Heat / Cold Injury and Illness Prevention

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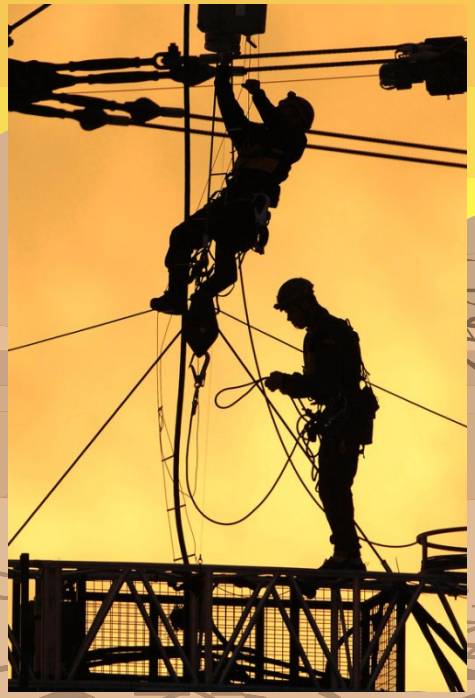
How ***HEAT*** and ***COLD*** puts Stress on your Body



Generation of Body Heat

Metabolic Heat – generated through the digestion of food, work, and exercise.

Environmental Heat – absorbed from the surrounding environment.

Objectives

- Understand how the body responds to heat and cold temperatures
- Understand how to work safely in hot and cold environments
- Recognize what happens when your body's temperature system fails, and the factors involved
- Describe the types of heat and cold related emergencies
- Describe basic preventive measures for heat and cold stress
- Review available Hot and Cold Phone-apps.

The Body's Response to Heat

- The body tries to maintain a constant internal temperature
- When the internal temperature rises, the body attempts to get rid of excess heat by:
  - Increasing blood flow to skin surface
  - Releasing sweat onto skin surface

AM I HYDRATED?

Urine Color Chart

1		If your urine matches these colors, you are drinking enough fluids
2		Drink more water to get the ideal color in Shade 1 and 2.
3		Dehydrated
4		You may suffer from cramps and heat-related problems
5		Health risk! Drink more water.
6		Health risk! Drink more water.
7		Health risk! Drink more water.
8		Health risk! Drink more water.

Effects of Body's Response

- Reduced blood flow to brain
  - Reduced mental alertness and comprehension
- Reduced blood flow to active muscles
  - Fatigue, loss of strength
- Increased sweating
  - Slipperiness

Potential result of too much heat = a Higher rate of mistakes/injuries

When Cooling Mechanisms Fail

- High air temperature reduces effectiveness of the cooling system
- High humidity reduces evaporation rate of sweat
- Excess loss of sodium
- Dehydration

HEAT EXHAUSTION OR HEAT STROKE?

HEAT EXHAUSTION SYMPTOMS

1. Faint or dizzy
2. Excessive sweating
3. Cool, pale, clammy skin
4. Nausea, vomiting
5. Rapid, weak pulse
6. Muscle cramps

HOW TO TREAT IT

1. Move to cooler location
2. Drink water
3. Take a cool shower or use cold compresses

HEAT STROKE SYMPTOMS

1. Throbbing headache
2. No sweating
3. Body temp above 103° Red, hot, dry skin
4. Nausea, vomiting
5. Rapid, strong pulse
6. May lose consciousness

HOW TO TREAT IT

1. Get emergency help
2. Keep cool until treated

Heat Stroke

- Cause:
  - Total breakdown of body's cooling system
- Signs & Symptoms:
  - High body temperature (>103)
  - Sweating stops and skin is hot, red, and dry
  - Headache, dizziness, weakness, rapid pulse, chills, difficulty breathing
  - If untreated, delirium and unconsciousness

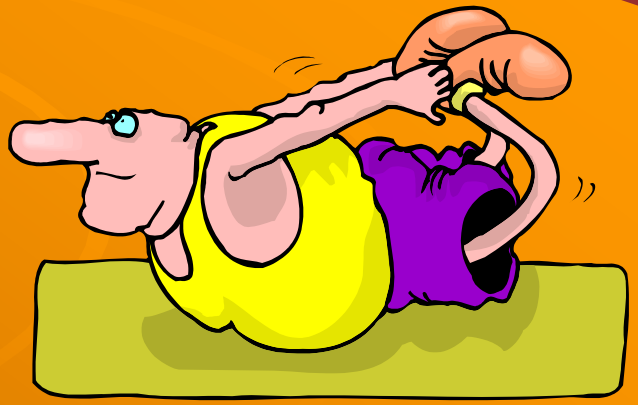
Heat Stroke - Treatment

- Treat as a medical emergency
  - May result in death, if not treated
- Move victim to cool area
- Give small cup of water (if not nauseous)
- Loosen and/or remove clothing
- Cool with water or massage with ice
- Fan vigorously to improve evaporation

Heat Exhaustion

- Cause:
  - Too much loss of water & salt: sweating
- Signs & Symptoms:
  - Heavy sweating, intense thirst, skin is pale and cool, rapid pulse, fatigue or weakness, nausea & vomiting, headache, blurred vision, fainting
- Treatment:
  - Move to cool area, rest with legs elevated, loosen clothing, give fluids, cool with water & fan

Heat Cramps



- Cause:
  - Loss of salt
- Signs & Symptoms:
  - Painful spasms in arms, legs and abdomen
  - Hot, moist skin

- Treatment:
  - Drink water, rest, massage cramped areas

Dehydration

- Cause:
  - Excessive fluid loss
- Signs & symptoms:
  - Fatigue, weakness, dry mouth
- Treatment:
  - Fluids and salt replacement

Heat Rash

- Cause:
  - Inflamed skin
- Signs & Symptoms:
  - Rash w/ pink pimples, itching, tingling
- Treatment:
  - Cleanse area & dry, apply calamine or other lotions

Preventing Heat Illnesses

- Know the factors that increase risk
  - The environment you're working in
  - The work you're doing
  - Your own conditioning
- Think about what you can do to prevent heat stress

Environmental Factors

- Air temperature
- Humidity
- Radiant heat source
- Air circulation

Work-related Factors

- Workload
  - Type of work
  - Level of physical activity
  - Time spent working
- Clothing
  - Weight (heavy v. breathable)
  - Color (dark v. light)
  - Personal protective equipment and clothing

Personal Factors

- Age
- Weight/fitness
- Use of drugs, alcohol, caffeine, medication
- Prior heat-related illness

Prevention

- Drink plenty of fluids
  - Don't rely on your thirst
  - 5-7 oz. every 20 minutes

- Acclimatization: adjust to the heat
  - The body takes 3-5 days to get used to the heat
  - Be careful when returning from a change in routine: (i.e. vacation)

Prevention (continued)

- Choose proper clothing
  - Choose light colors and lightest weight possible
  - Select proper personal protective equipment
- Schedule tasks with some consideration of the heat
  - Work/rest cycles
  - Heaviest tasks early morning or dusk
- Eat properly, get enough sleep & rest

Review

- How the body responds to heat
- Why cooling mechanisms fail
- What factors contribute to heat-related illness
- How to recognize and treat the most common heat disorders
- How to prevent heat-related illness

Cold Weather Precautions

BE PREPARED!

The Weather Channel

Frostbite vs. Hypothermia

- Frostbite: A condition when the body tissue freezes after being exposed to the cold environment.
- Hypothermia: A condition when the entire body cools because the body's ability to regulate temperature fails. The person may die if not given prompt medical care.

Cold Exposure

- Cold exposure may cause injury to:
  - Feet – Hands – Ears – Nose
  - Whole body (hypothermia)

There are five ways the body can lose heat:

Cold Exposure

- Conduction – direct transfer of heat from a part of the body to a colder object by direct contact

  i.e., when a warm hand touches cold metal or ice
- Heat can also be gained if the substance being touched is warm.

Cold Exposure

- Convection – transfer of heat to circulating air

  I.e., 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

- 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

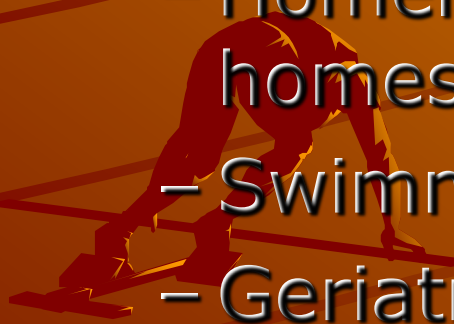
- The rate and amount of heat loss or gain by the body can be modified in three ways:
  - Increase or decrease in heat production
  - Move to an area where heat loss can be decreased or increased
  - Wear insulated clothing, which helps decrease heat loss in several ways

Hypothermia

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

Hypothermia

- 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

- 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

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

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

Care for Hypothermia

- Move person to warm place
- Check ABC's & care for shock
- Remove wet clothing & cover with blankets
- Monitor use of heating pads to avoid unintentional burns
- Warm the person SLOWLY and handle person carefully

Local Cold Emergencies

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

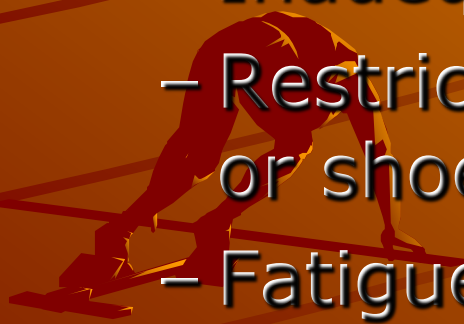
LocalCold Emergencies

Local Cold Emergencies

- 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

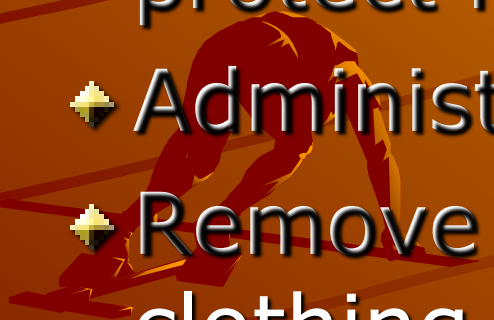
Local Cold Emergencies

- 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, age
  - Poor nutrition
  - CVD, diabetes



Emergency Care of Local Cold Injuries

- 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.

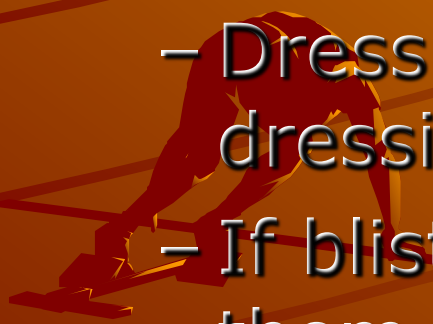


Emergency Care of Local Cold Injuries

- 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.

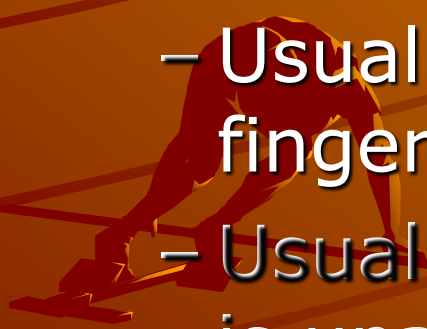
Emergency Care of Local Cold Injuries

- 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.



Frostnip & Immersion Foot

- 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 & Immersion Foot

- Immersion foot:
  - Also called trench foot
  - Occurs after prolonged exposure to cold water
  - Common in hikers and hunters
  - Signs and symptoms of both include pale skin and cold to the touch
  - Normal color does not return after palpating the skin
  - Loss of feeling/sensation

Frostbite

Most serious local cold injury because the tissues are frozen.

Gangrene requires surgical removal of dead tissue.

Frostbite

- Signs and symptoms include:
  - 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

- 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.

Care for Frostbite

- Remove wet clothing and jewelry from affected area
- Soak the frostbitten area in ***WARM*** water
- Cover with dry, sterile dressings. ***DO NOT rub the frostbitten area!***
- Check ABC's and care for shock.
- ***DO NOT*** rewarm a frostbitten part if there is a danger of it refreezing.

General Management of Cold Emergencies

- 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

- 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

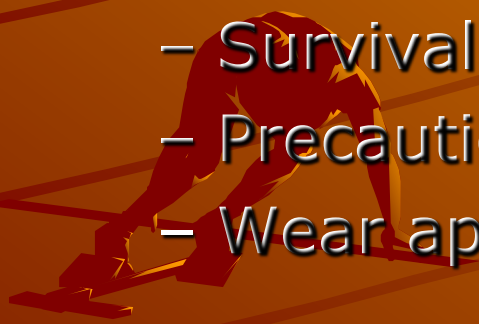
- If the patient is alert, shivering, responds appropriately, and the core body temperature is between 90˚ F to 95˚ F, thenthe hypothermia is mild.
- Apply heat packs or hot water bottles to the groin, axillary, and cervical regions.
- Rewarm the patient slowly.
- Give warm fluids by mouth.

General Management of Cold Emergencies

- 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.

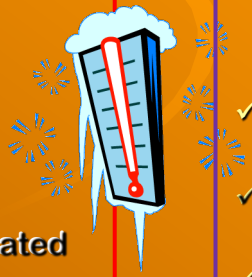
Cold Exposure & You

- 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



Cold Impacts & Preparedness

Potential Impacts



- Frozen pipes could become a significant problem.
- Dead car batteries could strand people.
- Any power outages that occur (weather related or not) could leave people without heat.
- People may improperly use secondary sources of heat; increasing chances for Carbon Monoxide poisoning.
- Structure fires could escalate.
- Frostbite/hypothermia.
- Ice jams could become a problem.

Safety Tips

- ✓ Stay indoors during the worst part of the extreme cold.
- ✓ Keep a winter survival kit in your vehicle if you must travel.
- ✓ Check tire pressure, antifreeze levels, heater/ defroster, etc.
- ✓ Learn how to shut off water valves for potential pipe bursts.
- ✓ Trickle water through their pipes and to increase heating in crawl/ceiling spaces to prevent freezing in the first place.
- ✓ Check on the elderly.
- ✓ Bring pets inside.

How to Dress

- Wear layers of loose-fitting, lightweight clothing.
- Wear a hat.
- Cover your mouth to protect your lungs from extreme cold.
- Mittens, snug at the wrist, are better than gloves.
- Try to stay dry and out of the wind.

For more winter safety information, visit: http://www.ready.gov/winter-weather

National Weather Service
Binghamton NY

Follow Us:

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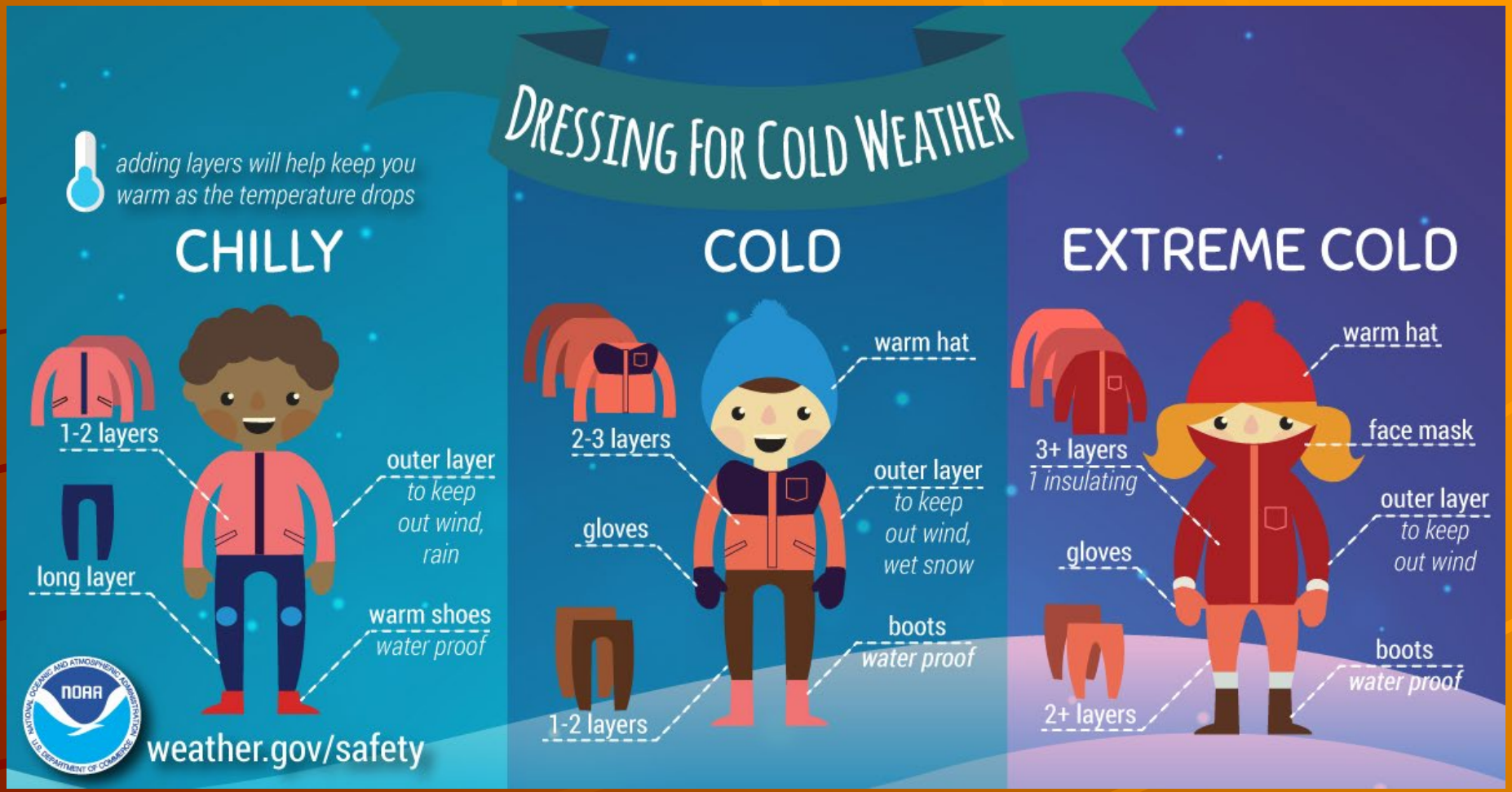
#WinterSafety

Cold Weather Preparedness Tips



QUESTIONS