

DIAGNOSE IT *hyperthermia plus CNS dysfunction — that is the whole definition*

THE TWO CRITERIA

Core temperature above roughly 40°C together with central nervous system dysfunction — confusion, ataxia, seizure, agitation, or coma. **Measure a true core temperature:** rectal or esophageal. **Oral, axillary and tympanic readings are unreliable** and underestimate, delaying treatment.

TWO TYPES

Exertional — young, fit, exercising or working in heat; often **sweating**, with rhabdomyolysis and rapid onset. **Classic (non-exertional)** — elderly, frail, during a heatwave; often **hot and dry**, with comorbidity and anticholinergic or diuretic medication.

NOT THE SAME AS

Heat exhaustion — temperature usually under 40°C with **intact mentation**. **Anhidrosis is not required** for heat stroke, and expecting dry skin in an exertional case is a classic reason the diagnosis is missed.

COOL IMMEDIATELY *the single intervention that changes mortality*

- Cold-water immersion is the gold standard** for exertional heat stroke. Prioritize a modality achieving a **cooling rate of at least 0.155°C per minute** — immersion achieves roughly 0.13°C/min or better with ice water and circulation.
- The target is 39°C, reached within 30 minutes of recognition.** Achieving the target faster is associated with **lower mortality**, so time-to-cool is the quality metric.
- Cool first, transport second.** Where immersion is available on scene, cooling takes priority over moving the patient, guided by **real-time core temperature monitoring** to avoid under- or over-cooling.
- If immersion is not possible:** evaporative cooling with tepid water spray plus continuous fanning, ice packs to **neck, axillae and groin**, cold intravenous fluids, and cooling blankets. These are slower — use several simultaneously.
- Stop active cooling at about 38.5–39°C** to avoid overshoot into hypothermia, then monitor continuously, since **rebound hyperthermia** occurs.

TWO DRUGS NOT TO GIVE *both are common reflexes and both are wrong*

NO ANTIPYRETICS

Acetaminophen and NSAIDs should not be used. Heat stroke is **not** a hypothalamic set-point problem — the set point is normal and the body is simply overwhelmed — so antipyretics do not work. Worse, they **may exacerbate coagulopathy and contribute to organ dysfunction** in a patient already at risk of hepatic injury and DIC.

NO DANTROLENE

Dantrolene has not been shown to improve recovery and is not indicated in heat-related illness. It is the treatment for **malignant hyperthermia**, which is a different disease with a different mechanism. Reaching for it here delays effective cooling.

MANAGE THE ORGAN INJURY *the damage continues after the temperature normalizes*

System	What to do
Airway & breathing	Protect the airway in the obtunded patient. Seizures are common — treat with benzodiazepines, which also reduce shivering during cooling.
Circulation	Fluid resuscitate , but avoid over-filling — much of the hypotension is vasodilatory and improves with cooling alone. Reassess after the temperature falls before escalating to vasopressors.
Rhabdomyolysis	Very common in exertional heat stroke. Check creatinine kinase and potassium, give generous fluids, and watch for acute kidney injury and hyperkalemia.
Liver & coagulation	Hepatic injury peaks at 24–72 hours and can progress to acute liver failure. DIC is a leading cause of death — monitor platelets, fibrinogen and clotting.
Electrolytes & glucose	Check sodium, potassium, calcium, phosphate and glucose repeatedly. Hypoglycemia is common in exertional cases and easily missed in an obtunded patient.
Shivering	Shivering during cooling generates heat and slows the cooling rate . Suppress it with benzodiazepines rather than slowing the cooling.

WHO IS VULNERABLE, AND WHAT MAKES IT WORSE *most classic heat stroke is predictable*

Factor	Detail
Drugs that impair cooling	Anticholinergics and antihistamines block sweating. Diuretics cause volume depletion. Beta-blockers blunt the cardiac output response. Antipsychotics impair central thermoregulation. Stimulants — cocaine, amphetamines, MDMA — increase heat production. Review the drug chart in every case.
Host factors	Age over 65 or under 4 · obesity · dehydration · cardiovascular, respiratory or neurological disease · skin disease limiting sweating · social isolation and lack of air conditioning, which dominates heatwave mortality.
Exertional risk	High humidity matters more than temperature alone, because it blocks evaporative loss. Also poor acclimatization, occlusive clothing or protective equipment, and continuing to exert through early symptoms.
Consider the mimics	Sepsis · thyroid storm · malignant hyperthermia after anesthesia · neuroleptic malignant syndrome (lead-pipe rigidity) · serotonin syndrome (clonus, hyperreflexia) · anticholinergic toxicity · intracranial hemorrhage. Rigidity or clonus points away from simple heat stroke.

PEARLS & PITFALLS

- Antipyretics do not work, and neither does dantrolene.** The hypothalamic set point is normal in heat stroke; this is a failure of heat dissipation, not a pyrogen-driven fever, so acetaminophen and NSAIDs achieve nothing and add hepatic and renal injury to a patient already at risk. **Dantrolene is for malignant hyperthermia, not for this.**
- Stop cooling at about 38.5 to 39°C** rather than at normothermia, because the temperature keeps drifting down after you stop and overshoot hypothermia is a real, avoidable complication.
- Get a true core temperature.** Oral and tympanic readings underestimate and are a common reason cooling is started late.
- Cool first, transport second.** Time above 40°C determines organ injury, and cooling en route is usually far slower.
- Sweating does not exclude heat stroke.** Exertional cases are frequently still sweating.
- No antipyretics and no dantrolene.** Neither works, and antipyretics may worsen coagulopathy and liver injury.
- Suppress shivering** with benzodiazepines rather than easing off the cooling.
- Watch for delayed liver failure and DIC** — the patient can look better at 6 hours and deteriorate at 48.