Objectives

1. Define key terms introduced in this chapter.
2. Explain the importance of being able to recognize and provide emergency medical care for patients with environmental emergencies.
3. Describe the process by which the body maintains normal temperature (slides 15-16).
4. Explain the mechanisms by which the body loses heat (slides 17-18).
5. Explain the mechanisms by which the body gains heat (slides 19-20).
6. Describe the pathophysiology of generalized hypothermia (slides 22-23, 26-27).
7. Recognize factors that contribute to a patient's risk for hypothermia, (including immersion hypothermia, and urban hypothermia, and myxedema coma or hypothyroidism) (slides 24-25, 28-33).
8. Describe the pathophysiology of local cold injury, including the stages of local cold injury (slides 34-37).
9. Discuss the assessment based approach to cold-related emergencies (slides 38-51).
10. Describe the emergency medical care for generalized hypothermia (slides 44-45).
11. Describe the emergency medical care for immersion hypothermia (slides 46-47).
Objectives

12. Describe the emergency medical care for local cold injury (slides 48-49).
13. Describe the pathophysiology of heat-related emergencies (slides 53-56).
14. Recognize factors that contribute to a patient’s risk for hyperthermia (slides 57-58).
15. Discuss the assessment-based approach to heat related emergencies (slides 59-72).
16. Describe the emergency medical care for a heat emergency patient with moist, pale, normal-to cool skin (slides 65-66).
17. Describe the emergency medical care for a heat emergency patient with hot skin that is moist or dry (slides 67-68).

Objectives

18. Describe the emergency medical care for heat cramps (slides 69-70).
19. Describe the characteristics of common venomous snakes and factors that affect the severity of a snakebite (slides 74-75).
20. Recognize the signs, symptoms, and patient history associated with bites or stings of the following (slides 78-87):
   a. Black widow spiders
   b. Brown recluse spiders
   c. Scorpions
   d. Fire ants
   e. Ticks
21. Discuss the assessment-based approach to bites and stings (slides 88-99).

Objectives

22. Describe the signs and symptoms and the emergency medical care for anaphylactic shock resulting from a bite or sting (slides 94-95).
23. Describe the signs and symptoms and the emergency medical care for a bite or sting (slides 96-97).
24. Recognize the signs, symptoms, and patient history associated with the bite or sting of a marine animal and the emergency medical care for marine life poisoning (slides 100-101).
25. Explain the pathophysiology of lightning strike injuries (slides 104-105).
26. Given a scenario with a patient who has been struck by lightning, predict findings and complications associated with the mechanism of injury (slides 106-107).
Objectives

27. Describe the emergency medical care for a patient who has been struck by lightning (slides 108-109).
28. Describe the signs, symptoms, and patient history associated with acute mountain sicknsses and emergency medical care for acute mountain sickness (slides 112-113).
29. Describe the signs, symptoms, and patient history associated with high altitude pulmonary edema and emergency medical care for high altitude pulmonary edema (slides 114-115).

Objectives

30. Describe the signs, symptoms, and patient history associated with high altitude cerebral edema and emergency medical care for high altitude cerebral edema (slides 116-117).

Topics

- Heat and Cold Emergencies
- Exposure to Cold
- Exposure to Heat
- Bites and Stings
- Lightning Strike Injuries
- High Altitude Sickness
CASE STUDY

Dispatch

EMS Unit 621
Respond to 2125 Central Avenue for an elderly woman who fell in a snow bank approximately two hours ago. Police are on scene.

Time out 1314

Upon Arrival

• 62-year-old female wearing housecoat and slippers found lying in a snow bank for at least two hours
• Complains of pain in left ankle
• Patient is responsive and not shivering
How would you proceed to assess and care for this patient?

Heat and Cold Emergencies

Regulation of Temperature
Approximate core temperature: 98.6 degrees F or 37 degrees C
• Hypothalamus
• Thermoreceptors
• Heating and cooling the body

Regulation of Temperature

When Heat Loss Exceeds Heat Gained

When Heat Lost Exceeds Heat Gain
Regulation of Temperature

When Heat Gained Exceeds Heat Loss

Initial deep, rapid breathing
Feeling of heat and weakness
Increasing disorientation and weakness
Skin that is either 
normal color or temperature
pale in color
Hot
Dry or moist
Loss of appetite
Nausea and/or vomiting
Weakness or exhaustion
Sweats

Muscle cramps

When Heat Gained Exceeds Heat Lost

Exposure to Cold
Generalized Hypothermia

• Increase in heat loss
• Decrease in heat production
• Mortality can be up to 87 percent
• Sudden or gradual onset

Pathophysiology of Generalized Hypothermia

Predisposing Factors
Predisposing Factors

- Ambient temperature, wind chill, and moisture
- Age
- Medical conditions
- Alcohol, drugs, and poisons
- Duration
- Clothing
- Activity level

Pathophysiology of Generalized Hypothermia

Stages of Hypothermia

Stage 1: Shivering is a response by the body to generate heat. It does not occur below a body temperature of 90°F.
Stage 2: Apathy and decreased muscle function. Fine nerve function is affected, then gross motor functions.
Stage 3: Decreased level of responsiveness is accompanied by a glossy stare and possible freezing of the extremities.
Stage 4: Decreased vital signs, including slow pulse and slow respiration rate.
Stage 5: Death.
Urban Hypothermia

Those affected
• External and internal
• Elderly

Pathophysiology of Generalized Hypothermia

Myxedema Coma

Myxedema Coma

• Causes
• Signs and symptoms
• Emergency medical care
Local Cold Injury

Back to Objectives

• “Frostbite"
• Requires colder temperatures than are needed for generalized hyperthermia

Pathophysiology of Local Cold Injury
• Locations
• Predisposing factors
• Stages of injury

Assessment-Based Approach: Cold-Related Emergency

Scene Size-Up

Scene Size-Up

• Safety
• Evidence of cold exposure
Assessment-Based Approach: Cold-Related Emergency

**Primary Assessment**

- General impression
- Airway
- Breathing
- Circulation
  - May be difficult

**Secondary Assessment**
Secondary Assessment

• History
• Physical exam
• Signs and symptoms

Assessment-Based Approach: Cold-Related Emergency

Emergency Medical Care for Generalized Hypothermia

• Remove the patient from further heat loss
• Handle patient gently
• Administer $O_2$
• Use AED if necessary
• Actively rewarm if patient is alert
Assessment-Based Approach: Cold-Related Emergency

Emergency Medical Care for Immersion Hypothermia

- Instruct patient to make the least effort to stay afloat
- Lift patient from water in a horizontal or supine position
- Remove wet clothing

Emergency Medical Care for Local Cold Injury
Emergency Medical Care for Local Cold Injury

- Signs and symptoms
- Remove the patient from environment
- Never thaw if there is danger of refreezing
- Use rewarming procedures

Assessment-Based Approach: Cold-Related Emergency

Reassessment

- Mental status
- ABCs
- CPR
- Vital signs every five minutes
- No reexposure to cold

Reassessment
Exposure to Heat

Hyperthermia

• Heat cramps
• Heat exhaustion
• Heatstroke

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Pathophysiology of Heat-Related Emergencies

Predisposing Factors

- Heat cramps
- Heat exhaustion
- Heatstroke
Predisposing Factors

- Climate
- Strenuous activity
- Age
- Preexisting illness
- Certain drugs and medications
- Lack of acclimation

Assessment-Based Approach: Heat-Related Emergency

Scene Size-Up

- Safety
- Ambient temperature
- Exercise/activity
- Medications
Assessment-Based Approach: 
Heat-Related Emergency

Primary Assessment

- Mental status
- ABCs
- O₂
- Skin color, temperature, and condition
- Priority patient

Secondary Assessment
Assessment-Based Approach: Heat-Related Emergency

Emergency Medical Care for a Heat Emergency Patient with Moist, Pale, Normal-to-Cool Skin

- Move to a cool place
- Administer O₂
- Remove clothing
- Apply cold, wet compresses
- Place patient in supine position
- Give water if no AMS or vomiting
- Transport
Assessment-Based Approach: Heat-Related Emergency

Emergency Medical Care for a Heat Emergency Patient with Hot Skin That is Moist or Dry

• Move to a cool place
• Remove clothing
• Administer O₂
• Cool the patient
• Be prepared for seizures or vomiting
• Transport

Emergency Medical Care for Heat Cramps

Assessment-Based Approach: Heat-Related Emergency
Emergency Medical Care for Heat Cramps

- Move to a cool place
- Consult medical direction for orders for sips of low-concentration salt water
- Apply moist towels
- Explain to the patient what happened and how to avoid recurrence

Assessment-Based Approach: Heat-Related Emergency

Reassessment

- Mental status
- ABCs
- Vital signs
- Treatment
Insect Bites and Stings

• Treated like other wounds
• Medical help is necessary only if:
  – Itching lasts longer than two days
  – Signs of infection
  – Allergic reaction develop
  – The insect is poisonous
• Signs of normal reaction

Black Widow Spider
Black Widow Spider

- Recognition
- Location found
- Signs and symptoms

Insect Bites and Stings

Brown Recluse Spider

Brown Recluse Spider

- Characteristics
- Appearance of bites
Insect Bites and Stings

Scorpion

- Types
- Signs and symptoms

Insect Bites and Stings

Fire Ant
Fire Ant

• Appearance
• Signs and symptoms

Insect Bites and Stings

Tick

• Disease transmitter
• Locations found
• Tick removal
Assessment-Based Approach: Bites and Stings

Scene Size-Up

• Scene safety
• Look for signs of insect activity near patient

Primary Assessment
Primary Assessment

• General impression
• Mental status
• ABCs

Assessment-Based Approach: Bites and Stings

Secondary Assessment

• Signs and symptoms of anaphylaxis
• Hives
• Upper airway obstruction
• Wheezing or stridor
• Hypotension
Assessment-Based Approach:
Bites and Stings

Emergency Medical Care
for Anaphylactic Shock

• Maintain airway
• Administer O₂ and support breathing
• Administer epinephrine by prescribed auto-injector
• Call for ALS
• Initiate early transport

Back to Objectives
Emergency Medical Care for a Bite or Sting

- Remove stinger
- Wash area
- Remove any constricting objects
- Lower injection site below level of heart
- Apply cold pack
- Observe patient for signs of allergic reaction
- Keep patient calm

Assessment-Based Approach: Bites and Stings

Reassessment

- ABCs
- Signs of anaphylactic shock
Marine Life Bites and Stings

- Quantity of poisonous marine animals
- Differences from land animal bites
- Emergency medical care

Lightning Strike Injuries
Pathophysiology of a Lightning Strike Injury
Assessment of the Lightning Strike Patient

Back to Objectives

Signs and symptoms
• Nervous
• Cardiac
• Respiratory
• Skin
• Musculoskeletal
• Ophthalmic
• Otologic

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Emergency Care for the Lightning Strike Patient

Back to Objectives
High Altitude Sickness

- At high altitudes, ambient atmosphere decreases
- The pressure of oxygen also decreases
- High altitude is considered > 5,000 feet
- Signs and symptoms
- Medications taken to prevent altitude sickness
  - Diamox
  - Nifedipine
Acute Mountain Sickness

- Typically occurs with rapid ascent to 6,600 feet or greater
- Signs and symptoms
- Severe signs
- Emergency medical care

High Altitude Pulmonary Edema
High Altitude Pulmonary Edema

- Also known as H.A.P.E.
- Results from changes in the pressure in pulmonary vessels
- Causes fluid to be forced out of capillaries and collect around alveoli
- Signs and symptoms
- Emergency medical care

High Altitude Cerebral Edema (HACE)

- Also known as H.A.C.E.
- Occurs from the collection of excessive fluid in the brain tissue
- Most often occurs at altitudes above 12,000 feet
- Signs and symptoms
- Emergency medical care
Primary Assessment

• Outside temperature: 26 degrees Fahrenheit
• Patient name: Harriet Rector
• Patient rambles in statements
• Provide manual in-line stabilization
• ABCs; find no life threats except cold

Follow-Up

Primary Assessment

• Apply O₂ at 15 lpm via a nonrebreather mask
• Roll patient to place blanket under her
Secondary Assessment
- Move patient to spine board
- Patient complains left leg hurts
- Unable to gain history information
- Patient has no sensation in toes
- Patient has painful swollen ankle as well
- BP: 102/60; HR: 60; RR: 12; skin pale, cold, and firm; SpO₂: 92

CASE STUDY
Treatment and Reassessment
- Cover patient with warm and dry blanket en route
- Monitor ABCs, vital signs, and mental status en route
- Successfully transfer patient to ED

Critical Thinking Scenario
- Elderly male victim of a fall
- Respond to a gated retirement community near your station; it's a hot summer day
- The patient's daughter meets you upon your arrival and states that her father has not been answering his phone since yesterday, so she came to check on him
- She found him lying naked on the bathroom floor and called 911
Critical Thinking Scenario

• You note the ambient temperature inside the home is cool from air conditioning, probably 70–72 degrees Fahrenheit
• The patient explains he was getting out of the shower yesterday afternoon and slipped and fell, injuring his hip
• By your estimation, the patient has been lying naked on a cold tile floor in an air-conditioned home for almost 18 hours

Critical Thinking Scenario

• The patient seems to be an inconsistent historian and the daughter states that, "He is just not acting like himself"
• You find palpable instability, pain, and an overlying contusion to the injured hip
• Your partner is going to retrieve the immobilization equipment from the ambulance and asks if he should also grab the tympanic thermometer

Critical Thinking Questions

1. Does this call initially present as one with an environmental concern?
2. What is the patient’s initial emergency that rendered him susceptible to an environmental emergency?
3. What would you expect to find regarding the patient’s core temperature with the tympanic thermometer?
Critical Thinking Questions

4. How might your treatment of this patient change, given a disturbance in his core temperature?
5. Describe the factors that contributed to the potential change in his core temperature.

Reinforce and Review

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