



# HYPERTHERMIA

## History

- Age, very young and old
- Exposure to increased temperatures and / or humidity
- Past medical history / Medications
- Time and duration of exposure
- Poor PO intake, extreme exertion
- Fatigue and / or muscle cramping

## Signs and Symptoms

- Altered mental status / coma
- Hot, dry or sweaty skin
- Hypotension or shock
- Seizures
- Nausea

## Differential

- Fever (Infection)
- Dehydration
- Medications
- Hyperthyroidism (Thyroid Storm)
- Delirium tremens (DT's)
- Heat cramps, exhaustion, stroke
- CNS lesions or tumors

Temperature Measurement Procedure **if available**

Temperature Measurement should NOT delay treatment of hyperthermia

Remove from heat source to cool environment

Cooling measures

Remove tight clothing

Blood Glucose Analysis Procedure

Age Appropriate

Diabetic Protocol AM 2/ PM 2 **as indicated**

### Heat Stroke

#### Classic Heat Stroke

- Not common type
- Hot and Dry
- Altered Mental Status

#### Exertional Heat Stroke

- **Most common type**
- Wet with prior sweating
- Altered Mental Status

Assess Symptom Severity

### HEAT CRAMPS

Normal to elevated body temperature  
Warm, moist skin  
Weakness, Muscle cramping

PO Fluids as tolerated

Monitor and Reassess

### HEAT EXHAUSTION

Elevated body temperature  
Cool, moist skin  
Weakness, Anxious, Tachypnea

### HEAT STROKE

Fever, usually > 104°F (40°C)  
Hot, dry skin  
Hypotension, AMS / Coma

Age Appropriate  
 Airway Protocol(s) AR 1 - 7 **as indicated**

Altered Mental Status  
Protocol UP 4 **as indicated**

Active cooling measures  
Target Temp < 102.5° F (39°C)

**B** 12 Lead ECG Procedure

IV or IO Access Protocol UP 6

**P** Cardiac Monitor

**A** **NORMAL SALINE BOLUS**  
**Adult: 500 mL IV / IO**  
Repeat to effect SBP > 90  
**Maximum 2 L**  
**Pediatric: 20 mL/kg IV / IO**  
Repeat to effect Age appropriate  
SBP ≥ 70 + 2 x Age  
**Maximum 60 mL/kg**

Age Appropriate  
Hypotension/ Shock  
Protocol AM 5/ PM 3 **as indicated**

Monitor and Reassess

**Notify Destination or Contact Medical Control**



# HYPERTHERMIA

**PASSIVE COOLING MEASURES:** Remove patient from the heat source/hot environment; remove clothing.

**ACTIVE COOLING MEASURES:** Apply room temperature water to skin and increase the air flow around the patient.

Use of ice/cold packs at pulse points should be limited to HEAT STROKE with temperature greater than 104°F.

## Pearls

- **Recommended Exam: Mental Status, Skin, HEENT, Heart, Lungs, Neuro**
- **Extremes of age are more prone to heat emergencies (i.e. very young and very old).**
- **Temperature measurement:**
  - **Obtain and document patient temperature if able.**
  - **Many thermometers and routes of measurement are available.**
  - **Order of preference for route of measurement: Rectal > oral > temporal > axillary.**
- Heat illness is predisposed by use of: tricyclic antidepressants, phenothiazines, anticholinergic medications, and alcohol.
- Cocaine, Amphetamines, and Salicylates may elevate body temperatures.
- Intense shivering may occur as patient is cooled.
- **Heat Cramps:**
  - Consists of benign muscle cramping secondary to dehydration and is not associated with an elevated temperature.
- **Heat Exhaustion:**
  - Consists of dehydration, salt depletion, dizziness, fever, mental status changes, headache, cramping, nausea and vomiting.
  - Vital signs usually consist of tachycardia, hypotension, and an elevated temperature.
- **Heat Stroke:**
  - Consists of dehydration, tachycardia, hypotension, temperature  $\geq 104^{\circ}\text{F}$  ( $40^{\circ}\text{C}$ ), and an altered mental status.
  - Sweating generally disappears as body temperature rises above  $104^{\circ}\text{F}$  ( $40^{\circ}\text{C}$ ).
  - The young and elderly are more prone to be dry with no sweating.
  - **Exertional Heat Stroke:**
    - **In exertional heat stroke (athletes, hard labor), the patient may have sweated profusely and be wet on exam.**
    - **Rapid cooling takes precedence over transport as early cooling decreases morbidity and mortality.**
    - **If available, immerse in an ice water bath for 5 – 10 minutes. Monitor rectal temperature and remove patient when temperature reaches  $102.5^{\circ}\text{F}$  ( $39^{\circ}\text{C}$ ). Your goal is to decrease rectal temperature below  $104^{\circ}\text{F}$  ( $40^{\circ}\text{C}$ ) with target of  $102.5^{\circ}\text{F}$  ( $39^{\circ}\text{C}$ ) within 15 minutes. Stirring the water aids in cooling.**
    - **Nearly 66% of all exertional heat strokes occur in high school athletes during the month of August.**
    - **In NC, it is mandatory that all high school field houses have a dunk tank and available ice and water.**
    - **Other methods include cold wet towels below and above the body or spraying cold water over body continuously.**
- **Neuroleptic Malignant Syndrome (NMS):**
  - Neuroleptic Malignant Syndrome is a hyperthermic emergency which is not related to heat exposure.
  - It occurs after taking neuroleptic antipsychotic medications.
  - This is a rare but often lethal syndrome characterized by muscular rigidity, AMS, tachycardia and hyperthermia.
  - **Drugs Associated with Neuroleptic Malignant Syndrome:**
    - Prochlorperazine (Compazine), promethazine (Phenergan), clozapine (Clozaril), and risperidone (Risperdal) metoclopramide (Reglan), amoxapine (Ascendin), and lithium.
  - **Management of NMS:**
    - Supportive care with attention to hypotension and volume depletion.
    - Use benzodiazepines such as diazepam or midazolam for seizures and/ or muscular rigidity.