

# Coolheart Registry Hypothermia Protocol by Fritz Sterz

## December 2003

Please look at [www.coolheart.com](http://www.coolheart.com)

### **Inclusion Criteria**

- Time from restoration of spontaneous circulation (ROSC = SAP 80 mmHg > 5 min) until initiation of cooling < 240 min.
- Patient not obeying any verbal command at any time after ROSC and prior to initiation of cooling
- Etiology of cardiac arrest should be no trauma and/or severe bleeding
- Patients should not have terminal disease and/or pregnancy and/or coagulopathy (except: therapeutic induced)
- An invasive procedure in for example the catheter laboratory (PTCA, Stent, etc. for obvious signs of an acute coronary syndrome) is no exclusion for cooling the patient, but should then preferably done endovascular.

### **Procedure for Initiating Hypothermia**

- Plan for RICH (od HHH)
- Protocol - amendment according Bernard et al for continuing hypothermia
- CoolGard & Icy - Basic and advanced life support
- According to Guidelines (AHA, ERC, etc. and standardized ICU procedures)
  - Intubation
  - Foley catheters
  - Arterial catheters
  - Central venous catheters
  - Cardiovascular monitoring
  - EKG
  - Diuresis
  - Arteria radialis pressure
  - Central venous pressure
  - Central venous pressure

### **Therapeutic mild hypothermia (32-34°C)**

- Cooling System used according to the instruction guide
- Target temperature 33°C
- Cooling System set the lowest possible temperature to reach the desired patient temperature as soon as possible
- Twenty-four hours after temperature reaches 33°C, passive rewarming to > 36°C be done in 8 hours
- When temperature > 35°C sedation, analgesia and paralysis will be discontinued as feasible
- Efforts to maintain or achieve normothermia < 36.5°C after rewarming is standard for all patients
  - Primarily with turning of all heating measures
  - Metamizol, Perfalgan, Diclofenac, Aspirin, etc.
  - At least with the Cooling Device Temperature measurements

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- Tympanic Temperature routine immediately after admission of the patient and continuously during cooling and rewarming
- Insert as soon as possible a foley catheter temperature probe
- Monitor in addition the temperature with general temperature purpose probes in the esophagus

### Sedation & Analgesia

- Midazolam 3.6 .g/kg/min
- Fentanyl 0.6 .g/kg/min
  - Titrated until temp > 35°C

### Paralysis

- Rocuronium 0.1 mg/kg/2hourly until temp > 35°C
  - Use the least dose to permit complete muscle relaxation Mechanical ventilation
- Maintain arterial saturation of > 95% e.g. paO<sub>2</sub> 75-100 mmHg
- PaCO<sub>2</sub> 40 ±5 mmHg

### Blood pressure

- Keep mean arterial blood pressure > 75 mmHg
  - Treat pressure drops primarily with crystalloid fluids or hydroxyl ethyl starch
  - Use vasopressors such as nor epinephrine, dopamine and adrenaline, if sufficient blood pressure control cannot be achieved with fluids alone

### Nutrition and fluid homeostasis

- Control fluid balance up to + 50 ml/kg/24h
  - keep serum blood glucose between 80 and 100 mg/dl
  - control hyperglycemia >100 mg/dl with insulin infusion
  - keep hematocrit between 30 and 45%
- give no dextrose, glucose and free water
- begin parenteral nutrition or enteral feeding as soon as practical

### Electrolytes, Blood Gases and Laboratory

- routinely check laboratory values on admission, 6, 12, 24, 36 and 48 hours after restoration of spontaneous circulation
  - monitor blood gases at room temperature
  - sodium, potassium, chloride
  - glucose
  - lactate
  - creatinine, urea
  - CK, CPK, TNT
  - CRP
  - PTZ, PTT
  - Hb, Hct, Leuco

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- Keep electrolytes and blood gases in normal ranges
  - Arterial pH between 7.35 and 7.45

### Intracranial pressure and Positioning

- Monitoring of ICP is not necessary
- But provide optimal head position (0°)
- Be careful with movements of the head to avoid too much torsion and flexion of the neck

### Death and autopsy reporting

- Determine and certify brain death according to orderly, accepted legal and ethics methods
- When brain death is certified, withdraw all supportive measures

### Withdrawal of life support

- Maintain life support for at least three days in all except certified brain dead patients
- Maintain life support for at least seven days in all patients who respond to pain in any manner

### Complication of hypothermia

- Continuously monitor daily for the first 7 days of hospitalization
  - Pneumonia
  - Sepsis
  - Cardiac arrhythmias
  - Coagulopathy

### Uniform reporting of data

- Use the recommended Utstein guidelines
  - Date of event, sex, date of birth, cause of cardiac arrest, location of arrest, witnessed vs. non-witnessed arrest, primary ECG rhythm (ventricular fibrillation vs. other), estimated 'low' and 'low' flow times
  - Methods to apply hypothermia
  - Target temperature, time until target temperature achieved, time of cooling to target temperature stopped, time of normothermia achieved
  - Complications
  - Survival to hospital discharge and survival at 6 months
  - Neurological recovery at hospital discharge and within 6 months, long-term quality of life at 6 months, long-term dependency
  - Glasgow Pittsburgh Outcome Categories (Category 1 is conscious and normal, without disability, Category 2 is conscious with moderate disability, Category 3 is conscious with severe disability, Category 4 is a comatose or vegetative state, Category 5 is death)

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**Indication in comatose cardiac arrest patients after ROSC for an interventional catheter laboratory procedures (PTCA, Stent, etc)**

- Obvious signs of an acute coronary syndrome
  - EKG with at least one of the following high-risk clinical criteria:
    - >2 mm ST elevation in >2 consecutive anterior leads
    - >1 mm ST elevation in >2 consecutive inferior leads
  - Cardiogenic shock (within 60 min after ROSC, for a least 30 min, before start of cooling):  
Clinical criteria: hypotension [systolic blood pressure of <80 mm Hg or the need for excessive doses of catecholamines, to maintain a systolic blood pressure of >90 mm Hg] and end-organ hypoperfusion KILLIP-class: >2 (II: crackles, S3 gallop and elevated jugular venous pressure, III: frank pulmonary oedema, IV: cardiogenic shock - hypotension  
  
Homodynamic criteria: cardiac index of no more than 2.2 liters per minute per square meter of body-surface area and a pulmonary-capillary wedge pressure of at least 15 mm Hg
  - Malignant Arrhythmias (developed within 60 min after ROSC, before start of cooling):  
Repetitive life-threatening arrhythmias in need for >5 series of defibrillation (= 3x) within 60 min associated with severely compromised left ventricular function not to stabilize with conventional pharmacological measures