ENVIRONMENTAL EMERGENCIES

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BMRC FA25

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Hypothermia

What causes Hypothermia?

- Prolonged exposure to extreme cold
- The body is not able to retain heat to stay within its normal range (97° F - 99°F)

Hypothermia Onset

- Acute (minutes)
- Sub-acute (hours)
- Chronic (days)

Specific Risk Factors

- Water immersion
- Alcohol consumption
- Low body fat percentage
- Certain endocrine conditions such as hypothyroidism
- Open wounds

Stages of Hypothermia

MILD: 90°F - 95°F Body temp.

- Shivering
- Cold / pale skin
- Slow cap refill

MODERATE: 82°F - 90°F Body temp.

- Slower shivering
- Cold / pale / bluish skin
- ALOC: confusion

SEVERE: Less than 82°F Body temp.

- Shivering stops
- Paradoxical undressing
- Slow/weak HR & RR

Hypothermia Treatments

TREATMENT:

- Remove px from cold environment & keep them still
- Initiate warming (passive warming ONLY for unresponsive px*)
- Administer O2
- Check BGL & cardiac rhythm
- Immediate transport

BLS SPECIFIC CONSIDERATIONS:

- Assess pulse for longer (30-45 seconds)
- If px is unresponsive and there is any doubt about pulselessness then initiate CPR
- If px presents VTAC or VFIB, avoid administering shock more than one time

ACTIVE WARMING: Warming via external heat source

- Applying heat packs to neck, armpits & groin
- Turning up heater in ambulance
- Warm fluid IV (ALS)

PASSIVE WARMING: Allowing the body to rewarm itself by preventing further heat loss

- Removing px from cold environment
- Removing wet clothing
- Covering px with blanket

ALCO Protocol

HYPOTHERMIA

- **Routine Medical Care**
- Protect the patient from the environment
- If patient is in extremis, begin treatment prior to secondary survey
- Check skin temperature

1. **INTRODUCTION:** Hypothermia is a reduced core temperature where the cold challenge overwhelms heat production and heat retention factors. The rate of onset can be:
   - 1.1 **Acute** (minutes to hours) e.g. immersion in cold water
   - 1.2 **Sub-acute** (hours)
   - 1.3 **Chronic** (often over several days) Homeless, drug users, alcoholics, and compromised individuals are at high risk. Elderly persons and those taking certain medicines are also at risk. Injured and seriously ill individuals can become hypothermic quickly

   → **Note:** a hypothermic critical trauma patient has a very high mortality and morbidity rate!
2. **SIGNS AND SYMPTOMS OF HYPOTHERMIA:**
   - 2.1 Altered mental status including: confusion, mood changes, and speech difficulties. The patient's judgment may be affecting causing him/her to exhibit inappropriate behaviors such as removing clothing
   - 2.2 Decreased motor function, poor coordination
   - 2.3 Diminished sense of cold sensation
   - 2.4 Pupils that respond slowly or sluggishly
3. **TREATMENT:**
   - 3.1 **General:**
     - 3.1.1 Remove the patient from the cold environment and prevent further heat loss
     - 3.1.2 Remove wet clothing, begin rewarming - cover with blankets, turn up the heat in the ambulance
     - 3.1.3 Do not let the patient walk or exert him/herself
     - 3.1.4 Administer O_2 - titrate to 94-99% SpO_2 (warmed and humidified is preferred)
     - 3.1.5 Closely monitor cardiac rhythm
     - 3.1.6 Check blood glucose levels. Administer glucose as needed (see ALOC **page 33** – adult or **page 62** - pediatric)
     - 3.1.7 Transport immediately
   - 3.2 **BLS:**
     - 3.2.1 CPR should be initiated if there is any doubt about pulselessness
     - 3.2.2 Severely hypothermic patients may appear dead. If you find an unresponsive, hypothermic patient, take time (30-45 seconds) to try and find a pulse before beginning CPR. Chest compressions should be avoided if any signs of life are present
     - 3.2.3 If VT or VF is present, defibrillation should be attempted. If one shock is unsuccessful, subsequent shocks should be deferred

Frostbite

CAUSE OF FROSTBITE:

- Frostbite describes damage to the skin and tissue caused by prolonged exposure to extreme colds typically below 31°F
- Frostbite most often affects the extremities such as the hands, feet, ears, nose, & lips

STAGES OF FROSTBITE:

Frostnip:

- Precursor to frostbite; tissue is not yet frozen
- Affected area is cold, painful, slightly numb
- Skin is red/purple

Superficial Frostbite:

- Body tissue freezes
- Affected area stings, swells, & blisters
- Skin peels & is white/waxy in color

Deep Frostbite:

- Larger blisters start to form
- Affected area is numb
- Skin turns black & hard as tissue dies

Frostbite Treatments

TREATMENT:

- Remove any jewelry or accessories because affected areas will swell after being warmed
- Passively rewarm px
- Do not massage or agitate affected areas
- Do not pop any blisters
- Wrap affected areas in dry, sterile gauze (separating fingers & toes if possible)
- It is likely that the px is also experiencing hypothermia

Hyperthermia

HEAT CRAMPS:

- Core body temperature below 102°F
- Muscle cramps typically in the extremities and/or abdomen
- Heavy sweating
- Dizziness & nausea
- Increased heart rate

HEAT EXHAUSTION:

- Core body temperature up to 104°F
- Muscle cramps
- Excessive loss of water & sodium caused from profuse sweating
- Pale, cool, diaphoretic skin signs
- Dizziness & nausea
- Syncope or near-syncope
- Orthostatic hypotension*
- Rapid / shallow breathing
- Weak pulse

HEAT STROKE:

- Core body temperature above 105°F
- Hot, dry skin signs; no sweating
- Altered mental status, confusion
- Syncope
- Possible LOC or seizures
- Hypotension
- Rapid / shallow breathing
- Rapid, strong pulse

Hyperthermia Treatments

HYPERTHERMIA TREATMENT:

- **Conscious Patient:**
  - Remove px from hot environment and place in supine position with legs elevated
  - Loosen or remove clothing
  - Administer O2
  - Fan the px
  - If the px is conscious, not nauseated, & has a gag-reflex then they may be given water

- **AMS Patient:**
  - Remove px from hot environment, place on left side, & monitor airway
  - Wet px's skin and fan aggressively
  - Apply cold packs to armpits, neck, & groin
  - Transport immediately

ALCO PROTOCOL

HYPERTHERMIA / HEAT ILLNESS

- **Routine Medical Care**
- Protect patient from environment.
- If the patient is in extremis, begin treatment prior to secondary survey.
- Consider: the environment, patient age, and pre-existing conditions

1. **SIGNS AND SYMPTOMS OF A HEAT EMERGENCY**
   - ➔ Weakness or exhaustion
   - ➔ Dizziness
   - ➔ Headache
   - ➔ Sweating may or may not be present
   - ➔ Fainting or feeling faint
   - ➔ Rapid heart rate
   - ➔ Muscle cramps
   - ➔ Altered mental status (coma, seizures, delirium)
2. **PREEXISTING CONDITIONS THAT CAN CONTRIBUTE TO A HEAT EMERGENCY:**
   - ► **Psychiatric disorder** (both because of the medications taken and perhaps the patient's poor judgement)
   - ► **Heart disease**
   - ► **Diabetes**
   - ► **Alcohol**
   - ► **Fever**
   - ► **Fatigue**
   - ► **Obesity**
   - ► **Dehydration** (either decreased fluid intake or sweating)
   - ► **Medications**
3. **TREATMENT:**
   - 3.1 **If the patient is conscious:**
     - 3.1.1 Remove patient from hot environment
     - 3.1.2 Loosen or remove clothing
     - 3.1.3 Place in supine position with legs elevated
     - 3.1.4 Administer O_2
     - 3.1.5 Fan the patient
     - 3.1.6 Water may be given if patient is alert, has a gag reflex, and is not nauseated
   - 3.2 **If altered mental status is present:** (see above)
     - 3.2.1 Place on left side and monitor airway
     - 3.2.2 Wet the skin and fan aggressively
     - 3.2.3 Apply cold packs to the axillae, groin and neck (if available)
     - 3.2.4 Administer IV fluid challenge (250-500 mL NS)
     - 3.2.5 Transport immediately

Lightning

Injury from lightning can be caused by being struck directly or by standing near the struck target

- Lightning travels across the skin, rather than through it, causing burns
- May cause cardiac arrest & dysrhythmias

EMT Reverse Triage for lightning MCI:

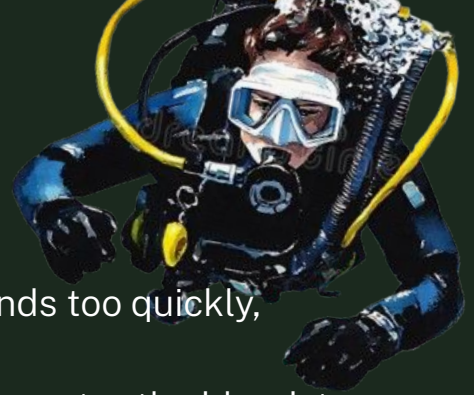
- Immediately resuscitate cardiac arrest patients: those who appear dead may be easily resuscitated with good survival rates, therefore they should be treated first

Water Emergencies: Drowning

Drowning:

- Drowning is the process of respiratory impairment due to submersion in a liquid.
- Leads to hypoxia (inadequate O2), acidosis (decrease pH), hypothermia (cold), and laryngospasm (closure of the vocal cords), all of which can be life-threatening.
- May be complicated by head or spinal injuries, especially in diving accidents or high-impact water entries.
- Prompt intervention is critical, including rescue breathing and spinal precautions when indicated.

Water Emergencies: Diving



Descent:

● Caused by a sudden increase in pressure on the body during descent.

● Symptoms may include:

● Ear pain, ringing in the ears, dizziness, facial pain.

● Loss of balance, hearing impairment, headaches,
eardrum rupture.

● Divers experiencing these symptoms should seek medical attention immediately.

Ascent:

● Occur when a diver ascends too quickly, leading to:

○ Air embolism – Air bubbles enter the bloodstream, potentially rupturing alveoli and causing severe chest pain and respiratory distress.

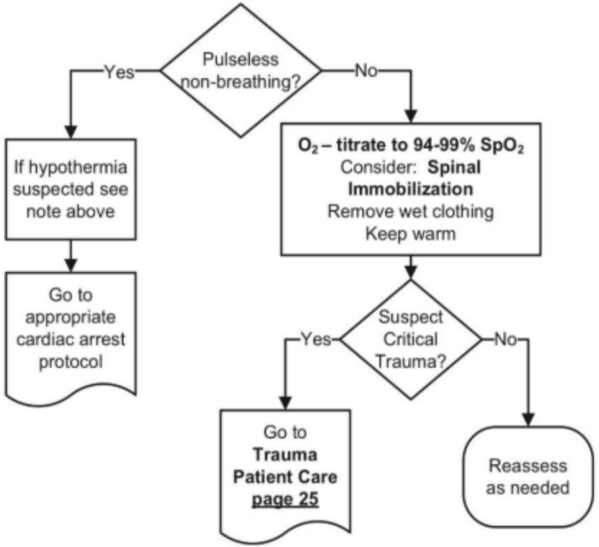
○ Decompression sickness ("The Bends") – Rapid pressure reduction causes nitrogen bubbles to form in the bloodstream,leading to:

- Dizziness, nausea, severe joint/abdominal pain, and impaired circulation.

● Requires immediate medical care, often involving hyperbaric oxygen therapy.

SUBMERSION

- **Routine Medical Care**
- Consider spinal precautions prior to extrication if possibility of neck trauma
- Rapid extrication from water
- If **hypothermia** suspected and the patient is in Ventricular Fibrillation, rapid transport to the closest receiving hospital is essential for rewarming. Patients who are hypothermic rarely respond to treatment. (see Hypothermia **page 17**)
- **Consider CPAP** - see CPAP procedure (**page 118**) for indications



Bites and Stings

1. **Snake Bites**

- Require immediate care, most snake bites are not venomous
- Load and go
- Removing restrictive items and mark the edge of the bit with pen (to see change after swelling)

Some native venomous snakes species here are

- Pit vipers (rattlesnakes, copperheads, water moccasins): have hinged fangs and a triangular head to help deliver the venom
- Coral snakes are often colorful and have small fangs (less efficient at venom delivery compared to pit vipers

Bites and Stings

Snake Bite Symptoms

- Bite marks (look like fang marks)!!
- Pain and swelling
- Rapid pulse, labored breathing, weakness, vision issues
- Nausea, ALOC, vomiting

Bites and Stings

Snake Bite Treatments:

- Call medical direction to locate the nearest facility with antivenom
- Treat for shock since venom can reduce circulation and place the bitten area below to heart to slow blood blow
- Make sure the patient is calm for a lower pulse to reduce the circulation of the venom
- Remove constricting items (watches, rings, wristbands) in order to track the swelling
- Loosely splint the extremity to reduce movement

Bites and Stings

Spider Bites!!

- **In North America, there are only two venomous spiders we will worry about…**
  - **1. Black Widow**
    - Black body and characterized by hourglass red spot
    - Symptoms: muscle pain, Nausea and vomiting Redness and swelling
  - **2. Brown Recluse**
    - More dangerous one out of the two
    - Causes local tissue damage but may not be painful initially.
    - Within days, necrotic tissue forms ulcers that deepen into the skin.

BROWN RECLUSE LOOK-ALIKES

Brown recluse

Wolf spider

Grass spider

Cellar spider

N EXTENSION
Lancaster County

Bites and Stings

TREATMENT for spider bites

1. **Contact Medical Control.**
- **Treat for shock, assist ventilations if needed.**
- **Expose the bite and remove constricting jewelry or clothing.**
- **Immobilize the bitten extremity.**
- **Attempt to identify the spider if safe, but do not waste time.**

Bites and Stings

There are other types of stings from hymenoptera bugs:

- Other Types of Stings:
- Hymenoptera Stings Ants, Bees, Wasps:
  - Painful but not life-threatening unless the patient has an allergy.
- Symptoms of an Allergic Reaction:
- Stridor, wheezing, difficulty swallowing, dizziness. Allergic reaction will affect two of the body's systems (respiratory and skin for example)
- Treatment:
  - ● 0.3 mg IM epinephrine EpiPen – may repeat every 15 minutes if needed. If the patient is a child under the weight of 30 kg, the correct dosage is .15 mg IM epinephrine)
  - 0.1 mg IV/IO epinephrine – for extreme shock or if the patient does not respond to IM epinephrine (outside of EMT scope of practice).

High Altitude Sickness (Above 8000ft)

1. **High Altitude Pulmonary Edema (HAPE)**
   - Fluid buildup in the lungs at elevations above 8,500 feet.
2. **High Altitude Cerebral Edema (HACE)**
   - Brain swelling due to altitude.

Symptoms:
-Headache
-Nausea / vomiting
-Fatigue and weakness
-Loss of appetite
-Dizziness and lightheadedness
-Increased thirst

Treatments:
-Descend immediately to a lower altitude
-Administer supplemental oxygen
-Keep the patient warm and at rest
-Monitor ABCs (Airway, Breathing, Circulation)
-Evacuate quickly if symptoms are severe or worsening

Low Altitude Sickness (Below 5000 ft)

1. **Decompression Sickness (The Bends)**
   - nitrogen bubbles form in the blood and tissues during rapid pressure decrease.

Symptoms

- Ear or sinus pain (barotrauma)
- Cough or chest pain after diving (decompression sickness)
- Joint or muscle pain
- Shortness of breath
- Skin itching or rash
- Fatigue or confusion in severe cases

Treatments:
- Ascend slowly to equalize pressure
- Administer high-flow oxygen
- Hyperbaric chamber if decompression sickness is suspected
- Monitor for respiratory distress

Altitude Emergencies

	High Altitude Sickness (Above 8000 ft)	Low Altitude Sickness
Cause	Decrease oxygen levels	**Pressure changes** during descent (not due to lack of oxygen) — can cause **barotrauma** or **decompression sickness**
Symptoms	-Headache -Nausea / vomiting -Fatigue and weakness -Loss of appetite -Dizziness and lightheadedness -Increased thirst	- Ear or sinus pain (barotrauma) - Cough or chest pain after diving (decompression sickness) - Joint or muscle pain - Shortness of breath - Skin itching or rash - Fatigue or confusion in severe cases
Sever Forms	High Altitude Pulmonary Edema (HAPE) High Altitude Cerebral Edema (HACE)	**Decompression Sickness (The Bends)** — nitrogen bubbles form in the blood and tissues during rapid pressure decrease
Treatments	-**Descend immediately** to a lower altitude -**Administer supplemental oxygen** -Keep the patient **warm and at rest** -**Monitor ABCs** (Airway, Breathing, Circulation) -**Evacuate quickly** if symptoms are severe or worsening	- **Ascend slowly** to equalize pressure - **Administer high-flow oxygen** - **Hyperbaric chamber** if decompression sickness is suspected - **Monitor for respiratory distress**

Thank You