HEAT RELATED EMERGENCIES

Instructor: Bill Streett - Training Section Chief
# C.E. Card Numbers

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<th>BLS Providers</th>
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<tr>
<th>Course #</th>
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Fluid Loss and Physical Exertion

• Question: During physical activity, how much fluid will these firefighters loose?
Fluid Loss and Physical Exertion

- Physical Exertion or Exercising in the heat can result in fluid depletion of 1 to 2 Liters / Hour per firefighter!
Moral of the Story:

- HYDRATE EARLY and OFTEN – Especially during days of anticipated high temps.
OBJECTIVE

- Identify heat related exposure injuries and the steps for treating each type.
FACTORS AFFECTING HEAT LOSS

- Conduction – 2%
- Convection – 10%
- Evaporation – 30%
- Radiation – 65%
- Respiration – 3%
Heat Loss

Vasodilation
RESPIRATION
EVAPORATION
Behavioral Modification
Decrease Heat Production
PREDISPOPOSING FACTORS

- Environment
  - Amount of time exposed
  - Temperature to which body part was exposed
  - Wind velocity
- Age of patient
- Medical condition of patient
- Ingestion of drugs or poisons
Medications That Catalyze Heat Related Emergencies

<table>
<thead>
<tr>
<th>Drug Classifications</th>
<th>Examples</th>
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<tr>
<td>Beta Blockers</td>
<td>Propanalol, Inderal</td>
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<tr>
<td>Anticholinergics</td>
<td>Atropine Sulfate</td>
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<tr>
<td>Diuretics</td>
<td>Lasix, Mannitol, Urea</td>
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<td>Ethanol</td>
<td>Coors, Bud, Jim Beam</td>
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<td>Antihistamines</td>
<td>Benadryl, Terfenadine</td>
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<td>Cyclic Antidepressants</td>
<td>Amitril, Prozac, Zoloft</td>
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<tr>
<td>Sympathomimetics</td>
<td>Sudafed, Cocaine, Meth</td>
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<td>Phenothiazines</td>
<td>Protran, Chlorpromazine</td>
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Induced Heat Related Emergencies

- Often taken with alcohol or other drugs (meth.)
- Used in the Club scene with low ventilation.
- Concept of time is lost.
- Body’s metabolism is greatly accelerated.
- Users will dance for hours
Ecstasy (MDMA) Deaths

“The leading causes of actual MDMA-related death are complications of "malignant hyperthermia/hyperpyrexia"...what most people would call Heatstroke.
Pathophysiology of Ecstasy Induced Heatstroke

• After a night of ecstasy, alcohol, and several hours of dancing:

  The body generates an extreme amount of heat after person ignores hydration and looses track of time.
  - LOC starts to diminish.
  - Protein components of blood break down, forming clots throughout the circulatory system.
  - Internal bleeding begins as these clots travel.
  - Liver, already under the strain of alcohol, starts to fail (initially at the cellular level advancing to entire sections of the liver).
Pathophysiology of Ecstasy Induced Heatstroke (cont.)

- Proteins start to saturate the circulatory system and are dumped into the renal system (kidneys).
- Kidneys eventually fail under this systematic strain and overload of proteins.
- Brain cell start to die further diminishing level of consciousness.
- Ecstasy user ultimately goes into cardiac arrest.
- Body maintains a core temp. of 104 F. an hour after the person’s death.
Why the elderly are so susceptible

- Affects of vasodilation on the body
- Predisposed medical conditions like diabetes and heart disease
- Number and efficiency of sweat glands decrease with age
HEAT RELATED EMERGENCIES

Upon Examination, consider the following:
- Mechanisms that Decrease (or Increase) Body Heat.
- Types of Heat Illness Involved.
MECHANISMS THAT DECREASE BODY HEAT

• Sweating
• Dilation of skin blood vessels
• Remove clothing
• Move to cooler environment
TYPES OF HEAT ILLNESSES

- Hyperthermia
- Heat cramps
- Heat exhaustion
- Heatstroke
HYPERTHERMIA

- Def: An illness that results when the body is exposed to more heat energy than it can handle.
HEAT CRAMPS

- Painful muscle spasms that occur after vigorous activity.
- Exact cause not well understood.
HEAT EXHAUSTION

- Fluid depletion occurs
- Mild hypovolemic shock secondary to fluid and salt loss
- Signs and symptoms
  - Weakness or exhaustion
  - Nausea and headache
  - Dizziness or faintness
  - Rapid pulse
  - Cold, clammy skin
  - Elevated temperature
HEATSTROKE

- Least common, most serious
- Mechanisms overwhelmed
- Signs and symptoms
  - Hot, dry and flushed skin
  - Altered level of consciousness
  - Unresponsive
  - Falling blood pressure
  - Temp of 106 degrees F or more
**GENERAL EMERGENCY MEDICAL CARE**

- Patient’s with moist, pale and normal to cool skin
  - Move patient from environment
  - Administer oxygen
  - Loosen or remove clothing
  - Place patient in supine position
  - Fan the patient
  - If responsive, and not nauseous, give water to drink
**Adult – Environmental: HYPERthermia**

**Heat cramps** are painful cramps or spasms of large muscle groups encountered during exertion in hot environments. **Heat exhaustion** is a syndrome of dizziness, nausea, vomiting, weakness, and occasionally syncope which may be associated with a normal body temperature or a moderate temperature elevation. **Heat stroke** presents with disorientation, seizures, and/or coma and an elevated body temperature.

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**EMT – Basic**

1. Administer oxygen, obtain vital signs, and initiate pulse oximetry monitoring.
2. Obtain accurate body core temperature, if possible.
3. Move to cooler environment and remove excess clothing, protect from further heat gains.
4. **Heat exhaustion**: Carefully begin rehydration with sport drink or water, if patient can tolerate liquids by mouth. Do not give large amounts of fluid rapidly or administer fluids by mouth to any patient who has an altered mental status. If temperature >103 degrees F., cool patient with tepid wet towels, fans, and spray water.
   - Remove cooling agent when temperature reaches 100 degrees F. Avoid rapid decrease of temperature to prevent shivering which will increase temperature.
5. **Heat stroke**: Aggressive evaporation cooling is indicated (using fine mist water spray and forced air stream with fans), apply ice packs to groin and arm pits.
   - Continue cooling until core temperature is 104 degrees F. or less. Avoid rapid decrease of temperature to prevent shivering which will increase temperature.
LFEMSC ALS Protocol

EMT – Enhanced / Intermediate / Paramedic

1. Establish IV access.
2. Heat cramps/heat exhaustion: Fluid therapy bolus up to 1 liter NS IV with evidence of hypovolemia or hemodynamic compromise, or severe heat cramps with painful, involuntary muscle spasms.
3. Heat stroke: Cautious fluid therapy initially at 250 ml/hr of NS. If evidence of hypovolemia or hemodynamic compromise exists, then initiate fluid therapy bolus up to 1 liter NS IV to maintain SBP >90 mmHg.

Key Points / Considerations

• The major difference between heat exhaustion and heat stroke is Central Nervous System (CNS) impairment.
• The treatment of heat exhaustion is rest with fluid volume and electrolyte replacement.
• Severe heat cramps will respond to rest and intravenous re-hydration with NS.
• Dehydration and volume depletion may not occur in classic heat stroke. Vigorous fluid administration may produce pulmonary edema, especially in the elderly.
GENERAL EMERGENCY CARE

- Use a fan to lower temperature
- Elevate feet
- Apply cold compresses
- Have victim lie down
- Have victim drink fluids
Patient’s with hot, dry, or moist skin
- Move patient from environment
- Administer oxygen
- Loosen or remove clothing
- Fan patient and run air conditioner
- Apply cool packs to neck, groin, & armpits
- Apply water with a sponge or wet towel
- Provide immediate transport!
Aggressive Cooling
EMERGENCY MEDICAL CARE cont.

• NOTE: Untreated heatstrokes will always result in death!
• Accounts for 175 – 200 in the United States annually.
QUESTIONS?

• Heat Related Emergencies