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**
  500 mL IV / IO
  Repeat to effect SBP > 90
  Maximum 2 L
  PED: Bolus 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

Toxic-Environmental Protocol Section

Hyperthermia

- Heat illness is a spectrum of illness from mild to severe.
- Occurs after body exposed to head for extended period of time or may be triggered by exercise or intensive work in hot environment and decrease fluid intake.
- The very young and the very old are most susceptible.

Heat Cramps:
- Common. Usually after working in hot environment and cramps develop during rest. Lower extremities are most commonly affected followed by abdominal cramps.

Heat Exhaustion:
- Caused by volume depletion during excessive sweating while working or playing in a hot environment.
- The small bowel is the organ most sensitive to heat illness, so abdominal pain, cramping, nausea, vomiting, and/ or diarrhea are common symptoms.

Heat Stroke:
2 Types:
- **Exertional Heat Stroke:**
  More common and is usually with play or work in a hot environment.
  Fever and altered mental status are keys to diagnosis.
  Typically rectal temp is > 104° F and the patient is altered.
  These patients may have wet hair and clothing from prior sweating. The patients are hot, altered, and wet.
- **Non-Exertional Heat Stroke:**
  This is most commonly taught, but rarely actually seen. Altered mental status, hot, and dry are typical symptoms.

Rapid cooling in heat stroke takes priority over transport.

Early cooling decreases morbidity and mortality.

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 ≥ 104°F (40°C), and an altered mental status.
  Sweating generally disappears as body temperature rises above 104°F (40°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°F (39°C). Your goal is to decrease rectal temperature below 104°F (40°C) with target of 102.5°F (39°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.