

Project: Ghana Emergency Medicine Collaborative

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HEAT RELATED ILLNESSES

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CASE 1

An 82 yo female with a history of hypertension and a previous MI is brought in by her family because of confusion. They found her in her house with the windows shut. It was very hot and she was lying in her bed moaning.

PE: elderly female, moaning, dry warm skin, P 124

BP 104/56, RR 22, rectal temp 104.8

Rest of exam unremarkable after removing several layers of clothing.

CASE 2

26 yo healthy British cricket player fell to the ground and vomited during a game. Was brought to the sidelines and vomited again. He became more and more confused, then had a seizure.

PE: young sweaty male, unresponsive, P 148, BP 102/52, RR 32, rectal temp won't give you a reading

Skin is hot and moist, pupils 3 mm and unreactive, groans to painful stimuli

RISK FACTORS

- High temperature with high humidity
- Older age
- Obesity
- Pre-existing cardiovascular disease
- Psychiatric illness
- Lack of acclimatization or physical conditioning
- Strenuous exertion
- A history of heat related illness
- Excessive clothing

MEDICATIONS AND DRUGS THAT CONTRIBUTE TO HEAT RELATED ILLNESSES

- Alcohol
- Amphetamines
- Anticholinergics
- Antihistamines
- Cocaine
- Diuretics
- Neuroleptics
- Phenothiazines
- Thyroid replacement
- Tricyclic antidepressants

HEAT CRAMPS

- Occurs with heavy exertion and sweating in high temperatures
- Usually heaving sweating and salt loss with replacement by water, resulting in a drop in serum sodium
- Muscle cramping particularly in legs and shoulders
- Normal temperature and blood pressure with mild tachycardia

TREATMENT: Give ORS solution or can give a liter of Normal Saline in a cool environment, can go home

HEAT EXHAUSTION

- Caused by salt and water loss
- Symptoms: headache, dizziness, nausea, vomiting, fatigue, cramping
- Exam: sweaty, tachycardic, temperature up to 102, appear dehydrated
- *****Mental Status is normal**
- Labs: BUN and creat may be slightly high, sodium can be high or normal

TREATMENT: cool environment with a fan, IV fluid replacement with NS and LR, admit patients that are not improving over several hours

HEAT STROKE

PATHOPHYSIOLOGY

- Body's thermoregulatory system fails or is overwhelmed, the body temperature rises and causes cellular damage (brain, muscle, kidneys, liver)
- Volume depletion and electrolyte abnormalities are not prominent features, and certainly are not the cause of the problem.

HEAT STROKE

- Key Elements:

1. Core temperature above 104.9 (40.5 C)
2. Altered mental status

May be:

Nonexertional (old person sitting in a hot home for days)

This is call Classic Heat Stroke. Usually are not sweaty.

Exertional (usually younger person exercising or working, occurs over hours) Usually are sweaty

HEAT STROKE

HISTORY AND PHYSICAL

HISTORY: Probably get a history from someone else.
confusion, unsteady gait, bizarre behavior, syncope,
seizure, coma

PHYSICAL EXAM:

- Core (rectal) temp >104.9 (40.5 C)
- Tachycardia and hypotension
- Dry or moist skin
- Altered mental status

DIFFERENTIAL DIAGNOSIS OF HYPERTHERMIA AND ALTERED STATUS

- **Infection** (sepsis or CNS infection, especially in the elderly patient found at home)
- Hyperthyroid Storm
- Neuroleptic Malignant Syndrome
- Pheochromocytoma
- Anticholinergic Poisoning (farmers)
- Drug Ingestion (cocaine, amphetamines)

HEAT STROKE

LABORATORY FINDINGS

- Metabolic acidosis on an ABG
- Leukocytosis (which can be confusing if infection is being considered)
- Elevated liver tests
- Elevated CPK
- Elevated BUN and creatinine
- May have electrolyte abnormalities
- Coagulopathy is common
- ECG may show evidence of injury, arrhythmias, or conduction abnormalities

COMPLICATIONS OF HEAT STROKE

- NEURO: injury is permanent in about 20% of survivors
- MUSCLE: causes rhabdomyolysis, measure CPK
- RENAL: rhabdo can result in acute renal failure
- HEPATIC: acute liver failure
- CARDIAC: myocardial muscle damage can result in arrhythmias and cardiac arrest
- PULMONARY: may develop ARDS
- HEMATOLOGIC: may develop bleeding and DIC

IMMEDIATE TREATMENT

- ABCs
- Put on Oxygen and Cardiac monitor
- Remove all clothing
- Check RBS
- Consider giving Narcan and Thiamine

TREATMENT

COOLING

EXTERNAL

- **Evaporative:** Wet the entire body with tap water and put a strong fan blowing on the patient. This is the best method. Need to keep re-wetting the body as the water evaporates.
- **Ice packs:** Can be put in groin and axillae. Causes vasoconstriction and slows cooling if packs put all over.
- **Immersion:** Immerse in an ice water bath. Not very practical and rarely used.

INTERNAL

- Gastric, bladder, and rectal lavage with cool water reported but not generally recommended.

OTHER TREATMENTS

- Intubate if patient is having respiratory distress or completely unresponsive.
- Try to suppress shivering which generates heat. Can use benzodiazepines if needed.
- Aggressively treat seizures (Seizures generate a lot of heat.)
- Frequently measure temperatures and avoid over-cooling. Stop cooling when temperature between 101-102.
- Place foley to monitor urine output.
- Admit to the ICU. These patients develop multiorgan failure and have a high mortality.

KEY POINTS

- Consider heat related problems in an older patient who presents with confusion and very high “fever”
- Take rectal temps if suspicious, remember that the core body temp may be even higher than the reading because most thermometers don’t read higher than 104-105.
- Begin immediate cooling. Must have a fan.
- Frequently recheck the rectal temp and stop the cooling when temp is about 101. Overshooting on the cooling is common.