

Evidence-Based Clinical Pathway: Accidental Hypothermia – *Diagnostic & therapeutic considerations*

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Primary Sources: 1) Brown DJA *et al.* Accidental hypothermia. *NEJM* 2012;367: 1930-1938; 2) Danzl D. Accidental hypothermia, Chapter 138 in *Rosen's Emergency Medicine* 7th edition 2009; 3) Bessen HA, *et al.* Hypothermia. Chapter 203 in *Tintinalli's Emergency Medicine*, 7th edition 2011.

Pathway applicability:

Patients with unintended (nontherapeutic) hypothermia by clinical impression or measured temperature
This pathway is supplemental to two related clinical pathways:
"Accidental Hypothermia – Temperature assessment & staging" and "Accidental Hypothermia – Rewarming therapy"

N.B. In this pathway temperature is abbreviated "temp" and reported in Fahrenheit/Celsius (e.g. 90°/30°)

Temperature assessment and rewarming therapy as per other hypothermia pathways

Airway/Breathing

Airway and ventilation considerations:

- Airway management pharmacology same as normothermia
 - Some drugs may not work as well
 - Beware hyperkalemia (if arrest preceded hypothermia)
- Airway manipulation benefits exceed risks but be smooth
 - Fiberoptics recommended
- Post-intubation/post-recovery ARDS is a major mortality threat
 - Provide lung-protective ventilation post-intubation
 - CXR to differentiate pulmonary edema from cold-related bronchorrhea (ciliary dysfunction) from pulmonary edema

Cardiac and rhythm considerations:

- Assume pulse is present if there are spontaneous respirations
- Use echo and peripheral US for pulse checks (assess 30-45 secs)
- All atrial dysrhythmias are common below 90°/32°
 - Respond to rewarming; need for drug therapy is unusual
 - Need for treatment (e.g. calcium channel blockers) rare
- Asystole developing during rewarming is *not* more ominous than VF
- Treatment of VF is generally same in hypothermia as in other cases
 - Warming is key
 - Any therapy unlikely successful below 82°/28°
- TV pacing is extremely hazardous; use transcutaneous pacing

Lab/hematologic considerations

- Lab machines warm blood and analyze it at normal temp
 - Coagulopathy often doesn't show on lab testing
 - ABG should not be corrected in any way
- Broad-based lab testing is often appropriate
- Consider focused lab testing
 - Endocrine (e.g. thyroid functions, cortisol, corticotropin)
 - Focused toxicologic screening

Rhythm

Labs

Prolonged arrest

Circulation

Dx

Diagnostic considerations

- Stroke/neurologic or endocrinologic
 - Hypopituitarism
 - Adrenal insufficiency
 - Hypothyroidism
 - Wernicke's encephalopathy
- Peripheral vasodilation or immobility
 - Trauma (e.g., neurogenic shock)
 - Toxicologic/drug-related vasodilation
 - Immobility (sedative-hypnotic OD)
- Hypothermia predispositions/diseases
 - Hypoglycemia
 - Hyperglycemia/DKA
 - Parkinson's
 - Judgment impairment (e.g. EtOH)

Vascular access and fluid management considerations

- Recovery-phase pulmonary edema is a major risk
- Urine output monitoring important (cold-induced diuresis)
- Central access is often desirable
 - US-guided IJ preferred (don't advance wire to heart)
 - Femoral/subclavian risky due to coagulopathy
- Cold liver doesn't metabolize lactated Ringer's (avoid LR)

Considerations regarding resuscitation and prolonged arrest

- Justification for prolonged resuscitation
 - Intact survival reported after 390 minutes' CPR
 - Survival after 66' cold-water immersion reported (initial temp 66°/19°)
 - Evidence: Warm most cases to at least 86°/30° before ceasing resuscitation
- When to cease efforts at resuscitation:
 - Temp <41°/5°
 - Rewarming has brought temp to range of 90°/32° without ROSC
 - K⁺ >12 mmol/L (K⁺ range 10-12 is gray zone)
- When ROSC occurs, consider maintaining therapeutic hypothermia