Hypothermia

Emergencies Meeker Fire & Rescue Continuing Education December 2025

HOW DO INJURIES FROM COLD EXPOSURE HAPPEN

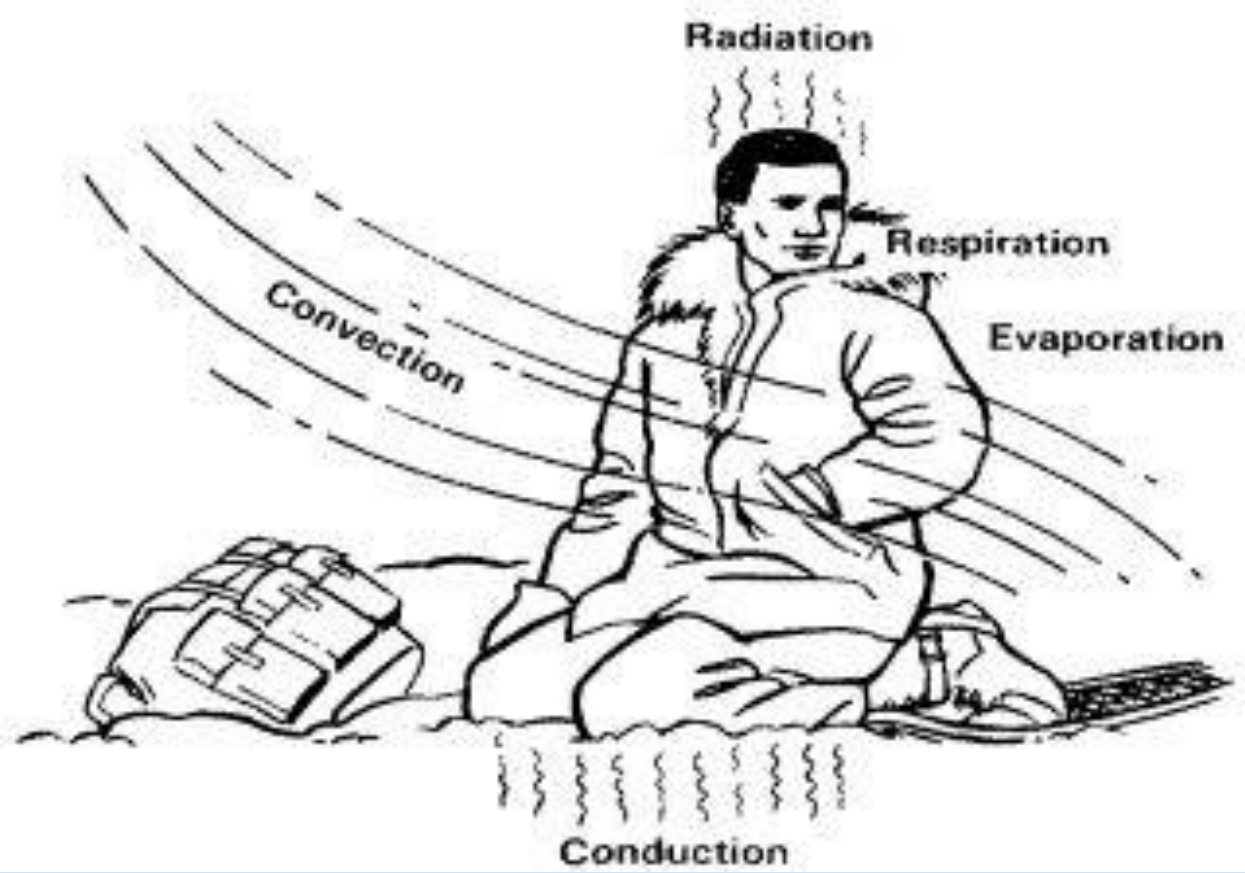
Injuries from the cold occur when heat loss exceeds heat gain.

Have decreased body temperature and prolonged heat loss.

Most hypothermia occurs at temperatures between 30°F and 50°F.

Ways to lose heat

Radiation: Transfer of heat by electromagnetic waves. 60 to 85% of our internal heat leaves via head, face and neck region.



Respiration: exhalation of heat from lungs. Can loose 2 to 9% of heat by breathing.

Evaporation: Heat draws moisture and carries it into space as a vapor.

Conduction: Heat transfer between physical contact Sleeping on cold ground, contact with water, metal objects

Convection: Transfer of energy by movement of air or fluid. 50% of heat is lost through convection

Risk Factors

Common risk factors predispose people to environmental emergencies

- Pre Existing medical conditions
- Younger and older people
- Dehydration
- Overall health and fitness
- Injury
- Acclimation to environment

Factors Affecting The Bodies Ability to Compensate

- Previous cold weather injury
- Inadequate nutrition
- Dehydration
- Alcohol
- Caffeine
- Nicotine
- Over activity, underactivity
- Duration of exposure to the cold
- Clothing
- Diabetes
- Cardiovascular disease
- Older age
- Infants/Children
- Spinal cord injury
- Trauma

What does cold exposure lead to ….

Local Cold Injuries

Most cold-related injuries are confined to exposed body parts.

- Frostnip
- Immersion foot (trench foot)
- Frostbite

Important factors in determining the severity of a local cold injury

- Duration of the exposure
- The temperature to which the body part was exposed
- Wind velocity during exposure
- Consider underlying factors (health, clothing, alcohol, etc)

Frostnip

- After prolonged exposure to the cold, skin may freeze while deeper tissues are unaffected.
- Numbness and pallor of the skin
- Ice crystals form **on** the skin but not in tissue
- Usually affects the ear, nose, and fingers
- Usually not painful, so the patient often is unaware that a cold injury has occurred.
- Symptoms usually resolve within 30 minutes

Immersion Foot (Trench Foot)

- Results from prolonged exposure to cold-wet conditions
- Time is 12 hours to several days.
- Affected extremities feel numb and like a “block of wood”
- Painless appearing bright red before becoming pale or white
- Peripheral pulses become diminished

Frostbite


Courtesy of Dr. Jack Poland/CDC.

Most severe local cold injury occurs when tissues are actually frozen.

Gangrene requires surgical removal of dead tissue.

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.

Frostbite – 1st Degree

- Numbness and erythema
- White/yellow firm plaque
- Mild edema; lack of blisters
- Itching and pain
- Long-term insensitivity to heat and cold can occur

Frostbite – 2nd Degree

- Superficial vesiculation
- Clear/milky fluid surrounded by erythema
- Substantial edema with formation of clear blisters

Frostbite – 3rd Degree

- Deeper blisters
- Purple/blood-containing fluid
- Indicates injury has extended through dermis (deeper into the tissue)

Frostbite – 4th Degree

- “Mummification”
- Injury completely through the skin into subcutaneous tissue, muscle, tendon, bone
- Appears blue gray and hard
- Absence of pain with rewarming

Definition of Hypothermia

The body tries to keep a temperature at 98.6°F.

Lowering of the core temperature below 95°F (35°C)

Body loses the ability to regulate its temperature and generate body heat

Causes of Hypothermia

Primary Hypothermia

Heat production is overcome by stress of excessive cold

Secondary Hypothermia

Impaired Thermoregulation

Endocrine, neoplasm, malnutrition, toxins

Increased Heat Loss

Sepsis, burns, cold infusions, trauma

HYPOTHERMIA

Signs and symptoms become more severe as the core temperature falls.

Progresses through four general stages

TABLE 33-1 Characteristics of Systemic Hypothermia

	Mild	Moderate	Severe	
Extent of Hypothermia	**93.2°F (34°C)**	**93.2° to 86°F (34° to 30°C)**	**<86°F (30°C)**	
Core Temperature	**95° to 93°F (35° to 33.9°C)**	**92° to 89°F (33.3° to 31.7°C)**	**88° to 80°F (31.1° to 26.7°C)**	**<80°F (<26.7°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, dysrhythmias, very slow respirations	Cardiac arrest
Level of consciousness	Withdrawn	Confused, lethargic, sleepy	Unresponsive	Unresponsive

Signs and Symptoms

Mild Hypothermia

- Occurs when the core temperature is greater than 93.2°F (34°C) but less than 98°F (36.7°C).
- Patient is usually alert and shivering.
- Pulse rate and respirations are rapid.
- Skin may appear red, pale, or cyanotic.

Moderate hypothermia

- Occurs when the core temperature is 86°F to 93.2°F (30°C to 34°C).
- Shivering stops.
- Muscular activity decreases.

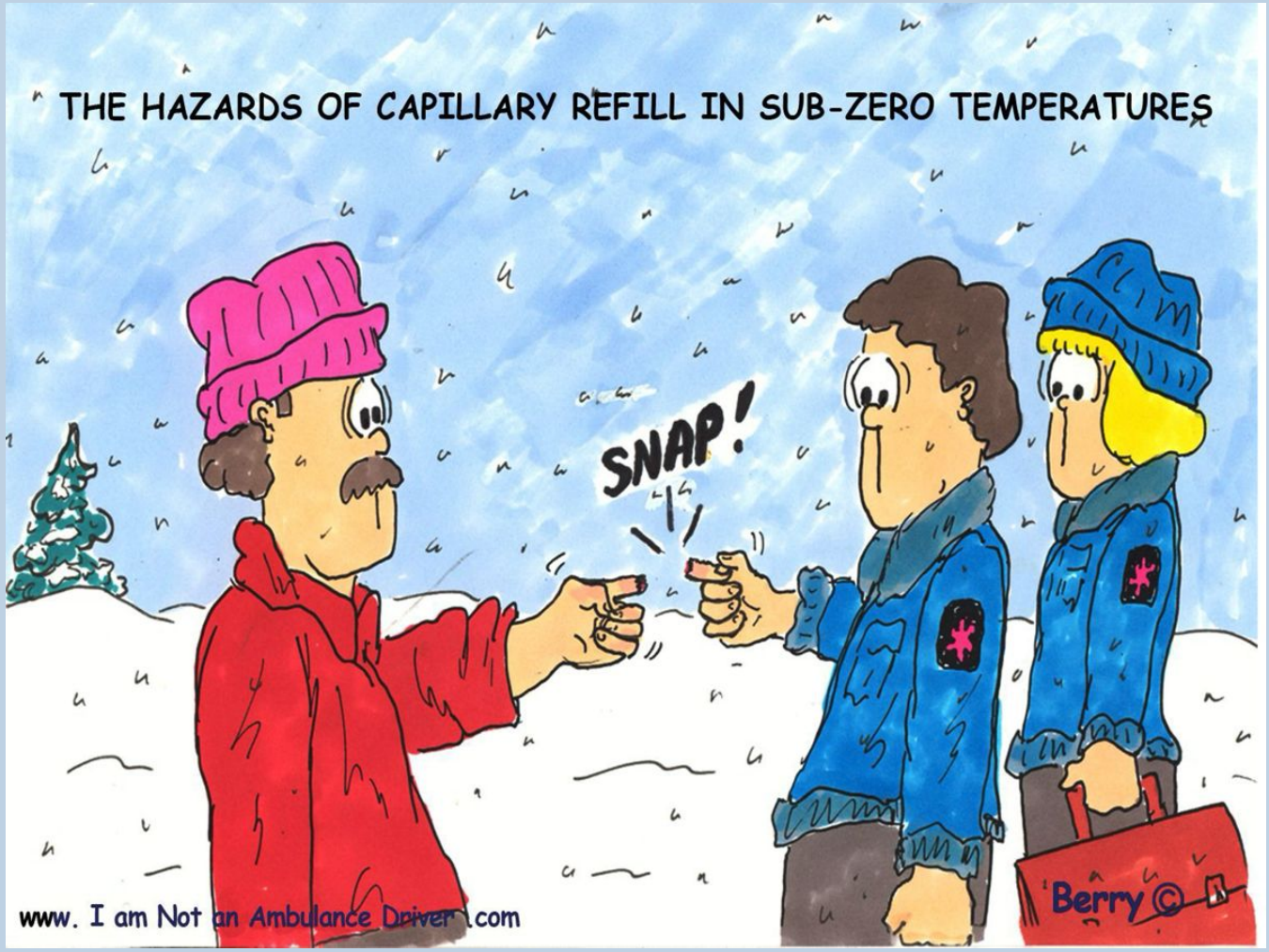
Severe hypothermia

- Occurs when the core temperature is less than 86°F (30°C).
- The patient becomes lethargic and stops fighting.

Beyond Severe Hypothermia

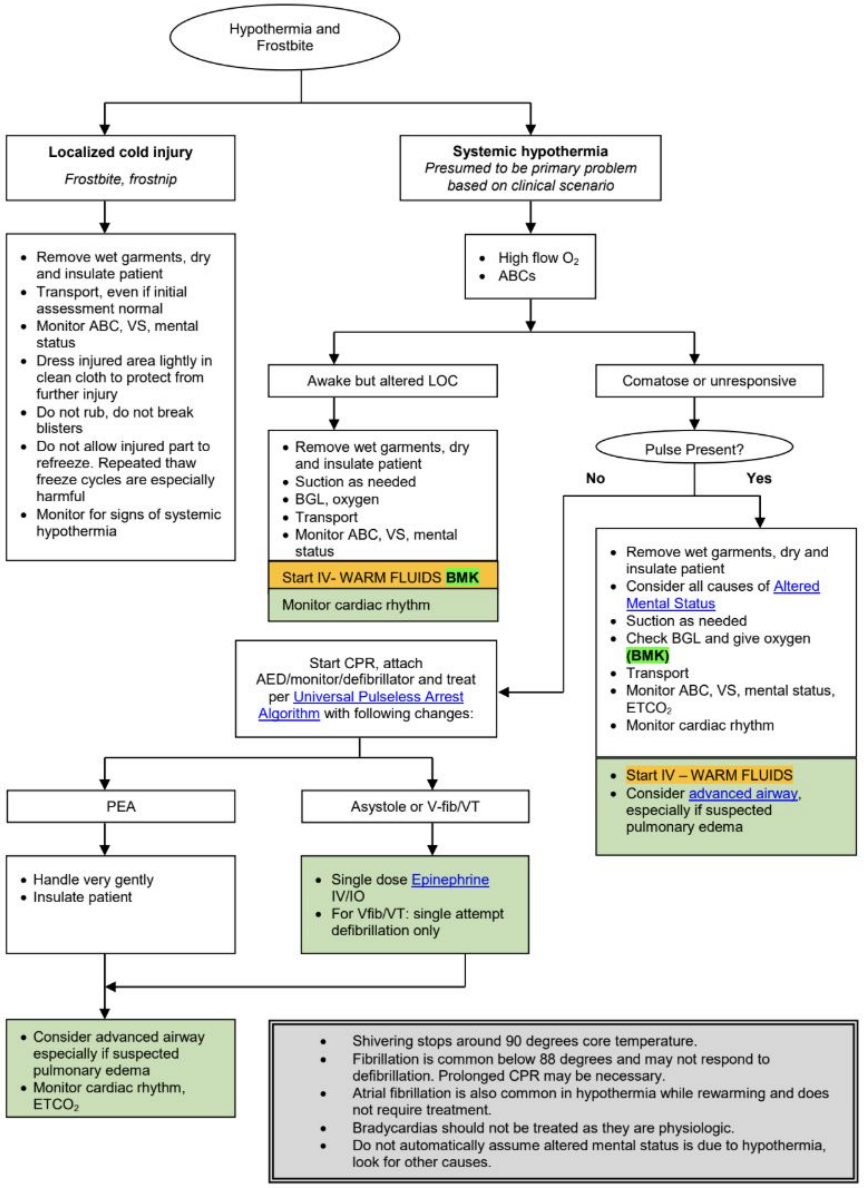
- If body temperature is 80°F or less
  - Pulse becomes slower and weaker.
  - Cardiac dysrhythmias may occur.
  - Patient may appear dead (or in a coma).
- Never assume a cold, pulseless patient is dead.

What to do for a patient with cold exposure



5020 ENVIRONMENTAL HYPOTHERMIA

EMR | EMT/EMT-IV | AEMT | Intermediate | Paramedic



Scene Size-up

Scene safety

- Note the environmental conditions.
- 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.
- Consider the number of patients.
- Summon additional help as quickly as possible.

Mechanism of injury/nature of illness

Primary Assessment

- Perform a rapid triage - sick or not sick
- If a life threat exists, treat it.
- Check core temperature.
- Evaluate mental status using the AVPU scale.
- An altered mental status can be affected by the intensity of the cold injury.
- History questions (risk factors)

Transport decision

All patients with hypothermia require immediate transport.

Rough handling of a hypothermic patient may cause a cold, slow, weak heart to fibrillate.

Primary Assessment (Continued)

If the patient is in cardiac arrest, begin compressions.

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 for up to 60 seconds to decide if the patient is pulseless.

The AHA recommends that CPR be started on a patient who has no detectable pulse or breathing.

Perfusion will be compromised.

Bleeding may be difficult to find.

Secondary Assessment

Physical examination:

- Focus on the severity of hypothermia.
- Assess the areas of the body directly affected by cold exposure.
- Assess the degree and extent of damage.

Monitoring devices

- Determine a core body temperature using a hypothermia thermometer.
- Pulse oximetry will often be inaccurate.

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

Move the patient from the cold environment.

Remove any wet clothing.

Remove constricting clothing

Place dry blankets over and under the patient.

If available, give the patient warm, humidified oxygen.

Handle the patient gently.

Do not massage the extremities.

Do not allow the patient to eat or use any stimulants.

General Management of Cold Emergencies (continued)

If transport will be delayed, 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.
- Never rub or massage injured tissues.

Rewarming in the field

- Immerse the frostbitten part in water between 102°F and 104°F.
- Dress the area with dry, sterile dressings.
- If blisters have formed, do not break them.Cover blisters with a dry, sterile dressing.
- Never attempt rewarming if there is any chance that the part may freeze again.

General Management of Cold Emergencies (continued)

Mild hypothermia

- Patient is alert, shivering, and responds appropriately.
- Place the patient in a warm environment, and remove wet clothing.
- Apply heat packs or hot water bottles to the groin, axillary, and cervical regions.
- Give warm fluids by mouth.

Moderate or severe hypothermia

- Do not try to actively rewarm the patient.
- The goal is to prevent further heat loss.
- Remove the patient from the cold environment.
- Remove wet clothing, cover with a blanket, and transport.

Cold Exposure and You

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

Questions ???