

# 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 <b>as indicated</b>

Assess Symptom Severity



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

**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

PO Fluids as tolerated
Monitor and Reassess

Age Appropriate Airway Protocol(s) AR 1 - 7 <b>as indicated</b>
Altered Mental Status Protocol UP 4 <b>as indicated</b>
Active cooling measures Target Temp < 102.5° F (39°C)
<b>B</b> 12 Lead ECG Procedure
<b>A</b> IV / IO Procedure
<b>P</b> Cardiac Monitor
<b>A</b> <b>Normal Saline Bolus</b> 500 mL IV / IO Repeat to effect SBP > 90 <b>Maximum 2 L</b> <b>PED: Bolus 20 mL/kg IV / IO</b> Repeat to effect Age appropriate SBP ≥ 70 + 2 x Age <b>Maximum 60 mL/kg</b>
Age Appropriate Hypotension / Shock Protocol AM 5 / PM 3 <b>as indicated</b>
Monitor and Reassess

 **Notify Destination or Contact Medical Control** 

# Hyperthermia

## Pearls

- **Recommended Exam: Mental Status, Skin, HEENT, Heart, Lungs, Neuro**
- **Extremes of age are more prone to heat emergencies (i.e. young and old). Obtain and document patient temperature if able.**
- 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 30 minutes. Stirring the water aids in cooling.**
    - 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.