**Overview**

- Thermoregulatory Emergencies
  - Temperature Regulation in the Body
  - Exposure to Cold
  - Exposure to Heat

- Drowning and Near Drowning
  - Emergency Medical Care of the Near-Drowning Patient

- Bites and Stings
  - Signs and Symptoms
  - Emergency Medical Care for Bites and Stings
Thermoregulatory Emergencies

- Any emergency involving a change in the temperature of the body

Temperature Regulation in the Body

- To work effectively, the human body must maintain a relatively constant internal temperature
- Alterations in the temperature of the body cause profound changes in vital chemical functions and can be life-threatening

The body performs a delicate balancing act between the heat generated in the body and the heat lost from it.
Temperature Regulation in the Body

- Decreasing body temperature
  - The body attempts to minimize heat loss
    - Peripheral vasoconstriction
    - Shivering
- Rising body temperature
  - The body tries to maintain its temperature by losing heat
    - Vasodilatation
    - Perspiration

Temperature Regulation in the Body

- Types of heat loss

  - Conduction
    - The transfer of heat directly from one object to another
  - Convection
    - The transfer of heat to moving air or liquid
  - Evaporation
    - The transfer of heat that occurs when a liquid changes into a gas
  - Radiation
    - The loss of heat, in the form of infrared energy, to cooler surroundings
Temperature Regulation in the Body

- Air breathed into the body must be humidified and warmed to body temperature to be used by the lungs
- This warm, humidified air is then exhaled, carrying heat out of the body
- This constant cycle of inhalation, warming and humidifying, and exhaling expends much energy and leads to tremendous heat loss and dehydration

The EMT-Basic must be aware of methods of heat loss when treating patients with hypothermia to prevent further heat loss.

Exposure to Cold

- Hypothermia
  - The condition in which the body temperature is below normal (98.6°F or 37°C)
Exposure to Cold

Predisposing factors
- Cold environments
- Immersion in water
- Age (elderly and the very young)
- Alcohol
- Shock

Exposure to Cold

Predisposing factors
- Head or spinal cord injury
- Burns
- Generalized infection
- Diabetes
- Hypoglycemia
- Some medications and poisons
Exposure to Cold

- Signs and symptoms of generalized hypothermia
  - Environmental conditions of cold exposure
    - Obvious exposure
    - Subtle exposure
      - Ethanol ingestion
      - Underlying illness
      - Overdose/poisoning
      - Major trauma
      - Outdoor resuscitation
      - Ambient temperature decreased (e.g., home of elderly patient)

- Cool/cold skin temperature
  - Place the back of your hand between the clothing and the patient’s abdomen to assess the general temperature of the patient

- Decreasing mental status or motor function—correlates with the degree of hypothermia
  - Poor coordination
  - Memory disturbances
  - Reduced or loss of sensation to touch
  - Mood changes
  - Less communicative
  - Dizziness
  - Speech difficulty
  - Poor judgment
    - Patient may actually remove clothing
Exposure to Cold

- Signs and symptoms of generalized hypothermia
  - Stiff or rigid posture
  - Muscular rigidity
  - Shivering may be present or absent

- Complaints of joint/muscle stiffness

Exposure to Cold

- Signs and symptoms of generalized hypothermia
  - Breathing variations
    - Early—rapid breathing
    - Late—shallow, slow, or even absent breathing

Exposure to Cold

- Signs and symptoms of generalized hypothermia
  - Slowly responding pupils
Exposure to Cold

- Signs and symptoms of generalized hypothermia
  - Pulse
    - Early—rapid
    - Late—slow and barely palpable and/or irregular, or completely absent
  - Low to absent blood pressure

Exposure to Cold

- Signs and symptoms of generalized hypothermia
  - Skin
    - Red—early
    - Pale
    - Cyanotic—blue-gray
    - Stiff/hard

Exposure to Cold

- Focused history
  - What was the source of the exposure?
  - What were the environmental conditions?
  - Was there a loss of consciousness?
  - Are the effects general or local?
Emergency Care for Generalized Hypothermia

- Protect the patient from further heat loss
  - Remove the patient from the environment
  - Remove wet clothing and cover with blanket

- Handle the patient extremely gently; avoid rough handling
- Do not allow the patient to walk or exert himself
Emergency Medical Care for Generalized Hypothermia

- Administer oxygen if not already done as part of the initial assessment
  - Oxygen administered should be warmed and humidified, if possible

Emergency Medical Care for Generalized Hypothermia

- Assess pulses for 30-45 seconds before starting CPR

Emergency Medical Care for Generalized Hypothermia

- If the patient is alert and responding appropriately, actively rewarm
  - Warm blankets
  - Apply heat packs or hot water bottles
    - Groin
    - Axilla
    - Cervical region
  - Turn the heat up high in the patient compartment of the ambulance
  - Do not allow the patient to eat or drink stimulants
- Do not massage extremities
Emergency Medical Care for Generalized Hypothermia

- If the patient is unresponsive or not responding appropriately, passively rewarm
  - Warm blankets
  - Turn the heat up high in the patient compartment of the ambulance
  - Do not allow the patient to eat or drink stimulants
- Do not massage extremities

Exposure to Cold

- Local cold injuries
  - Can present a danger to the extremities and other body tissues
  - Result from decreased blood flow in a cold part of the body or the actual freezing of a body part
  - Occur in a gradual progression: the deeper the freezing occurs, the more damage will result
  - Are most common in the fingers, toes, ears, nose, and face

Exposure to Cold

- Local cold injuries
  - Predisposing factors
    - A history of local cold injury may have damaged the blood vessels in an extremity, making it more susceptible to cold injuries
    - Smoking constricts blood vessels to extremities and also increases the likelihood of local cold injuries
Exposure to Cold

- Local cold injuries
  - Signs and symptoms—early or superficial injury
    - Pale skin with delayed capillary refill
    - Loss of feeling and sensation in the injured area
    - Skin still soft
    - Tingling sensation when rewarmed

Exposure to Cold

- Local cold injuries—late or deep injury
  - White or waxy skin
  - Firm or frozen feeling on palpation
  - Swelling and blisters
  - Loss of sensation in the injured area
  - If the injury has thawed or partially thawed, the skin may appear flushed with areas that are purple, pale, mottled, or cyanotic
Emergency Care for Local Cold Injuries

- Rewarming of local cold injuries is extremely painful and best performed in the hospital where the patient can be given medication for the pain.

Emergency Care for Local Cold Injuries

- Remove the patient from the cold environment
- Protect the cold extremity from further injury
  - The tissues in the cold extremity are susceptible to additional injury; prevent unnecessary contact with that extremity
- Administer oxygen if you have not already done so
- Remove wet or restrictive clothing and all jewelry
- Splint the extremity, and cover the injury with dry, sterile dressings

Actions to avoid:

- **DO NOT** reexpose the area to the cold
- **DO NOT** break blisters
- **DO NOT** rub or massage the area
- **DO NOT** apply heat or rewarm the area
- **DO NOT** allow the patient to walk on an affected extremity
Emergency Care for Local Cold Injuries

- If you have an extremely long transport time or if transportation to a hospital is delayed, consider rewarming the injury rapidly in the field after contacting medical direction.

To rapidly rewarm the area:

- Immersing affected part in warm (102°-104° F or 38°-39° C) water
  - The water will become cool from the cold part that is immersed
  - Be sure to keep adding warm water
  - Continuously stir the water
- Continue immersion until the skin is soft and the color and sensation have returned
  - Do not rub the area dry; pat gently
- Dress the injury with dry sterile dressings
  - If the injury is on the hand or foot, place dressings between the fingers and toes
- Protect the injured area from refreezing
Exposure to Heat

- Hyperthermia is present anytime a patient’s internal temperature rises above normal (37°C; 98.6°F).
- The body can warm itself more effectively in the cold than cool itself in the heat.
- Delicate central nervous system tissue is extremely sensitive to high body temperatures; therefore, hyperthermia can be a severe life threat.

Exposure to Heat

- Predisposing factors
  - Vigorous activity
  - Elderly
  - Infants and newborns
  - Heart disease
  - Dehydration
  - Obesity
  - Previous history of hyperthermia
  - Fever
  - Fatigue
  - Diabetes
  - Drugs and medications

Exposure to Heat

- Signs and symptoms of generalized hyperthermia
  - Muscle cramps
  - Weakness or exhaustion
  - Dizziness or fainting
  - Rapid, pounding heart beat
  - Altered mental status
  - Moist, pale, cool, or normal skin
  - Nausea and vomiting
  - Abdominal cramps
  - Hot skin
Emergency Care for Generalized Hyperthermia

- Patients with moist, pale, cool, or normal skin
  - Move the patient from the heat to a cool environment
  - Administer oxygen if you have not already done so during the initial assessment
  - Loosen or remove clothing
  - Cool the patient by fanning
  - Place a responsive patient in the supine position with legs elevated
  - Unless the patient is nauseated, or local protocol disagrees, give cool water to drink

- Patients with hot, dry skin
  - Remove the patient from the heat to a cool environment
  - Apply cool packs to the patient’s neck, groin, and armpits
  - Keep the patient’s skin wet by applying water with a sponge or wet towels
  - Fan the patient aggressively
  - Transport the patient immediately

Drowning and Near Drowning

- Drowning
  - Death following immersion in water (or any other liquid)

- Near drowning
  - Occurs when a patient survives an immersion incident
Water rescue requires specialized training—NEVER ENDANGER yourself or others by attempting something you are not trained to do.

- Immobilize the spine if trauma is suspected
- Ensure an adequate airway
- Provide oxygen and ventilate if necessary
- Provide external chest compressions if the patient is pulseless
- Suction as needed
Emergency Care for Drowning and Near Drowning

- If gastric distention interferes with artificial ventilation, place the patient on the left side.

- With suction immediately available, place your hand over the epigastric area and apply firm pressure to relieve the distention.

DO NOT attempt to relieve gastric distention unless it interferes with artificial ventilation.

There is a significant risk of aspiration.

In some cases, patients have survived after extremely long periods of submersion in cold water.

Any patient who is found pulseless and apneic following submersion in cold water should be resuscitated.
Bites and Stings

- Signs and symptoms
  - History of bite or sting
  - Pain
  - Redness
  - Swelling
  - Weakness
  - Dizziness
  - Chills
  - Fever
  - Nausea
  - Vomiting
  - Bite marks
  - Stinger

Bites and Stings

- Wasp sting with systemic reaction

Bites and Stings

- Jellyfish sting
Bites and Stings

- Snake bites

Bites and Stings

- Emergency medical care for bites and stings
  - If stinger present, remove it
  - Scrape stinger out (e.g., with edge of card)
  - Avoid using tweezers or forceps as these can squeeze venom from the venom sac into the wound
  - Wash area gently
  - Remove jewelry from injured area before swelling begins, if possible
  - Place injection site slightly below the level of the patient’s heart
  - Do not apply cold to snakebite
  - Consult medical direction regarding constricting band for snakebite
  - Observe for development of signs and symptoms of an allergic reaction; treat as needed

Bites and Stings

- Proper removal of stinger
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