Keeping a Cool Head After Resuscitation

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-and-

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“Although we await further studies with great interest, we recommend the use of mild induced hypothermia in survivors of cardiac arrest – as early as possible and for at least 12 hours.”

-- Peter Safar and Patrick Kochanek, NEJM 2002;346(8):612-3
Lack of Money
Is the Root
Of all Evil

-- George Bernard Shaw
Our Program: ICE

Induced Cooling by EMS
Elements of Prehospital Hypothermia

- **ROSC**
  - Uninterrupted compressions, timely defibrillation, controlled ventilations, efficient dispatch

- **Method of cooling**
  - $$ vs. ease of use

- **Hospital coordination**
  - Selective destination
  - Continuation of cooling
Pearls:
- **Criteria for Induced Hypothermia:**
  - ROSC after cardiac arrest not related to trauma or hemorrhage.
  - Age greater than 16
  - Female without obviously gravid uterus
  - Initial temperature > 34°C
  - Patient is intubated and remains comatose (no purposeful response to pain)
- If patient meets other criteria for induced hypothermia and is not intubated, then intubate according to protocol before inducing cooling. If unable to intubate DO NOT initiate induced hypothermia.
- When exposing patient for purpose of cooling undergarments may remain in place. Be mindful of your environment and take steps to preserve the patient's modesty.
- Do not delay transport for the purpose of cooling.
- Reassess airway frequently and with every patient move.
- Patients develop metabolic alkalosis with cooling. Do not hyperventilate.
- If there is loss of ROSC after cooling is initiated or any other complication as the result of this protocol please complete hypothermia unusual event reporting form and contact a Medical Director on completion of the call.
Postresuscitation protocol

Unsuccessful

Intubation Protocol

No

Criteria for Induced Hypothermia and initial temp > 34C

Yes

ET Tube Placed and ETCO<sub>2</sub> reading > 20 mmHg

Yes

Perform Neuro Exam and Record in ECR Induced Hypothermia Procedure

Expose patient Apply Ice Packs to Axilla & Groin

Versed 0.15 mg/kg to max 10 mg

P Vecuronium 0.1mg/kg to max of 10 mg

P Cold Saline Bolus 30mL/kg to max of 2 liters

P Dopamine 10-20 mcg/kg/min for MAP 90-100

MC Order

Legend

EMT

EMT-I

EMT-P

P

M

AT ANY TIME
Loss of Spontaneous Circulation:
Discontinue cooling and go to appropriate protocol

Monitor ETCO<sub>2</sub> Target
40 mmHg
DO NOT HYPERVENTILATE
Wake County EMS System
Induced Hypothermia

Screening for Utilization

1. Return of Pulse
2. Age > 16
3. Not obviously pregnant
4. Temperature > 34° C
5. No purposeful pain response
6. Intubated with ETCO$_2$ > 20

Preparation for Induction

1. Conduct NEURO assessment:
   a. Pupils (size, reactivity, equality)
   b. Motor Response to Pain
2. Remove clothing, protect modesty
3. Apply cold packs- axilla and groin
4. Goal ETCO$_2$=40. No hyperventilation
5. Attempt second IV, if not in place
Hospital Destination

- High volume cardiac catheterization center
- Post-arrest care may include PCI and transfer while in the 24 hour window is cumbersome
Key Representatives

• Nursing and Physicians from:
  – Emergency
  – CCU
  – ICU
  – NICU

• Nurses are the key representatives
  – Choose device, write standing orders, etc.
In Hospital Maintenance

- Continuing cooling
- Maintain sedation / paralysis
- Maintain MAP >90mmHg
- Close monitoring of glucose, potassium, volume status, temp
- Skincare if cooling blanket/ice
- Acetaminophen / GI prophylaxis
- Maintain for period of 24 hrs
Passive Rewarming

- Rewarm at 0.5-1°C/hr
- Takes approx 6-8 hrs
- Paralysis maintained until 36°C
- Monitor for electrolyte and fluid status during re-warming
- Strict normothermia for 48 hrs
Pitfalls

• Study criteria as exclusion criteria
  – Non VF/VT arrests
  – Unclear “down time”

• EMS personnel timid with fluid administration
  – Full bolus = 1.5 – 2 degree decrease
  – <500 ml = minimal temperature change
Pitfalls

• Supervisor not available for fluid administration

• What to do with the re-arrest patient?
Results So Far

• ~27 patients considered for IH
  – 8 excluded
    • 4 contraindicated
    • 2 no supervisor/arrest en route
    • 2 re-arrest

• 19 patients induced pre-hospital +
  2 patients induced in-hospital =
  21 total patients with some hypothermia
Why May This Work?

- Stated hypothermia mechanism to preserve neuro tissue
- MAP improvements due to cold fluid
- Marshal Isaac’s “we don’t *&^% with them” theory
Summary

• Induced hypothermia is a simple and safe intervention in the pre-hospital setting

• The hospital, departmental, and physician interactions create most of the pitfalls
Citations

1. Wake CNTY EMS DATABASE