

# I02: Hyperthermia

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## Introduction

Heat related illnesses are characterized by hyperthermia (a core temperature over 40°C) and central nervous system disturbances, and can be life-threatening conditions. They can be considered a form of systemic inflammatory response that affects multiple organ systems, which in many ways resembles sepsis. These illnesses can be categorized into three groups: heat cramps, heat exhaustion, and heat stroke.

Note: this guideline is intended to assist paramedics in managing heat from exogenous sources. It is not to be used to manage fever.

## Essentials

- Heat cramps are painful muscle spasms due to hyponatremia, associated with strenuous activity. Patients have a normal body temperature, with no evidence of dehydration.
- Heat exhaustion develops over hours to days, and is associated with fluid and electrolyte losses due to sweating with inadequate replacement. Patients have a normal mental status, though they may be light-headed, nauseated, tachypneic, and complaining of a headache. Body temperature is normal, or slightly elevated. Hypotension can be present, and may cause tachycardia.
- Heat stroke can be divided into two sub-types:
  - Classic (non-exertional) heat stroke occurring in the elderly with high ambient temperature. Can develop over hours to days from passive fluid losses by sweating. Classic heat stroke carries a high mortality rate. Mortality correlates with the degree of temperature elevation, time to initiation of cooling measures, and the number of organ systems affected.
  - Exertional heat stroke develops due to extreme environmental conditions combine with high metabolic rates of heat production to overwhelm the body's ability to lose heat. Generally seen in fit populations during exertional activities (e.g. long distance runners, firefighters, soldiers) especially when high humidity limits heat loss. Occurs when the body's thermoregulation defences are exhausted and is a true medical emergency.
- Both types of heat stroke can present with sudden loss of consciousness, irritability, seizures, ataxia, hallucinations, hemiplegia and coma. Patients may stop sweating in either case (and is a late sign of heat stroke). Rhabdomyolysis may complicate management.

## Additional Treatment Information

- The basic treatments for heat emergencies are the same across all license levels, and vary only in the case of critically ill patients suspected of heat stroke
- The management of classic heat stroke consists of ensuring adequate airway protection, breathing, and circulation, rapid active cooling, and treatment of complications
- Recommended treatment for exertional heat stroke includes whole-body cold-water immersion (CWI). However, remote locations or monetary or spatial restrictions can challenge the feasibility of CWI.
- A patient with a body temperature below 40°C can generally be managed using basic cooling techniques alone. Sheltering and removal from the heat source, removing all clothing except for underwear, and ensuring airflow over the patient comprise the initial actions. Spray bottles of water, or wet towels, can also be used to help cool patients; these should be continued until the core temperature is < 38°C.
- In more severe cases (i.e., a core temperature above 40°C), more aggressive interventions should be considered. Cool intravenous fluids can be considered in these instances, and should be given if the patient is significantly dehydrated, or if signs of poor perfusion are present. As with all instances of fluid replacement, caution should be exercised. Although the therapeutic endpoints for fluid resuscitation are not well defined, 10 mL/kg is suggested as an initial goal; consultation with ClinCall for additional guidance is recommended.
- Do not give antipyretics. Hyperthermia is distinct from fever in that the heat source is exogenous – the hypothalamus' set point is not affected.
- Be sure to differentiate shaking and tremors from seizures. Manage seizures in accordance with CPG [F02: Seizures](#).

## Referral Information

Heat exhaustion that responds to treatment within 15 minutes can be left in care of family.

## Interventions

### First Responder

- Ensure optimal oxygenation and ventilation
  - → [A07: Oxygen and Medication Administration](#)
  - → [B01: Airway Management](#)
- Shelter or otherwise remove patient from heat source
- Remove all clothing except underwear and ensuring airflow over patient
- Tepid water using spray bottles or wet towels can also be used

### Primary Care Paramedic – All FR and EMR interventions, plus:

- Consider vascular access and need for fluid replacement
  - → [D03: Vascular Access](#)
- Assess capillary blood glucose. Correct hypoglycemia as required
  - → [E01: Diabetic Emergencies](#)
- For obtunded, unresponsive patients, consider supraglottic airway
  - → [PR08: Supraglottic Airways](#)

### Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- Consider anticonvulsant
  - → [F02: Seizures](#)
- Consider endotracheal intubation in unresponsive patients
  - → [PR18: Anesthesia Induction](#)

### Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider neuromuscular blocker

## Evidence Based Practice

[Hyperthermia](#)

