**Table 1.** Review of controlled trials relevant to physical antipyresis methods applied to critically ill patients.

*Online-only content for “Physical Antipyresis in Critically Ill Adults” by Kiekkas and colleagues in the American Journal of Nursing, July 2008, p. 40-49.*

<table>
<thead>
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<th>Subjects and procedure</th>
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</table>
- Rate of core temperature decrease (°C/hr)  
- Core temperature decrease to ≤ 38°C after 8 hr of treatment  
- Recurrence of fever  
**Results:**  
Group 1:  
- Significantly faster decrease in core temperature (mean, 0.377°C/hr vs. 0.163°C/hr; P = 0.03)  
- Higher percentage of patients reached goal temperature of 38°C or lower after 8 hr of cooling (75% vs. 47%; P = 0.08), although difference was not significant  
- Significantly more time from removal of blanket to recurrence of fever (mean, 22.2 vs. 6.6 hr; P = 0.004)  
- Air-flow blanket recommended for future use more often: 100% vs. 50% |
| Diringer MN, et al. Crit Care Med 2004;32(2):559-64. | **End points:**  
- Total fever burden during the first 72 hr of treatment (fever burden = the product of temperature elevation above 38°C and time in hours to 72 hr, in degree hr)  
**Results:**  
Group 2:  
- Significantly lower total fever burden (mean, 2.87°C-hr vs. 7.92°C-hr; P < 0.01) |
- Defervescence at 24 hr after treatment  
- Recurrence of fever  
- Patient comfort  
- Lengths of ICU and hospital stay  
- Death  
**Results:**  
- Mean temperature decreased significantly in both groups at 24 hr after treatment: Group 1, from 38.9 ± 0.3°C to 37.6 ± 0.5°C (P < 0.001); Group 2, from 38.8 ± 0.5°C to 37.7 ± 0.6°C (P < 0.001)  
- No significant differences between groups in fever recurrence, patient comfort, lengths of ICU and hospital stay, and mortality rates |

PO = by mouth; PR = by rectum; NG = nasogastric tube; OG = orogastric tube.

Randomized study comparing 2 pharmacologic methods and 1 physical antipyretic method in 30 surgical ICU patients.

Group 1 received IV propacetamol (30 mg/kg body weight); Group 2 received IV metamizol (16 mg/kg body weight); Group 3 was treated with an air-flow cooling blanket, cloths plunged into iced water, or ice packs applied on most of the body surface.

**End points:**
- Core temperature decrease after 4 hr of treatment
- Energy expenditure index
- Hemodynamic parameters
- Urine output
- Plasma cytokine concentration

**Results:**
- No significant differences among groups in core temperature decrease, heart rate, and plasma cytokine concentration
- Energy expenditure index alteration per 1°C of temperature: Group 1, 8% decrease; Group 2, 7% decrease; Group 3, 5% increase (this increase was nonsignificant)
- Mean arterial blood pressure alterations: Group 2, significant decrease (from 71 ± 16 mmHg at baseline to 62 ± 13 mmHg at 2 hr of treatment; *P* = 0.008), then returned to baseline at 4 hr of treatment. The Group 2 mean remained significantly lower than the Group 3 mean at all time points after baseline. “The longitudinal effect of external cooling on blood pressure differed significantly” from that of either drug: compared with Group 3, the mean difference was −4.8 mmHg (−7.8 to −1.8) in Group 1, and −7.8 mmHg (−11.5 to −4.1) in Group 2
- Urine output alterations: Groups 1 and 3, nonsignificant; Group 2, significant decrease (mean, from 55 ± 42 to 25 ± 19 mL/hr; *P* < 0.05)


Study comparing 1 pharmacologic method, 1 physical method, and 1 combination antipyretic method in 14 liver-transplantation ICU patients. Only patients able to receive acetaminophen were randomized; those not so able were assigned to the physical antipyretic group.

Group 1 was given acetaminophen (650 mg every 4 hr, PO or NG); Group 2 was treated with a water-flow cooling blanket set at 18°C; Group 3 was given acetaminophen (650 mg every 4 hr, PO or NG) plus an air-flow cooling blanket set at 18°C.

**End points:**
- Core temperature decrease after 3 hr of treatment
- Incidence of shivering
- Hemodynamic parameters

**Results:**
- No significant differences among groups in core temperature decrease; incidence of shivering; or alterations of heart rate, arterial blood pressure, cardiac index, and systemic vascular resistance index


Validation study of an endovascular cooling method in 20 normothermic neurologic ICU patients in whom hypothermia was induced.

Group 1 was treated with an air- or water-flow cooling blanket and ice packs; Group 2 received endovascular cooling (CoolGard/Cool Line catheter system).

**End points:**
- Time to reach target core temperature (33°C to 34°C)
- Glasgow Outcome Score

**Results:**
- Group 2:
  - Significantly shorter time to reach target core temperature (mean, 190 ± 110 vs. 370 ± 220 min; *P* = 0.023)
  - Higher median Glasgow Outcome Score (4.5 vs. 2.5)

PO = by mouth; PR = by rectum; NG = nasogastric tube; OG = orogastric tube.
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| **Loke AY, et al. Nurs Crit Care 2005;10(5):247-54.** | **End points:**  
- Core temperature decrease to < 38°C within 8 hr of treatment  
- Mean time needed for core temperature to decrease to < 38°C  

**Results:**  
- Group 1:  
  - Significantly higher percentage of patients with core temperature decreasing to < 38°C within 8 hr of treatment (94% vs. 60%, \( P = 0.047 \))  
  - Significantly less time needed for core temperature to decrease to < 38°C (mean, 3.1 ± 0.8 vs. 5.7 ± 1.2 hr; \( P < 0.001 \)) |
| **Mayer SA, et al. Neurology 2001;56(3):292-8.** | **End points:**  
- Treatment success: core temperature decrease to ≤ 37.2°C within 24 hr of treatment  
- Treatment failure: core temperature > 38.3°C within 1 hr of treatment  

**Results:**  
- No significant difference between groups regarding treatment success or failure |
- Fever burden (the product of temperature elevation above 37.2°C and time in hours to 24 hr)  
- Percentage of time patients remained febrile  
- Time needed to attain normothermia (≤ 37.2°C)  
- Incidence of shivering  

**Results:**  
- Group 1:  
  - Significantly lower fever burden (median, 4.1°C-hr vs. 16.1°C-hr; \( P < 0.001 \))  
  - Significantly smaller percentage of study time (24 hr) remaining febrile (8% vs. 42%; \( P < 0.001 \))  
  - Significantly less time needed to reach normothermia (median, 142 vs. 532 min; \( P < 0.008 \))  
  - Significantly higher incidence of shivering (39% vs. 8%; \( P = 0.013 \)) |
| **Morgan SP. J Neurosci Nurs 1990;22(1):19-24.** | **End points:**  
- Time needed for core temperature to decrease to < 37.8°C  
- Incidence of shivering  

**Results:**  
- No significant difference among groups in time needed for core temperature to decrease to < 37.8°C  
- Group 3: Significantly higher incidence of shivering (57%, vs. 0% in both other groups; \( P < 0.0071 \)) |

PO = by mouth; PR = by rectum; NG = nasogastric tube; OG = orogastric tube.
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- Core temperature decrease to ≤ 38°C within 1 hr of treatment
- Recurrence of fever within 24 hr
- Incidence of shivering

**Results:**

Group 4:
- Higher percentage of patients with core temperature decrease to ≤ 38°C within 1 hr of treatment, but only in Group A patients


- Core temperature decrease
- Energy expenditure
- Hemodynamic parameters

**Results:**

- Mean core temperature decrease: nonsignificant in Group 1; in Group 2, 0.4°C, *P* < 0.05; in Group 3, 2°C, *P* < 0.0001
- Mean energy expenditure decrease: nonsignificant in Groups 1 and 2; in Group 3, 243 kcal/day, *P* = 0.004
- Mean heart rate decrease: nonsignificant in Group 1, 6 beats/min in Group 2 (*P* < 0.05), 14 beats/min in Group 3 (*P* < 0.0001)
- Mean arterial blood pressure decrease: nonsignificant in all groups


- Average daily core temperature
- Development of infection
- Death

**Results:**

- No significant difference between groups in the development of infection

**Group 1:**
- Significantly lower daily core temperatures (mean, 36.7 ± 0.7°C vs. 37.8 ± 0.6°C; *P* = 0.006)
- Higher mortality (7 deaths vs. 1, *P* = 0.06)

PO = by mouth; PR = by rectum; NG = nasogastric tube; OG = orogastric tube.