

# Evidence-Based Clinical Pathway: Accidental Hypothermia – Rewarming treatment

12/1/12 replaces no older version

Prepared by: Thomas SH

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* 7<sup>th</sup> edition 2009; 3) Bessen HA, *et al.* Hypothermia. Chapter 203 in *Tintinalli's Emergency Medicine*, 7<sup>th</sup> edition 2011.

**Pathway applicability:** Patients with unintended (nontherapeutic) hypothermia by clinical impression or measured temperature  
This pathway is supplemented by two related clinical pathways:

"Accidental Hypothermia – Temperature assessment & staging" and "Accidental Hypothermia – Diagnostic & therapeutic considerations"

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

Is the patient in obvious cardiorespiratory arrest with VF or asystole rhythm?

Yes

No

**Simultaneous therapy & data acquisition:**

- Defibrillate once
  - CPR until resume defib attempts at temp  $\geq 86^{\circ}/30^{\circ}$
  - Up to 3 doses 1 mg epi IV or IO
- Assess core temp (per pathway)
- Manage airway/ventilation as smoothly as possible
  - Fiberoptics recommended
  - Standard pharmacology as needed
  - Provide lung-protective ventilation post-intubation

**Simultaneous therapy & data acquisition:**

- Assess for pulse
  - Assume pulse present if spontaneous respirations noted
  - Bedside echo and peripheral pulse check (30-45 seconds)
- Assess core temp (per pathway)
- As needed, manage airway/ventilation as smoothly as possible
  - Fiberoptics recommended
  - Standard pharmacology as needed
  - Provide lung-protective ventilation post-intubation

What is the core temp?

Cease resuscitation

$<41^{\circ}/5^{\circ}$

$>95^{\circ}/35^{\circ}$

$90^{\circ}/32^{\circ}$  down to  $41^{\circ}/5^{\circ}$

$95^{\circ}/35^{\circ}$  down to  $90^{\circ}/32^{\circ}$

**Mild hypothermia treatment:**

- Passive external rewarming
  - Removal of cold/wet clothes
  - Blankets
- Manage as non-hypothermic

**Severe hypothermia**

Treatment dictated by:

- temp level
- success of rewarming efforts
- clinical picture
- All cases: Minimally invasive core rewarming
  - Heated inhaled gas if patient intubated
  - Heated IV fluids

**Moderate hypothermia treatment**

- Passive external rewarming (see box at right)
- Active external rewarming
  - Forced-air devices (Bair Hugger®)
  - Warm blankets
- Minimally invasive core rewarming
  - Heated inhaled gas if patient intubated (otherwise 30% of patient metabolic activity needed to heat respiratory gas)
  - Heated IV fluids ( $104^{\circ}/40^{\circ}$ )
- Move to invasive core rewarming only if clinical deterioration or nonresponse

**Stratification of severe hypothermia**

- Are there any of the following?

- Temp  $<86^{\circ}/30^{\circ}$
- Persistent hypotension
- Life-threatening dysrhythmia

Yes

No

**Severe hypothermia with instability or high risk for deterioration**

- Continue minimally invasive core rewarming
- Institute invasive core rewarming ( $104^{\circ}/40^{\circ}$  fluid); some combination of:
  - Warm-fluid peritoneal lavage with K<sup>+</sup>-free dialysate
  - Double-tube thoracostomy (high/low tube) left-side mediastinal lavage
  - Double-tube thoracostomy (high/low tube) right-side mediastinal lavage
  - Open-thoracotomy mediastinal lavage with open chest compressions
  - Dialysis if there is at least 40-50 mmHg mean arterial pressure
  - Cardiopulmonary bypass or ECMO indicated if temp  $<82^{\circ}/28^{\circ}$
- Following techniques have questionable efficacy/safety ratios:
  - Bladder lavage (poor heat transfer; prevents use of bladder thermistor)
  - GI tract lavage (moderate efficacy; significant risk)

**Severe hypothermia with low risk for deterioration**

- Invasive active core rewarming usually not necessary
- Continue minimally invasive core rewarming
- Active external rewarming usually appropriate, with cautions:
  - Delay active external warming of frostbitten extremities until core temp rises to approximately  $90^{\circ}/32^{\circ}$
  - Stop active external warming if see signs of core afterdrop (e.g. drop in core temp, worsening of acidosis, clinical deterioration)

**Rewarming endpoints (aim for hourly increase of 2-4° F):**

- Patient in arrest – Rewarm to  $90^{\circ}/32^{\circ}$  then cease efforts if no ROSC
- Nonarrest patient – Cease active core rewarm at  $95^{\circ}/35^{\circ}$