



Cold Weather Emergencies

Introduction

- Medical emergencies can result from exposure to heat or cold.
- Certain populations are at higher risk for heat and cold emergencies.
 - Children
 - Older people
 - People with chronic illnesses
 - Young adults who overexert themselves

Factors Affecting Exposure

(1 of 4)

- Physical condition
 - Patients who are ill or in poor physical condition will not tolerate extreme temperatures well.
- Age
 - Infants have poor thermoregulation and are unable to shiver.
 - Children may not think to put on layers.

Factors Affecting Exposure

(3 of 4)

- Environmental conditions
 - Conditions that can complicate or improve environmental situations:
 - Air temperature
 - Humidity level
 - Wind
 - Extremes in temperature and humidity are not needed to produce injuries.

Factors Affecting Exposure

(4 of 4)

- Environmental conditions (cont'd)
 - Most hypothermia occurs at temperatures between 30°F and 50°F.
 - Most heatstroke occurs when the temperature is 80°F and the humidity is 80%.
 - Examine the environmental temperature of your patient.

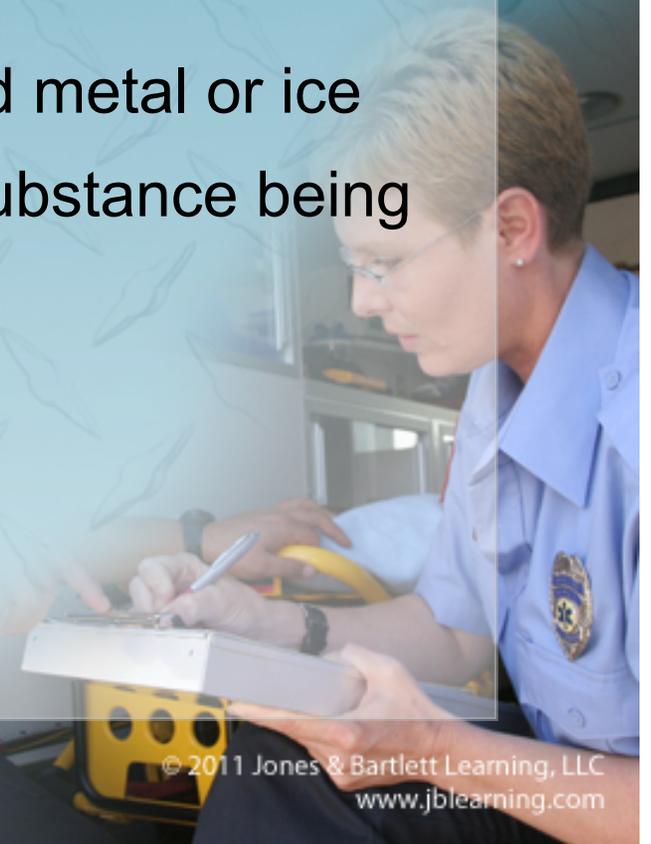
Cold Exposure (1 of 5)

- Cold exposure may cause injury to:
 - Feet
 - Hands
 - Ears
 - Nose
 - Whole body (hypothermia)
- There are five ways the body can lose heat.



Cold Exposure (2 of 5)

- Conduction
 - Direct transfer of heat from a part of the body to a colder object by direct contact
 - When a warm hand touches cold metal or ice
 - Heat can also be gained if the substance being touched is warm.



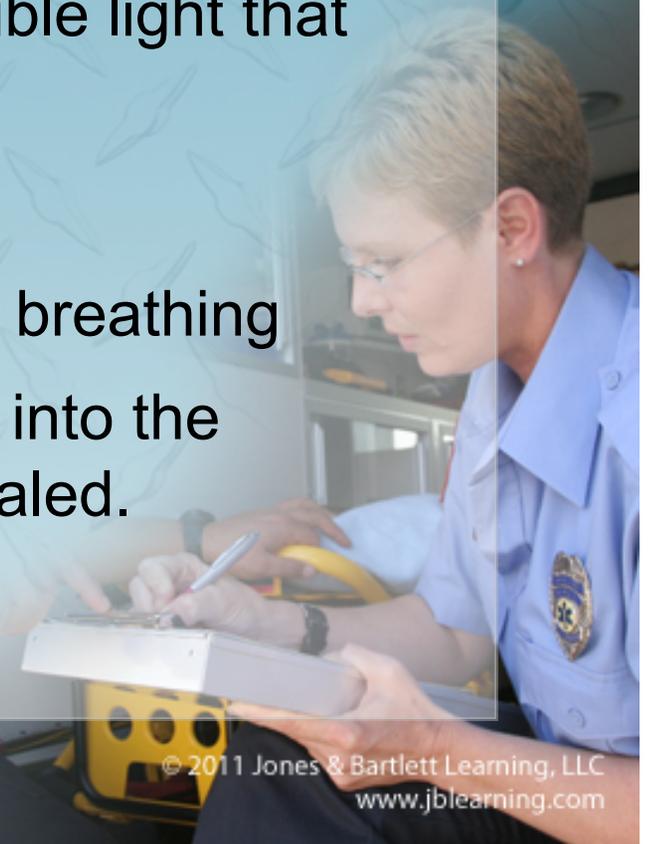
Cold Exposure (3 of 5)

- Convection
 - Transfer of heat to circulating air
 - When cool air moves across the body surface
- Evaporation
 - Conversion of any liquid to a gas
 - Evaporation is the natural mechanism by which sweating cools the body.



Cold Exposure (4 of 5)

- Radiation
 - Transfer of heat by radiant energy
 - Radiant energy is a type of invisible light that transfers heat.
- Respiration
 - Loss of body heat during normal breathing
 - Warm air in the lungs is exhaled into the atmosphere and cooler air is inhaled.



Cold Exposure (5 of 5)

- The rate and amount of heat loss or gain by the body can be modified in three ways:
 - Increase or decrease in heat production
 - Move to an area where heat loss can be decreased or increased.
 - Wear insulated clothing, which helps decrease heat loss in several ways.

Hypothermia (1 of 6)

- Lowering of the core temperature below 95°F (35°C)
- Body loses the ability to regulate its temperature and generate body heat
- Eventually, key organs such as the heart begin to slow down.
- Can lead to death



Hypothermia (2 of 6)

- Air temperature does not have to be below freezing for it to occur.
- People at risk:
 - Homeless people and those whose homes lack heating
 - Swimmers
 - Geriatric and ill individuals
 - Young infants and children



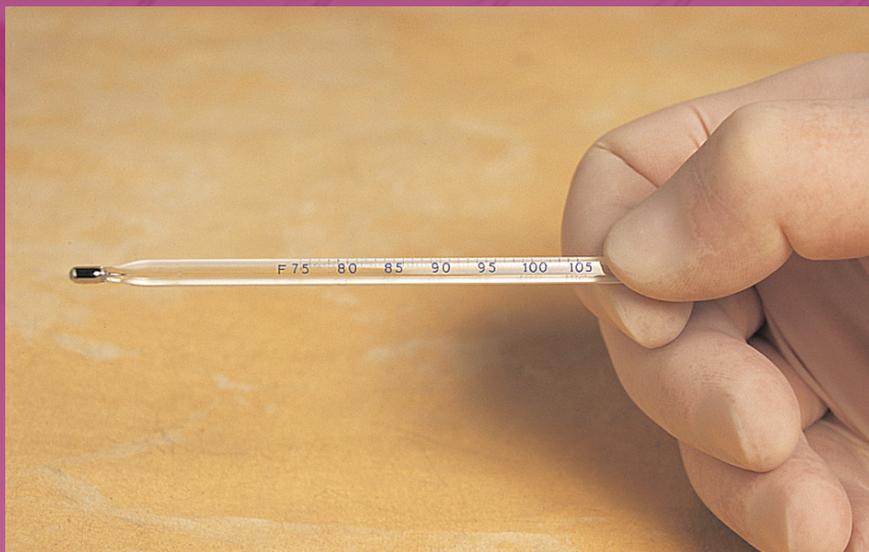
Hypothermia (3 of 6)

- Signs and symptoms become more severe as the core temperature falls.
- Progresses through four general stages

Table 30-1 Characteristics of Systemic Hypothermia

Core temperature	93° to 95°F (34° to 35°C)	89° to 92°F (32° to 33°C)	80° to 88°F (27° to 31°C)	< 80°F (< 27°C)
Signs and symptoms	Shivering, foot stamping	Loss of coordination, muscle stiffness	Coma	Apparent death
Cardiorespiratory response	Constricted blood vessels, rapid breathing	Slowing respirations, slow pulse	Weak pulse, arrhythmias, very slow respirations	Cardiac arrest
Level of consciousness	Withdrawn	Confused, lethargic, sleepy	Unresponsive	Unresponsive

Hypothermia (4 of 6)



- Assess general temperature.
 - Pull back your gloves and place the back of your hand on the patient's abdomen.
 - You may carry a hypothermia thermometer, which registers lower body temperatures.

Hypothermia (5 of 6)

- Mild hypothermia
 - Occurs when the core temperature is between 90°F and 95°F (32°C and 35°C)
 - Patient is usually alert and shivering
 - Pulse rate and respirations are rapid.
 - Skin may appear red, pale, or cyanotic.



Hypothermia (6 of 6)

- More severe hypothermia
 - Occurs when the core temperature is less than 90°F (32°C)
 - Shivering stops.
 - Muscular activity decreases.
- Never assume that a cold, pulseless patient is dead.



Local Cold Injuries (1 of 5)

- Most injuries from cold are confined to exposed parts of the body.
 - Extremities (especially the feet)
 - Ears
 - Nose
 - Face

Local Cold Injuries (2 of 5)



Source: Courtesy of Neil Malcom Winkelmann.



Source: © Chuck Stewart, MD.



Local Cold Injuries (3 of 5)

- Important factors in determining the severity of a local cold injury:
 - Duration of the exposure
 - Temperature to which the body part was exposed
 - Wind velocity during exposure

Local Cold Injuries (4 of 5)

- You should also investigate a number of underlying factors:
 - Exposure to wet conditions
 - Inadequate insulation from cold or wind
 - Restricted circulation from tight clothing or shoes, or circulatory disease
 - Fatigue
 - Poor nutrition

Local Cold Injuries (5 of 5)

- Underlying factors (cont'd):
 - Alcohol or drug abuse
 - Hypothermia
 - Diabetes
 - Cardiovascular disease
 - Older age

Frostnip and Immersion Foot

(1 of 3)

- Frostnip
 - After prolonged exposure to the cold, skin is freezing but deeper tissues are unaffected.
 - Usually affects the ear, nose, and fingers
 - Usually not painful, so the patient often is unaware that a cold injury has occurred

Frostnip and Immersion Foot

(2 of 3)

- Immersion foot
 - Also called trench foot
 - Occurs after prolonged exposure to cold water
 - Common in hikers and hunters
- Signs and symptoms of both
 - Skin is pale and cold to the touch.

Frostnip and Immersion Foot

(3 of 3)

- Signs and symptoms (cont'd)
 - Normal color does not return after palpation of the skin.
 - The skin of the foot may be wrinkled but can also remain soft.
 - The patient reports loss of feeling and sensation in the injured area.

Frostbite (1 of 3)



Source: Courtesy of Dr. Jack Poland/CDC

- Most serious local cold injury because the tissues are actually frozen
- Gangrene requires surgical removal of dead tissue.

Frostbite (2 of 3)

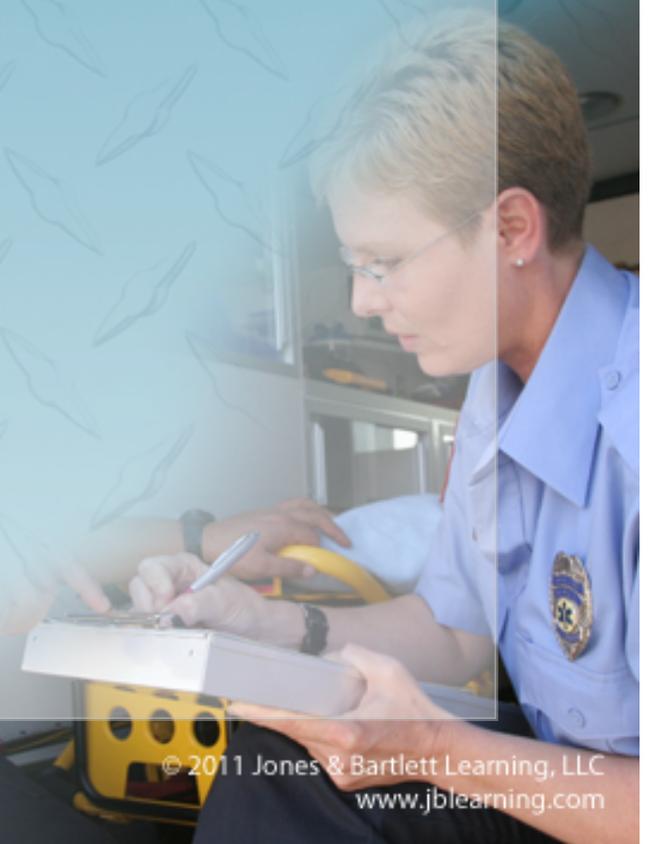
- Signs and symptoms
 - Most frostbitten parts are hard and waxy.
 - The injured part feels firm to frozen as you gently touch it.
 - Blisters and swelling may be present.
 - In light-skinned individuals with a deep injury, the skin may appear red with purple and white, or mottled and cyanotic.

Frostbite (3 of 3)

- The depth of skin damage will vary.
 - With superficial frostbite, only the skin is frozen.
 - With deep frostbite, deeper tissues are frozen.
 - You may not be able to tell superficial from deep frostbite in the field.

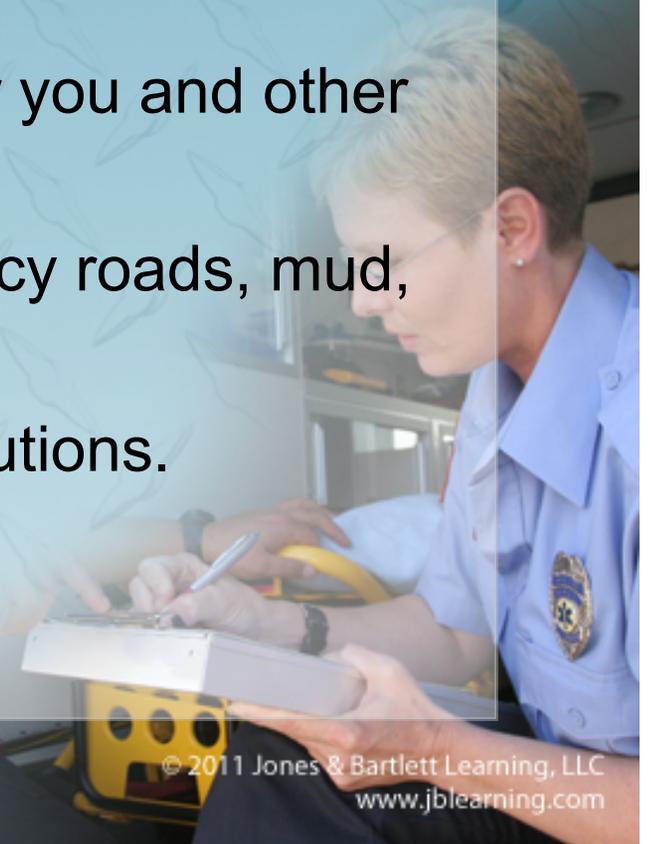
Assessment of Cold Injuries

- Patient assessment steps
 - Scene size-up
 - Primary assessment
 - History taking
 - Secondary assessment
 - Reassessment



Scene Size-up (1 of 2)

- Scene safety
 - Note the weather conditions; they have a large impact on treatment.
 - Ensure that the scene is safe for you and other responders.
 - Identify safety hazards such as icy roads, mud, or wet grass.
 - Use appropriate standard precautions.



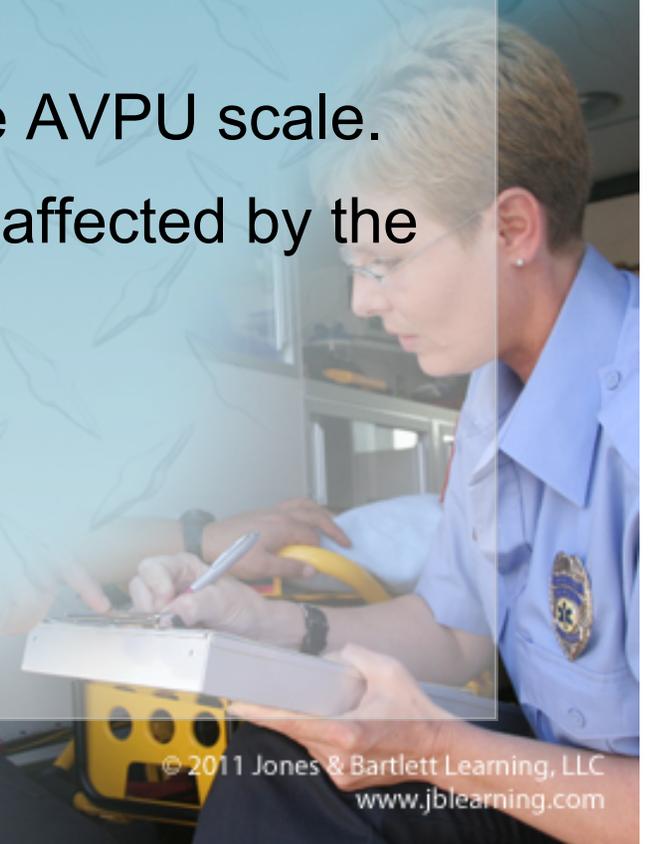
Scene Size-up (2 of 2)

- Scene safety (cont'd)
 - Consider the number of patients.
 - Summon additional help as quickly as possible.
- Mechanism of injury/nature of illness
 - Look for indicators of the MOI.
 - Consider how the MOI produced the injuries expected.



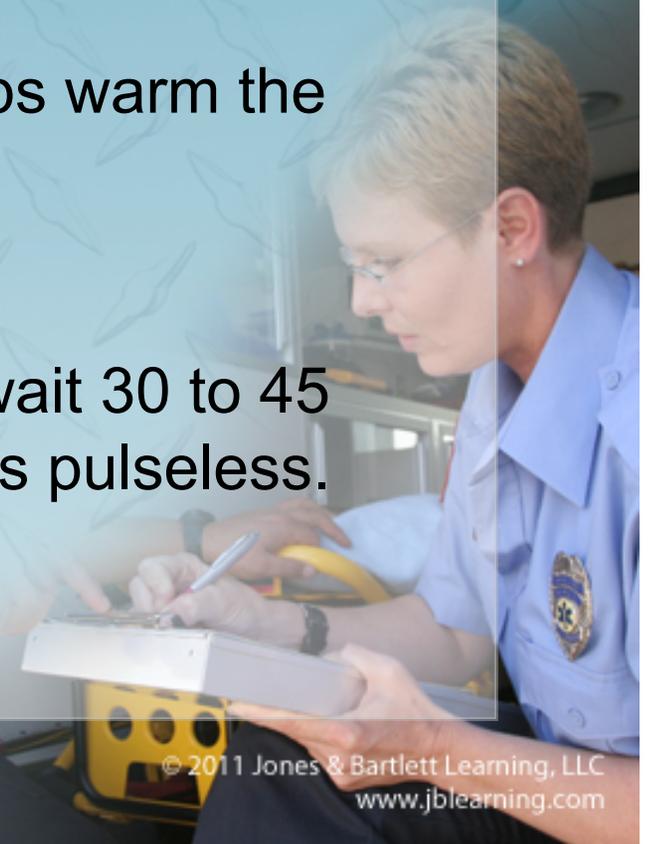
Primary Assessment (1 of 4)

- Form a general impression.
 - Perform a rapid scan.
 - If a life threat exists, treat it.
 - Evaluate mental status using the AVPU scale.
 - An altered mental status can be affected by the intensity of the cold injury.



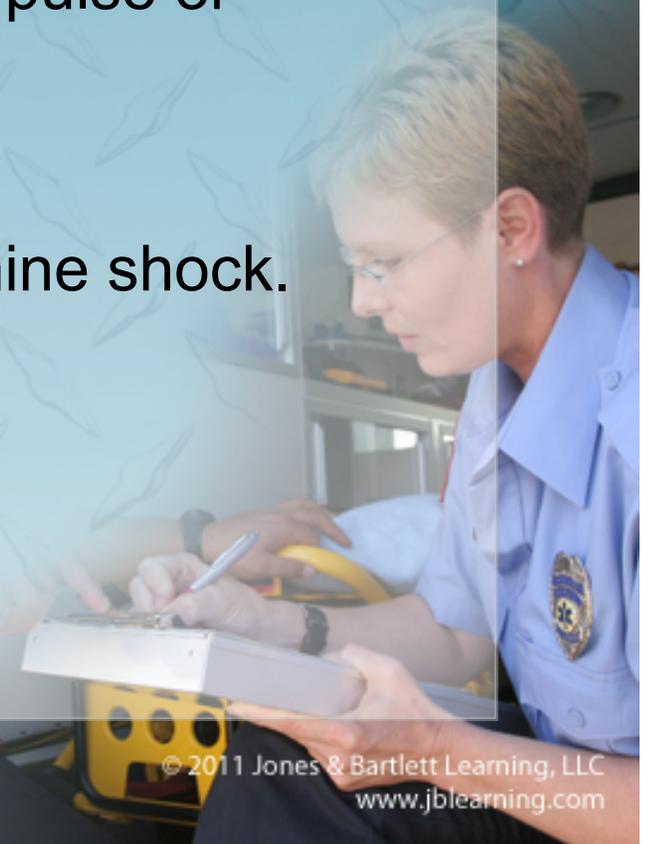
Primary Assessment (2 of 4)

- Airway and breathing
 - Ensure that the patient has an adequate airway and is breathing.
 - Warmed, humidified oxygen helps warm the patient from the inside out.
- Circulation
 - Palpate for a carotid pulse and wait 30 to 45 seconds to decide if the patient is pulseless.



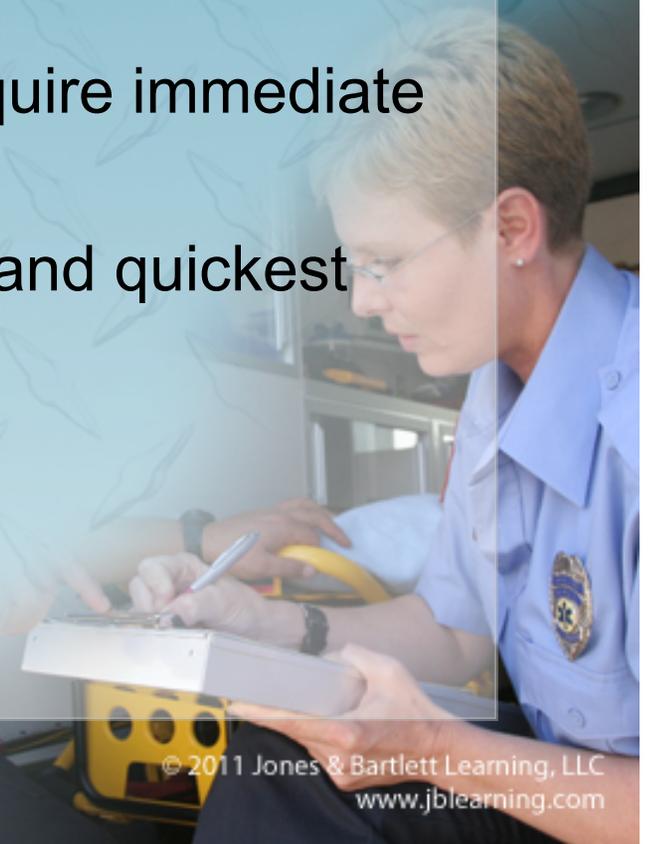
Primary Assessment (3 of 4)

- Circulation (cont'd)
 - The AHA recommends that CPR be started on a patient who has no detectable pulse or breathing.
 - Perfusion will be compromised.
 - Skin will not be helpful to determine shock.
 - Bleeding may be difficult to find.



Primary Assessment (4 of 4)

- Transport decision
 - Complications can include cardiac arrhythmias and blood clotting abnormalities.
 - All patients with hypothermia require immediate transport.
 - Assess the scene for the safest and quickest way to move your patient.



History Taking

- Investigate the chief complaint.
 - Obtain a medical history.
 - Be alert for injury-specific signs and symptoms and any pertinent negatives.
- SAMPLE history
 - Find out how long your patient has been exposed to the cold environment.
 - Exposures may be acute or chronic.



Secondary Assessment (1 of 3)



- Physical examinations
 - Focus on the severity of hypothermia.
 - Assess the areas of the body directly affected by cold exposure.
 - Assess the degree and extent of damage.
 - Pay special attention to skin temperatures, textures, and turgor.

Secondary Assessment (2 of 3)



- Vital signs
 - May be altered by the effects of hypothermia and can be an indicator of its severity
 - Respirations may be slow and shallow.
 - Low blood pressure and a slow pulse indicate moderate to severe hypothermia.
 - Evaluate for changes in mental status.

General Management of Cold Emergencies (1 of 4)



- Move the patient from the cold environment.
- Do not allow the patient to walk.
- Remove any wet clothing.
- Place dry blankets over and under the patient.



General Management of Cold Emergencies (2 of 4)

- If available, give the patient warm, humidified oxygen.
- Handle the patient gently.
- Do not massage the extremities.
- Do not allow the patient to eat, use any stimulants, or smoke or chew tobacco.

General Management of Cold Emergencies (3 of 4)

- If the patient is alert, shivering, responds appropriately, and the core body temperature is between 90°F to 95°F, then the hypothermia is mild.
 - Apply heat packs or hot water bottles to the groin, axillary, and cervical regions.
 - Rewarm the patient slowly.
 - Give warm fluids by mouth.

General Management of Cold Emergencies (4 of 4)

- When the patient has moderate or severe hypothermia, never try to actively rewarm the patient.
 - Passive rewarming should be reserved for an appropriate facility.
 - The goal is to prevent further heat loss.
 - Remove wet clothing, cover with a blanket, and transport.

Emergency Care of Local Cold Injuries (1 of 3)

- Remove the patient from further exposure to the cold.
- Handle the injured part gently, and protect it from further injury.
- Administer oxygen.
- Remove any wet or restricting clothing over the injured part.

Emergency Care of Local Cold Injuries (2 of 3)

- Consider active rewarming.
 - With frostnip, contact with a warm object may be all that is needed.
 - With immersion foot, remove wet shoes, boots, and socks, and rewarm the foot gradually.
 - With a late or deep cold injury, do not apply heat or rewarm the part.

Emergency Care of Local Cold Injuries (3 of 3)

- Rewarming in the field
 - Immerse the frostbitten part in water with a temperature of between 100°F and 105°F (38°C and 40.5°C).
 - Dress the area with dry, sterile dressings.
 - If blisters have formed, do not break them.

Cold Exposure and You

- You are at risk for hypothermia if you work in a cold environment.
- If cold weather search-and-rescue is possible in your area, you need:
 - Survival training
 - Precautionary tips
- Wear appropriate clothing.

Credits

- Chapter opener: Courtesy of BM1 Kevin Erwin/US Coast Guard.
- Background slide image (ambulance): Galina Barskaya/Shutterstock, Inc.
- Background slide images (non-ambulance): © Jones & Bartlett Learning. Courtesy of MIEMSS.