Chapter 16

Environmental Emergencies

Learning Objectives

- Describe various ways body loses heat
- List signs/symptoms of exposure to cold
- Explain steps in providing emergency care to patient exposed to cold
- List signs/symptoms of exposure to heat

Learning Objectives

- Explain steps in providing emergency care to patient exposed to heat
- Recognize signs/symptoms of water-related emergencies
- Discuss emergency medical care of bites/stings
- Describe pressure laws associated with diving emergencies
Learning Objectives

- Explain steps in providing emergency medical care to patient suffering from diving incident
- Describe types of high-altitude illness
- Explain steps in providing emergency medical care to patient suffering from high-altitude illness

Thermoregulation

- Range of normal central core temperature
  - 96.4°F to 99.8°F (35.8°C to 37.7°C)
- Strenuous exercise
  - 104°F (40°C)
- Body at rest
  - 96.4°F (35.8°C)

Thermoregulation

- Hypothalamus
  - Normal metabolism gives off heat as a by-product
  - Regulates production/conservation of heat/heat loss
  - Heat distributed throughout body by cardiovascular system/lost through skin
Thermoregulation

- Core temperature
  - Body core
    - Temperature within
      - Skull
      - Thorax
      - Abdominal-pelvic cavities
  - Body’s regulatory processes maintain this temperature within narrow limits
  - Regions of body’s shell have different temperatures as distance from heart/trunk increases

Thermoregulation

- Heat production
  - All metabolic processes within body generate heat
  - Basal metabolism
    - Provides constant supply of heat
  - Metabolic rate can be increased by hormones under central nervous system
  - Muscular activity

Heat Loss

- Radiation
  - Transfer of heat in form of infrared heat rays

- Conduction
  - Transfer heat to objects in direct contact with body
  - Influenced by heat transfer properties of material in direct contact with body

- Convection
  - Heat carried away by air currents
Heat Loss

- Evaporation
  - Moisture vaporizes on body's surface
  - Evaporation rate depends on:
    - Temperature
    - Movement of air
    - Humidity
  - Wind current important on humid days

- Breathing
  - Inhaled air – heated/cooled to body temperature

Heat Loss

- Information obtained when encountering patients who are exposed to the environment:
  - What is source & duration of exposure?
  - Has the patient lost consciousness?
  - Are heat effects localized or general?

Mechanisms of Control

- Brain
  - Sets body's thermostat
  - Regulates temperature by influence on:
    - Metabolic rate
    - Cardiovascular system
**Mechanisms of Control**

- **Cardiovascular system**
  - Brings heated blood from body core to skin & extremities
  - If more heat must be lost
    * Skin vessels dilate
    * Increase in cardiac output
  - If heat must be conserved
    * Skin vessels vasoconstrict
  - Vasodilation/vasoconstriction of skin’s blood vessels result in great changes in blood flow through skin

- **Skin**
  - Interface between external/internal environments
  - Primary role in heat regulation
  - Layer of insulation
  - Vasodilation/vasoconstriction within the skin influence heat exchange of core body heat with the environment
  - Heat loss is also regulated through evaporation

- **Behavioral regulation**
  - Conscious process of making changes to adapt to alterations in temperature
Cold Emergencies

- Local injuries
  - Frostnip/frostbite
    - Freezing of water between/within body cells resulting in ice crystal formation
- Lowered core body temperature
  - Result in hypothermia and death

Cold Emergencies

- Prehospital care
  - Prevent further heat loss
  - Protect injured parts
  - Provide rapid transport

Cold Emergencies

- Physiologic response to cold
  - Faced with cold, body's thermoregulatory centers respond by increasing heat production & decreasing heat loss
    - Early response to cold
      - Increase in metabolic rate to generate more heat
      - Vasoconstriction to reduce heat loss
    - Shivering occurs if these measures are inadequate
    - Shivering
      - Involuntary contraction of small groups of muscles
Cold Emergencies

- Physiologic response to cold
  - Signs that CNS is affected
    - Amnesia
    - Slurred speech
    - AMS

- Cold exposure leads to vicious cycle
  - Effects of cold exposure leave the victims unable to care for themselves or move to a safer environment
  - Cold has direct effect on rate of metabolism and O₂ needs
    - Metabolism decreases 6% every °C that body's temperature drops
    - Continue resuscitation

Cold Emergencies

- Hypothermia
  - Cold injuries may take minutes or hours to occur
    - Temp and type are important variables
  - Acute Immersion
    - Icy water
      - Death can occur in 15 minutes
      - Rarely survive 1 hour
  - Cold exposure
    - Subacute exposure to cold air results in longer survival times than submersion in water of same temperature
Cold Emergencies

- Hypothermia
  - Cold exposure
    - Subacute exposure
      - Exposure to cold air results in longer survival times than submersion in water of the same temperature
    - Chronic exposure
      - Disease & drug intoxication affect outcome
      - Shock can compromise heat production and compensatory actions

Cold Emergencies

- Hypothermia
  - Predisposing factors
    - Radiation heat loss is proportional to temperature difference between environment & body
    - Conductive heat loss is increased by contact with objects that conduct heat faster than air
    - Convection heat loss is greater when victim cannot find shelter
    - Evaporative heat loss can occur with wet clothing or after sweating from exertion

Cold Emergencies

- Hypothermia
  - Predisposing factors
    - Age
      - Elderly
      - Newborn
Cold Emergencies

- Hypothermia
  - Predisposing factors
    - Medical conditions can affect ability to generate heat, regulate temperature
      - Diseases causing malnutrition
      - Infections of the blood
      - Endocrine diseases
      - Shock
      - Head injury
      - Brain disease
      - Burns
      - Spinal cord injuries

- Hypothermia
  - Predisposing factors
    - Drugs/Alcohol
      - Benzodiazepines
      - Tricyclic antidepressants
      - General anesthetics
      - Narcotics
      - Organophosphates
      - CO
      - Barbiturates
      - Phenothiazines

- Hypothermia
  - Predisposing factors
    - Sign/symptoms
      - Cold to touch
      - Decreased level of consciousness
      - Decreased motor ability
      - Decreased vital signs
      - Shivering/muscular rigidity
**Cold Emergencies**

- **Hypothermia**
  - Mild hypothermia (89.6°F to 95°F; 32°C to 35°C)
    - Earliest stage of hypothermia
    - Pale skin
    - Shivering
    - Difficulty in speech/movement
    - Amnesia
    - Vital signs may be normal

- **Hypothermia**
  - Moderate hypothermia (80.6°F to 89.6°F; 27°C to 32°C)
    - Muscular rigidity
    - Gradual loss of voluntary motion
    - Cardiac output drops
    - Pulse/respirations depressed
    - Pupils dilate
    - Skin pale/cyanotic
    - Pulse irregular
    - Ventricular fibrillation may develop

- **Hypothermia**
  - Severe hypothermia (less than 80.6°F; less than 27°C)
    - Cerebral blood flow is one third normal
    - Unresponsive to pain
    - Cardiac output greatly depressed
    - Significant hypotension
    - Cardiac arrest
Cold Emergencies

Management
- Determined by
  - Time required to transport patient
  - Degree of hypothermia

- Prehospital management
  - Reduce further heat loss
  - Transport patient rapidly/gently
  - Avoid maneuvers that may precipitate dysrhythmias (ventricular fibrillation)
  - CPR initiated, continue until patient is rewarmed

Resuscitation techniques
- Supplemental O₂ should be given
- Ventilatory assistance
- Avoid hyperventilation
- Avoid stimulating gag reflex
- Assessment of pulses must be undertaken before cardiac compressions initiated

Resuscitation techniques
- Assess pulse before CPR
- Arrests, attach automated external defibrillator (AED)
- Shock, provide one shock/continue CPR
  - Temperature below 86°F (30°C), withhold further shocks until temperature raised
Cold Emergencies

- Management
  - Active rewarming techniques
    - Application of heat internally/externally
    - Internal techniques applied in hospital
    - In field
      - Warm/humidified oxygen
      - Application of local heat to large superficial vessels
      - Warm fluids containing sugar to conscious patient capable of drinking

- Active rewarming techniques
  - Restricted circumstances (not recommended for all patients)
    - Immersion in tub of hot water
    - Application of warmed blankets
    - Hot-water bottles to body’s shell
    - Beware of possible rewarming shock

- Transport
  - Undertaken as soon as possible
  - Handle gently
  - Rough ride should be avoided
Cold Emergencies

- **Prevention**
  - Be conscious of hazards
  - Take precautions based on principles of heat loss
  - Clothing layering
  - Avoid contact with conductors of heat
    - Metal
    - Snow
    - Water
  - Avoid alcohol intake
  - Do not smoke
  - Take food high in carbohydrates
  - Keep moving
  - Know your physical abilities
  - Seek shelter before hypothermia clouds judgment/hampers motor ability

Cold Emergencies

- **Local cold injuries**
  - Tend to occur in exposed extremities
  - Localized, sharply demarcated
  - Gradually progress from superficial to deep with continued exposure
  - Rewarming causes marked vasodilation of the area
Cold Emergencies

Local cold injuries
  ➢ Frostnip
    ▪ Reversible cold injury caused by intense vasoconstriction
    ▪ Warmed by:
      ▪ Applying firm pressure with warm body part
      ▪ Blowing warm breath

Local cold injuries
  ➢ Superficial frostbite
    ▪ Freezing of water within upper layers of skin
    ▪ Thawing
Cold Emergencies

- Local cold injuries
  - Deep frostbite
    - Freezing extends throughout dermis
    - Can involve subcutaneous tissues, muscle, tendons, neurovascular structures, bone

- Management of frostbite
  - Well-controlled, rapid rewarming
  - Protect from further heat loss
    - Insulate with layers of clothing/blankets
    - Remove wet clothing/jewelry
Cold Emergencies

Management of frostbite
- Do not break blisters, cover with sterile dressings
- Separate fingers/toes with folded dressings
- Do not allow patient to walk on affected lower extremity
- Administer supplemental O₂
- Assess patient for hypothermia/other injuries
- Prepare for evacuation from scene

Wilderness situations
- Rapid rewarming may be advisable
- Best if walk attempt is made on frozen extremity, not on a thawed or partially one

Rapid rewarming
- Immerse affected part into basin of water large enough to accommodate part without it touching walls of container
- Preheat water temperature to 105°F (40.6°C)
- Maintain water temperature
- Keep water circulating
- Anticipate patient will feel pain
- Dress area with sterile dressings
- Protect thawed part from refreezing
Cold Emergencies

- Management of frostbite
  - Rapid rewarming
  - Keep water circulating
  - Anticipate patient will feel pain
  - Dress area with sterile dressings
  - Protect thawed part from refreezing

Cold Emergencies

- Trench foot or immersion foot
  - Prolonged exposure (10 to 12 hours) to above-freezing temperatures & dampness
  - Causes damage to small vessels/nerves/occurs in stages
    - Vasoconstriction
    - Followed by increased circulation
    - Ulcers, gangrene may follow
  - Management
    - Keep extremity warm, dry
    - Protect from weight bearing/further injury

Heat Emergencies

- General types of heat-related conditions & heat related emergencies
  - Heat rash
  - Heat cramps
  - Heat exhaustion
  - Heat syncope
  - Heat stroke
Heat Emergencies

- Predisposing factors
  - Climate
  - Exercise, acclimating
  - Age
  - Preexisting illness
  - Alcohol and drugs

- Heat rash
  - Red rash with small bumps
  - Caused by blocked sweat glands
  - More common in young persons
  - Not emergency, but can interfere with body’s ability to compensate for heat production

- Heat cramps
  - Painful muscular contractions of heavily exercised muscles
  - May be induced during excessive exercise or hard work
Heat Emergencies

- Signs & symptoms of heat cramps
  - History of muscle cramping in heavily used muscles during or immediately after exertion
  - Usually experience period of excessive sweating

Heat Emergencies

- Management of heat cramps
  - Move patient to cooler environment
  - Replace fluid and electrolyte losses with electrolyte fluid solution or water
  - Stretch cramped muscle

Heat Emergencies

- Heat exhaustion
  - Inability of cardiovascular systems to keep up with stresses imposed by hot environment
  - Blood vessels to the skin vasodilate, blood flow to the skin increases to lose the heat
  - Previously dehydrated patient is more susceptible to this condition
  - Rarely causes death
Heat Emergencies

- Signs & symptoms of heat exhaustion
  - Hot environment
  - Period of recent exertion
  - Moist skin
  - Body temperature elevated
  - Weakness or exhaustion
  - Dizziness
  - Faintness
  - Nausea
  - Headache
  - Skin gray/cold/pink

Heat Emergencies

- Management of heat exhaustion
  - Move to cooler environment
  - Modest amounts of fluid – orally or intravenously
  - Loosening/removing clothing
  - Supine position - elevated legs

Heat Emergencies

- Heat syncope
  - Transient loss consciousness
  - Blood vessels dilating compensate excessive heat
Heat Emergencies

- Signs & symptoms of heat syncope
  - History of high temperature exposure & report short loss of consciousness
  - Awake, but weak & dizzy on standing
  - Hot & diaphoretic
  - Pulse rate increased
  - Blood pressure lower than normal

Heat Emergencies

- Management of heat syncope
  - Keep patient cool
  - Supine position
  - Administer O₂ as needed
  - Transport for further evaluation

Heat Emergencies

- Heat stroke
  - Complete failure of thermoregulatory system
    - Results in extreme increases in core body temperature & damage to cells, as well as changes in mental status
  - Characterized by hot, dry skin signaling importance of evaporation
  - Life-threatening emergency
    - Mortality rate if left untreated is 80%
Heat Emergencies

- Signs & symptoms of heat stroke
  - AMS ranging from confusion to coma
  - High body temperature
  - Hot, dry skin
  - Moist skin at time of collapse
  - Skin pink or flushed, may appear ashen
  - Increased heart, respiratory rate
  - Hyposensitive
  - Seizures

Heat Emergencies

- Management of heat stroke
  - Lower body temperature, highest priority
  - Apply ice packs to large superficial blood vessels
  - Provide O₂
  - Rapid transport
  - Stop cooling when temperature reaches 102°F (38.8°C)

Drowning & Submersion Episodes

- Drowning
  - Approximately 4000 people drown in United States each year
  - Respiratory impairment from submersion or immersion in liquid medium
  - Major problem: lack of O₂
  - Hypoxia results in unconsciousness
  - Time to cardiac arrest varies, particularly in cold water
  - Patients benefit from mammalian diving reflex
Drowning & Submersion Episodes

Management of submersion episodes
- Any submersion requiring field care and transport to a hospital for treatment or observation
- First concern is protection of rescuers
  - Attempt rescue with flotation device/boat
  - ABCs priority

- Management of submersion episodes
  - Unresponsive, breathing adequately
    - Place patient in recovery position
    - Administer supplemental oxygen
  - Breathing inadequately
    - Establish patent airway
    - Administer high-concentrated O₂

- Management of submersion episodes
  - Water in upper airway should be removed by drainage or use of suction
  - Occasionally, water swallowed during submersion episode
  - No pulse felt
    - Initiate cardiac compressions
Drowning & Submersion Episodes

Management of submersion episodes

- Cardiac arrest
  - Place patient on dry surface
  - Towel-dry chest wall before attaching electrode pads of AED

- Spinal injury suspected
  - Remove from water with alignment of spine maintained
    - Long spine board
    - Jaw thrust without head lift maneuver

Animal Bites & Stings

Most severe reaction is anaphylaxis

- Other effects local
- Before swelling, remove constricting clothing and jewelry
- Watch for signs of allergic reaction and treat accordingly

If anaphylactic reaction occurs:

- Place constricting band above bite or sting on extremity
- Check distal pulses
- Remove stinger or venom sac, if present
- Once stinger is removed, place ice pack over bite or sting
**Animal Bites & Stings**

- **Insect and spider bites**
  - **Brown recluse spider**
    - Bite can cause local necrosis around bite
    - Venom causes local pain/spreads to surrounding skin
    - Center darkens
    - Surrounding area blanches
    - Outermost ring turns reddish
    - Systemic reaction

- **Black widow spider**
  - Venom contains neurotoxin
  - Can cause weakness and respiratory depression
  - Antivenin available for severe cases
  - Small children and debilitated adults are most susceptible to severe consequences
  - Immobilize extremity

- **Fire ants**
  - Can inflict multiple stings
  - Sting can cause small, circumscribed elevated lesion, produces pus in 6 to 24 hours
  - Care is supportive
Animal Bites & Stings

- Insect and spider bites
  - Ticks
    - Small parasite that lives off blood of mammals & birds
    - Attach to host by harpoon type structure at mouth
    - Responsible for spread of many diseases
    - Treatment supportive
    - Do not remove tick
    - Assess patient for signs of transmitted disease
      - Muscle aches
      - Headache
  - Scorpions and tarantulas
    - Cause local pain but rarely fatal
    - Unpleasant tingling feelings at site and at distant sites
    - Problems with vision and swallowing
    - Slurred speech
    - Excess salivation
    - Involuntary jerking and shaking
    - Prehospital care supportive
    - Antivenin is sometimes used in severe cases

- Bees and wasps
  - Stings painful
  - Local irritation
  - Red, inflamed appearance
  - Systemic allergies and anaphylactic reaction must be treated aggressively
Animal Bites & Stings

- **Snakebite**
  - *Pit vipers*
    - Causes local necrosis
    - Definitive care requires use of antivenin
    - Do not contain venom at bite site
    - Recognition
      - Fang marks at bite site
      - Fangs inject venom
      - Swelling
      - Pain & redness
  - *Coral snakes*
    - Causes no local necrosis
    - Nervous system is affected when poison is absorbed
    - Treat by delaying absorption
    - Recognition
      - Found in southern United States
      - Distinguished by red, yellow, & black bands
      - Tiny fangs that are close together
      - Drop of blood expressed after envenomation
      - Often hold onto & "chews" victims for few seconds
      - Early signs and symptoms are minimal redness & swelling
Animal Bites & Stings

**Snakebite**
- Management
  - Have patient rest
  - Remove jewelry
  - Immobilize extremity
  - Swelling present, make small mark at its edge
  - Transport patient to closest hospital able to care for snakebites
  - Coral snake bites, application of loose elastic bandage over/around bite site
  - Follow local protocols

Animal Bites & Stings

**Marine animals**
- Sea animals can cause stings and punctures
- Treatment
  - Flood affected area with sea water
  - Wash with acetic acid or isopropyl alcohol
  - Apply shaving cream, sand or talcum powder to area, then scrape off
  - Avoid washing area with fresh water
Animal Bites & Stings

- Marine animals
  - Punctures
  - Treatment
    - Immobilize
    - Soak in water as hot as patient can tolerate for 30 to 90 minutes
    - Avoid water that could cause heat injury
    - Toxin should be inactivated by hot water

Diving Emergencies

- Incidence
  - 9 million certified divers in United States
  - 900 to 1000 dive-related injuries/year
  - 90 dive-related deaths/year
- Risk factors
  - Divers not properly trained or certified
  - Poor shape
  - Not allowing enough time between dives
  - Use of drugs or alcohol

Diving Emergencies

- Incidence
- Prevention
  - SCUBA – self contained underwater breathing apparatus
  - DAN – not for profit organization
Diving Emergencies

- **Physiology**
  - Most diving injuries are associated with pressure changes occurring as diver descends & ascends
    - Boyle’s law
      - Ears “pop” because gases in ear expand
    - Henry’s law
      - As body is exposed to higher pressures, more of the gases in the body will dissolve and be absorbed, resulting in toxic levels
    - Dalton’s law
      - Ratio of gases within body stays the same as pressure increases

- **Dybarism**
  - Generalized term - physiologic changes seen when person exposed to pressure changes
  - Areas of body filled with air
    - Hollow organs & lungs have greatest potential to be affected
    - As gases contract & expand, structures can be stretched or can collapse

- **Decompression sickness**
  - Body descends to depths, gases in body dissolve
  - Diver ascends too quickly, gases form bubbles
  - Signs range from
    - Pain & itching
    - Shortness of breath
    - Shock
    - Death
  - Treatment
    - Symptomatic
    - Transport to hospital with hyperbaric oxygen
Diving Emergencies

**Barotrauma**
- Air-filled chambers most susceptible to pressure changes
- Diver ascends too quickly
  - Pressure in ears may increase, causing rupture
  - Pressure in lungs may increase, causing pneumothorax

**Arterial gas embolism**
- Lungs damaged during ascent
- Air may be drawn into arterial circulatory system
- Signs
  - Shortness of breath
  - Seizure
  - Paralysis
  - Weakness

**Nitrogen narcosis**
- “Raptures of the deep”
- Diver descends, nitrogen is affected
- Dissolves in bloodstream
- Works as narcotic drug
- May act illogically
Altitude Illness

- Incidence
  - Seen in men and women equally
  - Less severe forms
    - Acute mountain sickness
  - More severe types
    - High-altitude pulmonary edema

- Physiology
  - Occurs when rapidly ascending to higher altitude
  - At higher altitudes, there is less atmospheric pressure which can affect pressure gradients within body

- Types
  - High-altitude cerebral edema (HACE)
    - Swelling of brain following rapid ascent to altitude
    - Signs can mimic stroke
  - High-altitude pulmonary edema (HAPE)
    - Fluid pushed into alveolar spaces as person ascends rapidly to high altitude
    - Life-threatening situation
  - Acute mountain sickness (AMS)
    - Not as severe as HAPE or HACE
    - Can resemble flu
Altitude Illness

- Treatment
  - Similar for all altitude illness
  - Airway must be monitored, controlled
  - High-flow O2
  - Suction airway adjuncts
  - Primary focus - bring patient to lower altitude

Summary

- Five ways heat can be lost from body
  - Radiation
  - Conduction
  - Convection
  - Evaporation
  - Breathing

- Shivering an involuntary mechanism body uses to produce heat

- Shivering sign of mild hypothermia

Summary

- Signs of mild hypothermia
  - Shivering
  - Amnesia
  - Poor muscle coordination

- Signs of moderate hypothermia
  - Stupor
  - Loss of consciousness
  - Cessation of shivering
  - Irregular pulse
  - Dilated pupils
  - Loss of voluntary motion
Summary

- **Sign of severe hypothermia**
  - Unresponsiveness to pain
  - Significant hypotension
  - Cardiac arrest from ventricular fibrillation

- **Signs of moderate hypothermia**
  - Stupor
  - Loss of consciousness
  - Cessation of shivering
  - Irregular pulse
  - Dilated pupils
  - Loss of voluntary motion

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Summary

- Continue resuscitation until patient has been warmed

- Check suspected hypothermia patient’s pulse 30 to 45 seconds before administering CPR

- Hypothermic patient into cardiac arrest, apply shocks up to three times with automated external defibrillator (AED), withhold additional shocks if temperature is below 86°F (30°C)

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Summary

- Internal active rewarming techniques may be needed to rewarm hypothermic patient at hospital

- Severe vasoconstriction of superficial areas of body that occurs from hypothermia can lead to frostbite

- Three types of local cold injuries
  - Frostnip
  - Superficial frostbite
  - Deep frostbite
Summary

- Frostnip characterized by pale, cold skin; loses sensation, becomes red/itchy on warming

- Superficial frostbite characterized by freezing of upper layer of skin while deep skin remains soft
  - Signs
    - White/waxy skin
    - Hard on surface
    - Soft below

Summary

- Deep frostbite characterized by freezing upper/deeper layers of skin
  - Appears
    - White
    - Feels frozen
    - Resists depression

Summary

- Treatment of mild/moderate frostbitten extremity
  - Remove jewelry
  - Apply dressing to affected part
  - Remove wet clothing
  - Cover part
  - Prevent further exposure to moisture
  - Do not rub/massage

- Rapid rewarming technique in which affected part is placed in 105°F (40.6°C) water until warmed
Summary

- Three types of heat emergencies
  - Heat cramps
  - Heat exhaustion
  - Heat stroke

- Heat cramps - muscular cramps caused by strenuous exertion/excessive loss of body fluids/electrolytes

Summary

- Signs of heat exhaustion
  - Weakness/exhaustion
  - Faintness
  - Pale skin
  - Rapid pulse
  - Hypotension
  - Headache
  - Nausea

- Move patients with heat exhaustion to cooler environment, loosen/remove clothing, place in supine position (legs elevated), provide 1 to 2L of water, fan

Summary

- Heat stroke caused by failure of body’s heat loss mechanisms/development of extremely high temperature

- Signs of heat stroke
  - Hot/dry skin
  - Rapid pulse/respiratory rate
  - Hypotension
  - Seizures
Summary

Treatment of heat stroke
- Move patient to cooler environment
- Administer high-concentration oxygen
- Cool with sponge/wet towels/fanning
- Place ice packs in armpits, groin, back of neck
- Rapidly transport to hospital

Rescuing drowning victim
- Rescuer safety is priority
- Throw flotation devices to victim
- Use boat to remove victim from water

Management of submersion patient in cardiac arrest
- Establish an airway
- Provide rescue breathing/chest compressions
- Use an AED for ventricular fibrillation
- Provide up to three shocks with AED for patient who is severely hypothermic

Spider bites may result in serious/rare complications
- Bleeding disorders
- Fever
- Chills
- Weakness
- Muscular rigidity

Prehospital care of insect bites
- Supportive care
- Clean site
- Remove stinger
- Immobilize extremity
Summary

- Poisonous snakes in United States
  - Pit Vipers (copperheads, rattlesnakes)
  - Coral snakes

- Management of poisonous snake bites
  - Immobilize affected part with splint
  - Mark edges of swollen area
  - Transport to appropriate hospital

Summary

- Coral snake bites may require application of elastic bandage around bite/limb
- Stings from marine animals should be flooded with sea water, rinsed with vinegar/alcohol
- Punctures treated by immobilizing area soaking with hot water

Summary

- Diving emergencies
  - Decompression sickness
  - Barotrauma
  - Arterial gas embolism
  - Nitrogen Narcosis

- Treatment
  - Symptomatic (ABCs)
  - Transport for hyperbaric treatment
Summary

- Rapid ascent to altitude can result in life-threatening conditions
  - Cerebral edema
  - Pulmonary edema

- Treatment
  - Airway management
  - Rapid descent to lower altitude

Questions?