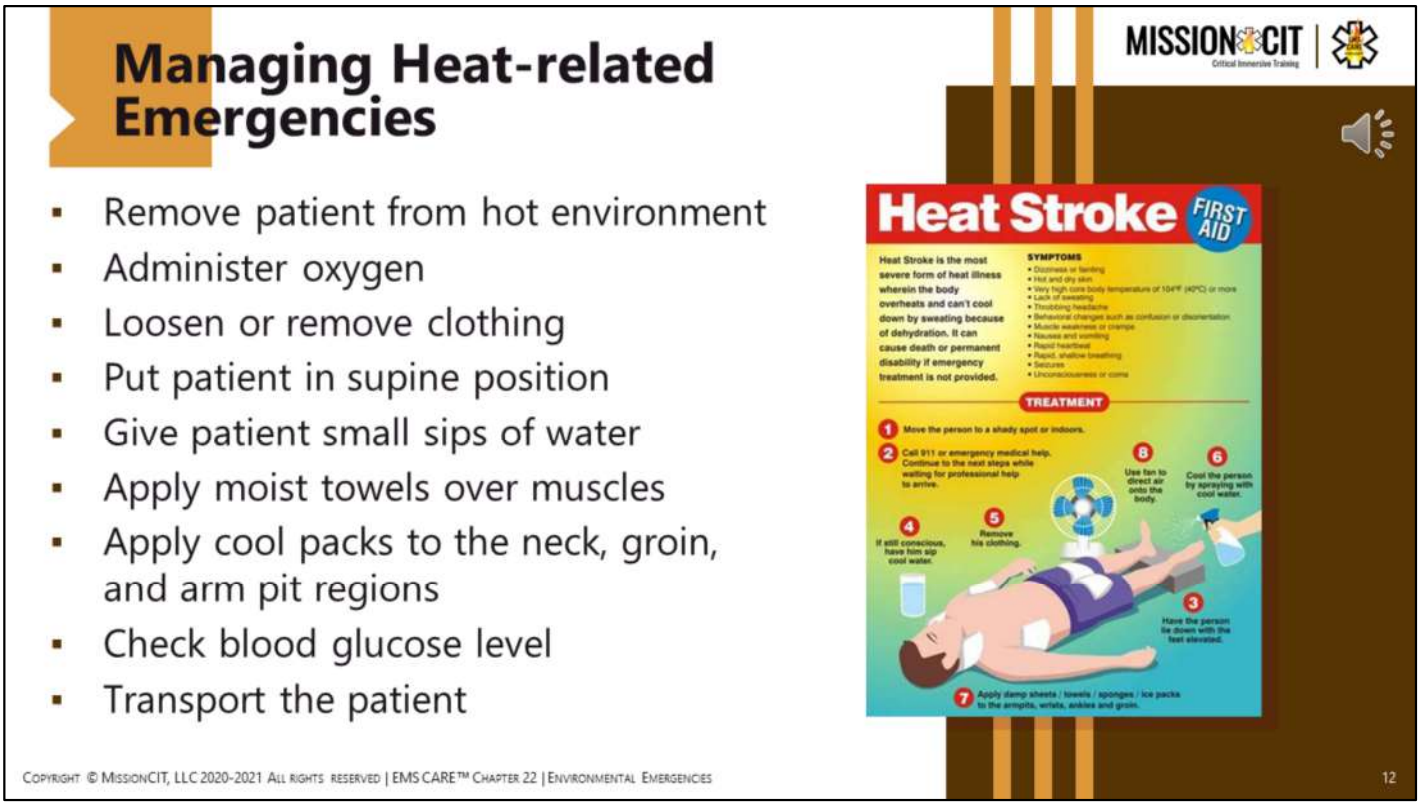
It occurs due to vigorous physical activity, poorly ventilated and humid space, heat waves in homes without adequate air conditioning, and in children who are left unattended in a locked car on a hot day.

Some of the symptoms of heat stroke are loss of consciousness, altered mental status, full

and rapid pulse, dilated pupils, and potential seizures.



Although they sound similar, heat stroke and stroke are different. Learn the symptoms of these life-threatening conditions.



To manage these heat-related emergencies,

- Remove patient from the hot environment
- Administer oxygen if there are signs of hypoxia or the potential for shock
- Loosen or remove clothing
- Put patient in supine position
- Give the patient small sips of water
- Apply moist towels over cramped muscles
- Apply cool packs to the neck, groin, and arm pit regions
- Check blood glucose level
- Transport the patient

Heat stroke is an emergency because the body's temperature controlling mechanisms fail, so the body is unable to get rid of the excess heat. If you're transporting a patient with heat stroke, inform the receiving facility ahead of time.

This brings us to the end of this lesson and in the next one, Missah will talk about water-related emergencies.