Chapter 33 - Environmental Emergencies

OBJECTIVES

33.1 Define key terms introduced in this chapter. Slides 13–14, 17, 29, 32, 38.
33.2 Describe the process of heat loss and heat production by the body. Slides 13, 21.

continued

OBJECTIVES

33.4 Recognize signs and symptoms of hypothermia. Slide 16.
33.5 Describe the indications, contraindications, benefits, and risks of passive and active rewarming techniques. Slide 17.

continued
Chapter 33 - Environmental Emergencies

OBJECTIVES

33.6 Prioritize steps in assessment and management of patients with varying degrees of hypothermia. Slides 16, 18
33.7 Discuss assessment and management for early or superficial local cold injury and for late or deep local cold injury. Slide 19

continued

OBJECTIVES

33.8 Discuss the effects of heat on the human body. Slide 21
33.9 Differentiate between assessment and management priorities for heat emergency patients with moist, pale, normal-to-cool skin, and those with hot skin that is either dry or moist. Slides 22–25

continued

OBJECTIVES

33.10 Anticipate the types of injuries and medical conditions that may be associated with water-related accidents. Slide 27
33.11 Discuss the assessment and management of the following water-related emergencies: drowning (including rescue breathing and care for possible spinal injuries), diving accidents, and scuba diving accidents. Slides 28–32

continued
OBJECTIVES

33.12 Discuss the assessment and management of the following types of bites and stings: insect bites and stings, snakebites, and poisoning from marine life. Slides 38–40

MULTIMEDIA

• Slide 36 Emergency: Near Drowning Video
• Slide 41 Effects of Venomous Snake Bites Video

CORE CONCEPTS

• Effects on the body of generalized hypothermia; assessment and care for hypothermia
• Effects on the body of local cold injuries; assessment and care for local cold injuries

continued
Chapter 33 - Environmental Emergencies

CORE CONCEPTS

- Personal effects on the body of exposure to heat; assessment and care for patients suffering from heat exposure
- Signs, symptoms, and treatment for drowning and other water-related injuries
- Signs, symptoms, and treatment for bites and stings

Topics

- Exposure to Cold
- Exposure to Heat
- Water-Related Emergencies
- Bites and Stings

Exposure to Cold
How the Body Loses Heat

• Conduction
• Convection
• Radiation
• Evaporation
• Respiration

Generalized Hypothermia

• Exposure to cold reduces body heat
• Body is unable to maintain proper core temperature
• May lead to death
• Predisposing factors of hypothermia
  – Injury
  – Chronic illness
  – Geriatric/pediatric

Generalized Hypothermia

• Obvious and subtle exposure
  – Alcohol ingestion
  – Underlying illness
  – Overdose or poisoning
  – Major trauma
Assessment: Hypothermia

- Shivering, in early stages
- Numbness
- Stiff or rigid posture
- Drowsiness
- Rapid breathing or pulse
- Loss of motor coordination
- Joint/muscle stiffness
- Unconsciousness
- Cool abdominal skin temperature

Rewarming

- Passive
  - Cover patient
  - Remove wet clothing
- Active
  - Apply external heat source
- Central
  - Apply heat to lateral chest, neck, armpits, and groin

Extreme Hypothermia

- Patient unconscious, no discernible vital signs
  - Heart rate can slow to 10 beats/minute
  - Very cold to touch
- If no pulse, start CPR with AED
- If pulse present, care as for any unresponsive patient
  - “You’re not dead until you’re warm and dead”
Localized Cold Injuries

- Most commonly affects ears, nose, face, hands, and feet
  - Blood flow limited by constriction of blood vessels
  - Tissues freeze, may form ice crystals
- Early/superficial (frostnip)
  - Remove from cold and cover
- Late/deep (frostbite)
  - Cover and immobilize gently

Exposure to Heat

- Heat not needed for temperature maintenance, and not lost, creates hyperthermia
- Left unchecked, leads to death
- Heat cramps and heat exhaustion
  - Moist, pale, normal-to-cool skin
- Heat stroke
  - Hot, dry, or possibly moist skin

Effects of Heat on Body

- Left unchecked, leads to death
- Heat cramps and heat exhaustion
  - Moist, pale, normal-to-cool skin
- Heat stroke
  - Hot, dry, or possibly moist skin
Heat Exhaustion: Signs and Symptoms

- Muscular cramps
- Weakness or exhaustion
- Rapid, shallow breathing
- Weak pulse
- Heavy perspiration
- Loss of consciousness

Heat Exhaustion: Treatment

- Remove from hot environment
- Administer oxygen
- Loosen or remove clothing
- Position supine
- Small sips of water
- Transport

Heat Stroke: Signs and Symptoms

- Rapid, shallow breathing
- Full, rapid pulse
- Generalized weakness
- Little or no perspiration
- Altered mental status
- Dilated pupils
- Seizures
Heat Stroke: Treatment

- Remove from hot environment
- Remove clothing
- Apply cool packs to neck, groin, and armpits
- Administer oxygen
- Transport immediately

Water-Related Emergencies

Types of Accidents Occurring on or Near Water

- Boating
- Water-skiing
- Wind surfing
- Jet-skiing
- Diving
- Scuba-diving
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Drowning

• Often begins as person struggles to keep afloat
• When they start to submerge, they try to take one more deep breath
• Water may enter airway, followed by coughing and swallowing, and involuntary swallowing of more water

Drowning

• Reflex spasm of larynx is triggered, sealing airway; unconsciousness results from hypoxia
• Some who die from drowning die just from lack of air
• Most attempt a final breath (or are unconscious) and water enters lungs

Drowning: Treatment

• Begin rescue breathing without delay
• If you reach a non-breathing patient in water, support patient in semi-supine position and provide ventilations
• May encounter airway resistance; will probably have to ventilate more forcefully than other patients
• Do not delay transport
Diving Accidents

• Most involve head and neck, but many also involve spine, hands, feet, and ribs
• Emergency care is the same as for any accident patient out of water

Scuba-Diving Accidents

• Arterial gas embolism (gas bubbles in bloodstream): diver holding breath
  – May be due to inadequate training, equipment failure, underwater emergency, or trying to conserve air
• Decompression sickness: diver surfacing too quickly from deep, prolonged dive
  – Takes 1–48 hours to appear

Diver Alert Network (DAN)

• Formed to assist rescuers with care of underwater diving accident patients
• Gives EMT or dispatcher information on assessment, care, and how to transfer patient to hyperbaric trauma care center
• Emergency: 919-684-8111
• Non-Emergency: 919-684-2948
**Water Rescue**

- **Reach**
  - Hold object for patient to grab
- **Throw**
  - Throw object that will float
- **Row**
  - Row boat to patient
- **Go**
  - Swim to patient (last resort)

**Ice Rescue**

- Throw flotation device to patient
- Toss rope with loop
- Push out flat bottomed aluminum boat
- Lay ladder flat on ice to distribute weight of rescuer
- Treat patient for hypothermia
- Always transport

**Emergency: Near Drowning Video**

[Click here to view a video on the subject of a near drowning.](#)
Bites and Stings

Spider and Insect Bites and Stings

- All spiders are poisonous
- Insect stings and bites are rarely dangerous
- Anaphylactic shock is a major concern
- Remove stinger quickly

Snakebites

- Require special care but are not usually life-threatening
- Death is not sudden unless anaphylactic shock develops
- Stay calm
- Keep patient calm and at rest
Marine Life Poisoning

- Can occur in variety of ways
  - Eating improperly prepared seafood or poisonous organisms
  - Stings and punctures
- Fresh water activates toxins on skin, increasing pain
- Use salt water to rinse affected area

Effects of Venomous Snake Bites Video

Click here to view a video on the subject of venomous snake bites.

Chapter Review
Chapter 33 - Environmental Emergencies

Chapter Review

• Patients suffering from exposure to heat or cold must be removed from the harmful environment as quickly and as safely as possible.
• Generalized cold injuries involve cooling the entire body (hypothermia). Treatment is based on whether the patient has normal or altered mental status.

continued

Chapter Review

• Patients who have hypothermia with altered mental status are considered to have severe hypothermia.
• Local cold injury involves an isolated part or parts of the body (frostbite). Early injury may be rewarmed gently.

continued

Chapter Review

• Late local cold injury involves freezing of tissue. Transport rather than rewarming unless transport is significantly delayed or if advised by medical direction.

continued
Chapter Review

• Hyperthermia is a heat emergency. Severity is determined by skin temperature. Skin which is normal to cool is considered less severe than skin which is hot to the touch. All heat emergency patients should be removed from the heat and cooled.

• Altered mental status in the setting of hyperthermia indicates a life-threatening emergency.
• Follow local protocols in reference to rewarming or cooling procedures.

• Immediate resuscitation of a water-related emergency patient may require quick, persistent intervention. Always assure your own safety before attempting any rescue.
• For injection or ingestion of poisons of insects, spiders, snakes, and marine life, call medical direction and follow local protocol.
Remember

• Heat is lost and gained through convection, conduction, evaporation, respiration, and radiation. Certain illnesses, medications, and underlying conditions make patients more susceptible to heat and cold injuries.

continued

Remember

• Actively rewarm alert and responsive hypothermia patients. Passively rewarm hypothermic patients with an altered level of consciousness.
• In a patient with signs of heat exhaustion and altered mental status, the EMT must assume heat stroke is present. Active cooling is essential.

continued

Remember

• Providers never should attempt a water rescue unless they have been properly trained to do so.
• The two special problems seen in scuba-diving accidents are arterial gas emboli and decompression sickness.
Remember

- When treating a scuba-related injury, EMTs should contact medical control to determine the most appropriate destination.
- Certain species of spiders, scorpions, and snakes can be poisonous to humans.

Questions to Consider

- Is the scene safe from heat, cold, or venomous creatures?
- How can I get the patient from the water safely?
- Hypothermia: Does the patient have an altered mental status?
- Hyperthermia: Is the patient’s skin temperature cool to normal, or hot?

Critical Thinking

- You are with your family at a local lake. You observe a boat capsize near the middle of the lake. Screams can be heard from the scene. You are a marginal swimmer. Several civilians begin swimming out to the site. Apply the concepts learned in scene size-up to this scene.
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