

Toxins and Environmental: HEAT- and COLD-RELATED EMERGENCIES

Hyperthermia/Heat Exposure

Goal: Prompt recognition and treatment of heat-related emergencies, with focus on immediate cooling and rehydration, and on mitigating risk for cardiovascular/neurologic decompensation and agitation

Inclusion Criteria: All patients with signs and symptoms of illness related to exposure to high environmental temperature/humidity

Exclusion Criteria: Fever from infectious or inflammatory conditions; Adverse Drug Events (such as malignant hyperthermia and neuroleptic malignant syndrome); thyroid storm; delirium tremens (DTs)

Refer to: [Excited Delirium](#), [Poisoned Patient](#), [Shock and Trauma CPGs](#)

Definitions:

1. **Heat cramps:** Minor muscle cramps, usually in the legs/abdominal wall; Begin after exertion; Temp normal
 - a. Not life-threatening
2. **Heat syncope:** Dizziness, fainting or presyncope resulting from blood pooling in the lower extremities
 - a. Not life-threatening
3. **Heat exhaustion:** Salt and water depletion; Usually gradual onset; Abnormal vital signs; Temp elevated
 - a. May progress to heat stroke
4. **Heat stroke:** Body cooling mechanisms fail; **ALTERED LOC**; Temp *usually* over 104°F (40°C)
 - a. True life-threatening emergency with two different clinical presentations:

CLASSIC	EXERTIONAL
External heat source (e.g. heat wave)	Exercise or work
Elderly, debilitated	Previously healthy
NO exertion	No acclimatization
Slower onset (hours to days)	Fast onset (hours)
No sweating	May be sweating
Hypoglycemia uncommon	Hypoglycemia common

Basic Level

1. Move victim to a cool, shaded area, away from sun or external heat source
 - a. If there is evidence of shock, position the patient supine with the feet elevated; monitor airway
2. Remove as much clothing as practical and loosen restrictive garments
3. Assess and support ABCs according to [UNIVERSAL CARE – ADULT](#) or [UNIVERSAL CARE – PEDIATRIC](#)
 - a. Monitor airway status for emesis, seizure
 - b. Initiate continuous ECG monitoring
 - c. Obtain and document POC glucose measurement
 - i. If hypoglycemic and patient can tolerate oral intake, provide small sips of cool liquids
 - d. Document temperature (and route of measurement):
 - i. **Core (rectal) temperature is most accurate, if available**
 - ii. **Non-core** temperature within normal range does NOT exclude serious heat illness/heatstroke
 - iii. **Elevated non-core** temperature suggests an even higher core temperature
 - iv. **Duration of high core temperature** is more important than the temperature level, *per se*
 - e. Assess neurologic status: Confusion? Coma? Agitation?
 - i. Altered Mental Status (AMS) is the hallmark of heatstroke, regardless of patient's temperature, especially if core (rectal) temperature measurement is unavailable
 - f. Assess skin:
 - i. Hot and flushed?
 - ii. Dry or sweaty?
 1. NOTE: Sweating does NOT exclude the diagnosis of heat stroke!

- g. Assess for other signs of shock
- 4. Administer supplemental oxygen to maintain SpO₂ of at least 94% (continuous monitoring)
- 5. If temperature is at least 104°F (40°C) **OR** if there is altered mental status, begin rapid cooling **on-scene**:
 - a. Principle: "Wet and Windy" BEFORE leaving the scene
 - i. Mist exposed skin with tepid water, while fanning the skin: continue cooling en route
 - b. Ice packs to groins and axillae (adjunct only – NOT primary method)
 - c. Ice bath immersion (most rapid and effective cooling method):
 - i. This is generally unavailable for EMS, but may have been started before EMS arrival
 - ii. If ice-bath cooling was started before arrival, e.g. for student athlete, continue cooling on scene to complete 20-minute treatment, before getting en route
- 6. SAMPLE History focus:
 - a. Signs/symptoms: Cramps, headache, altered mental status, orthostatic symptoms, weakness, nausea
 - b. Allergies
 - c. Medications (including over-the-counter, supplements); Alcohol ingestion; Illicit drugs (overdose?)
 - d. Past Medical History, especially cardiovascular, neurologic
 - e. Last oral intake
 - f. Events:
 - i. Environmental: Ambient temperature and humidity
 - ii. Exertion: level of activity and other circumstances (young child left in vehicle?)
 - iii. Length of time at risk
 - iv. Attire worn
- 7. Once advanced level care arrives on scene, give report and transfer care

Advanced Level

- 8. Initiate continuous waveform capnography (PetCO₂) monitoring
 - 9. Continue cooling measures:
 - a. Consider discontinuing cooling measures at (core) temperature of 103.1-104°F (39.5-40.0°C)
 - b. Do not administer acetaminophen or other antipyretics, even if available on-scene
 - 10. Monitor for shivering and seizures (see below)
 - 11. Consider differential diagnosis, especially for adults and workplace/occupational settings, e.g. acute coronary syndrome (ACS), stroke, hypoglycemia, drug/alcohol intoxication, head injury
 - 12. Treat hypoglycemia per [Diabetic Emergencies CPG](#)
 - 13. Continue hydration:
 - a. Heat cramps, syncope, or exhaustion: oral fluids (sports drinks, or table salt ¼-½ tsp/qt. water), as tolerated*
 - b. Heat stroke: establish IV/IO access and:
 - i. Administer Normal Saline 20 mL/kg (**but no more than a total of 1000 mL (1L)**)
 - ii. Reassess vital signs and perfusion status (BP, HR, RR, mental status, skin color, capillary refill)
 - iii. Repeat once Normal Saline 20 mL/kg (**but no more than a total of 1000 mL (1L)**)
 - iv. Reassess vital signs and perfusion status (BP, HR, RR, mental status, skin color, capillary refill)
 - 14. *Consider small fluid bolus IV/IO for dehydration, even if vital signs are normal:
 - a. 10 mL/kg (up to 500 mL total) for adults 14 years of age and older
- a. **Pediatric (Infants and children under 14 years of age):**
Administer 10-20 mL/kg (up to 500 mL total)
- b. Assess and document clinical response & repeat bolus if signs of hypoperfusion persist
 - 15. Treat seizures or uncontrolled shivering during cooling according to the [Seizures CPG](#):
 - a. Risk of treating shivering (respiratory depression, etc.) must be weighed against potential benefit
 - b. *In pediatric patients, prepare for assisted ventilation/advanced airway management prior to treatment*
 - 16. Monitor vital signs and transport:
 - a. Strongly consider transport of suspected heat stroke patients to a Level I or Level II Trauma Center
 - 17. For additional patient care considerations not covered under standing orders, contact BioTel