ICE: Induced Cooling by EMS

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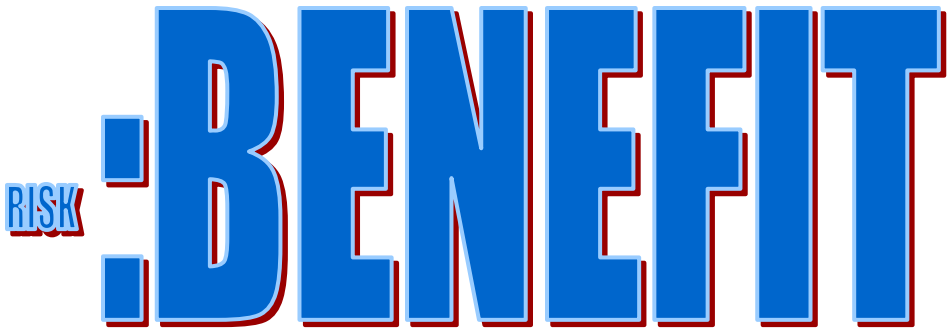
Metaanalysis[21]

- Short term benefit ratio
  - 1.68;95% CI 1.29-2.07
- 6 mos benfit ratio
  - 1.44 95% CI 1.11-1.76
- NNT 6 CI (4-13)
- Other NNT
  - ASA (MI) 25
  - Beta blocker 42
  - Cath facility 15


RISK
:BENEFIT

Lack of Money Is the Root Of all Evil

-- George Bernard Shaw

Our Program: ICE

Induced

Cooling by

EMS

What Have We Done So Far?

- February 2006 – EMS physicians and command staff leadership reviewed literature
- March 2006-August 2006 – Developed community-wide plan for post-resuscitation care
- August 2006-October 4, 2006 – Education regarding the plan
- Implemented plan – October 5, 2006

Essential Community Members

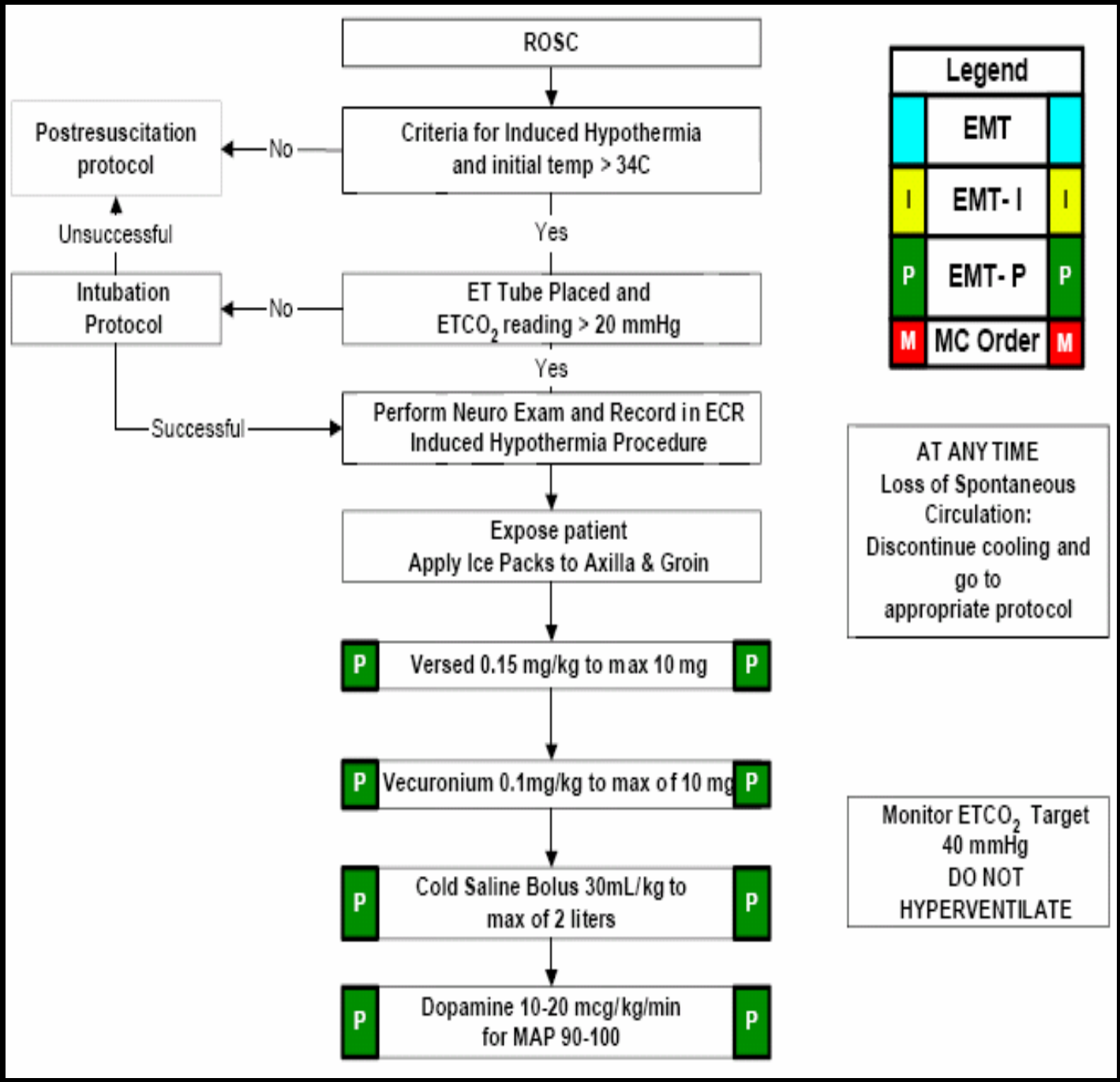
- EMS, Emergency Medicine, Cardiology, Intensivists
- Need administration, nursing, and physicians
- Did I mention nursing??

Protocol Development

- Nursing chose the cooling system
- Nursing wrote the protocols for hospital
- Dr. Hinchey wrote the protocols for EMS

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 > 34C
- 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 patients 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.


ROSC
Criteria for Induced Hypothermia and initial temp > 34C
No
Postresuscitation protocol
Unsuccessful
Yes
ET Tube Placed and ETCO2 reading > 20 mmHg
No
Intubation Protocol
Yes
Successful
Perform Neuro Exam and Record in ECR Induced Hypothermia Procedure
Expose patient
Apply Ice Packs to Axilla & Groin
P
Versed 0.15 mg/kg to max 10 mg
P
P
Vecuronium 0.1mg/kg to max of 10 mg
P
P
Cold Saline Bolus 30mL/kg to max of 2 liters
P
P
Dopamine 10-20 mcg/kg/min for MAP 90-100
P
Legend
EMT
I
EMT- I
I
P
EMT- P
P
M
MC Order
M
AT ANY TIME
Loss of Spontaneous Circulation:
Discontinue cooling and go to appropriate protocol
Monitor ETCO2 Target 40 mmHg
DO NOT HYPERVENTILATE

DATE /TIME	Weight _____kg	Time of ROSC _____

1. ☑ STAT point of care HCG. Inform MD of the results
2. ☑ Place temperature-sensing foley to monitor temp.
3. ☑ Set up for icy catheter insertion
4. ☑ **TIME COOLING STARTED: _____(in ED)**
   (GOAL is to get core temp to 32°-34°C within 6 hrs of onset of arrest)
   ☑ If core temperature is greater than 93.2°F (34°C) at initiation of protocol, bolus with **refrigerated 0.9% NS** until patient's core temperature is 93.2 °F (34° C). Bolus at 100mL/min with a maximum of 2 liters total. This is to include EMS volume. **(Omit if already given by EMS)**

Initiate Cool Guard protocol (preferred method)

5. If unable to use intravascular catheter above, initiate surface cooling by placing two cooling blankets (one anterior, and one posterior). Observe boney skin areas q 2hrs for any signs of breakdown. Place ice packs around neck, in axillary areas, and in groin.

IF patient has recurring arrhythmias, discontinue active cooling, and inform ED MD.

6. ☑ BP, MAP, HR, O2 saturation, and cardiac rhythm hourly.
7. ☑ Record core temperature q 15 minutes
8. ☑ Alternative methods for monitoring core temp may be rectal probe
9. ☐ 0.9% **NS** at _____mL/hr. Once icy catheter is inserted discontinue cold saline and replace with room temperature 0.45% **NS** at 100mL/hr.
10. Record total amount of cold saline infused prior to transporting to ICU _____mL
11. ☑ Record initial foley output _____mL
12. Labs:

☐ UA	☐ Phos	☐ ABG (temp corrected)	☐ CK's q 3 hrs x 3
☐ PT	☐ Magneusium	☐ UCG	☐ Other:
☐ PTT	☐ Lactate	☐ Cardiac Panel	_____

Patient Identification:

WakeMed

Adult Emergency Department
Induced Hypothermia and/or Rewarming
Status Post Cardiac Arrest Orders

140010

13. ☑ Set up CVP monitor. When functional, attach to icy catheter triple lumen.
CVP goal of 6-10 mmHg

14. ☑ **Nitroglycerin IV** start at 5 mcg/min, increase by 5 mcg/min increments q 3-5 min until a BP response is noted. Goal is to keep MAP* less than 120 or ❒ _____

15. ☑ Norepinephrine (**Levophed**) IV start at 0.5 mcg/min and titrate as needed to keep **MAP** greater than 75.
❒ Other pressor agent: _____

16. ❒ **Fentanyl** _____ mcg/hr (2 mcg/kg/hr initially) continuous infusion
(Consider if patient is hemodynamically unstable or has renal insufficiency, or if Creatinine Clearance < 50 mL/min.)
OR:
❒ **Morphine** _____ mg/hr (0.1 mg/kg/hr) continuous infusion
(Consider if patient is hemodynamically stable.)

17. ❒ Lorazepam (**Ativan**): _____ mg/hr (0.01 mg/kg/hr initially) continuous infusion to maintain sedation.
OR:
❒ Propofol (**Diprivan**): _____ mcg/min (5 mcg/kg/min initially) continuous infusion, titrate Q 5 minutes to maintain sedation.

18. ❒ Vecuronium (**Norcuron**): _____ mcg/min (0.8-1.2 mcg/kg/min) continuous infusion. Pharmacy to mix 1:1 in NS **(Avoid in significant renal or hepatic impairment.)**

☑ Insert NGT to low intermittent wall suction

☑ Intake and output hourly

☑ If femoral line, reverse Trendelenberg to raise HOB as much as possible without kinking line

19. Vent Settings
☑ No warm humidified air
☑ Continuous ETCO2 monitoring
☑ ABG
(Goal $PaCO_2$ 35-45)

20. STAT Diagnostics:
❒ PCXR ❒ 12 lead ECG ❒ Other: _____

Physician signature:	**Transcribed by:**	**Checked by (Nurse):**
_____	_____	_____
Beeper #: _____ --- _____	**Date:** _____ **Time:** _____	**Date:** _____ **Time:** _____

Patient Identification:

WakeMed

Old Habits

- One facility wanted to use the HACA criteria strictly
  - Was resuscitation started between 5 and 15 minutes after collapse?
  - Did the entire code last then 60 minutes?
- Many hesitate to initiate therapy when:
  - Initial rhythm was not VF/VT
  - Patient is going to the cardiac cath lab

Old Habits

- The immediate post-resuscitation neurologic exam
- One of the reasons we use paralysis – to get people not to do this!
- The immediate post-resuscitation neurologic exam is useless as a prognostic tool

Maramattom BV et al. The Neurologist 2005;11:234-43

What Have We Found?

- Since October 2006, we have induced 70 patients
- We have experienced no complications and 2 mild protocol violations
- “Doc, resuscitation is hard – this is easy”

Case Reports

- We are too early to give you statistically meaningful comparisons
- We do have IRB approval and we hope to have our data collection complete by February of 2008
- For now, here are some case reports

Case #1

- 42 year old male – former paramedic in our System
- Witnessed arrest in his home
- Wife and 7 year-old son performed compression-only CPR via EMD
- Fire and EMS arrived simultaneously 9 minutes later

Patient #1

- Patient was induced on-scene after 20 minutes of resuscitative efforts (total time without pulses = 29 minutes)
- Patient was found to have submassive PE and was hypoxic with SaO2 of 75-80 for first 24 hours
- Stablized after 48 hours in ICU with anticoagulation

Patient #1

- When sedation was lightened, patient pulled his ET tube, requiring emergent re intubation
- Patient restrained, sedation lightened, patient chewed through the ET tube
- Reintubated and taken for trach
- Weaned and discharged on HD #28
- Completely intact

Patient #2

- 21 year-old triathelete
- Warm water drowning at NC State
- Ventricular fibrillation

Patient #2

- Patient suffered prolonged pressor dependence of uncertain etiology
- Developed compartment syndrome in lower extremities
- Fasciotomies performed on HD #2
- Seven total trips to operating suite
- Last was for BKA due to ischemia from pressors/compartment syndrome

Patient # 2

- Discharged from rehab on total hospital day #55
- Etiology of arrest was never completely understood
- Cardiology placed AICD prior to discharge

Patient #2

- Now has blog on the web
- Jokes of “swimming in circles”
- Full neurological recovery

Summary

- ICE is easy
- Anecdotally, it appears to improve outcomes for us
- There are essentially no negatives
- www.wakegov.com/ems


WAKE COUNTY
EMS
PARAMEDIC

Citations

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