Post Arrest Regionalization: The NYC Experience

Scott D. Weingart, MD FACEP
Director of Emergency Critical Care
Elmhurst Hospital Center and
Mount Sinai School of Medicine
AHA REGIONALIZATION GUIDELINES

*Circulation* 2010;121;709-729

TAKE HEART AMERICA

(Crit Care Med 2011; 39:26 –33)

**Systems-Based Approach**

- Widespread CPR & AED Training
- AEDs in communities
- Public Education

- Rapid Response
- Start CPR immediately
- High Performance CPR
- Impedance Threshold Device
- Rapid AED placement

Resuscitation Centers of Excellence
- Therapeutic Hypothermia
- 24/7 Revascularization
- ICDs & Electrophysiology
- Track Outcomes

Hospital

EMS

- High Performance CPR
- Advanced Airways
- Intravenous drug delivery (optional)
- Impedance Threshold Device
- Automated CPR Devices (optional)

THERAPIES IN A CARDIAC ARREST RESUSCITATION CENTER

**Table 1. Effectiveness of Multifaceted Post-Cardiac Arrest Interventions**

<table>
<thead>
<tr>
<th>Authors/Reference</th>
<th>Design</th>
<th>Population</th>
<th>Intervention</th>
<th>Comparator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oddo et al 2009</td>
<td>Case-control</td>
<td>Prop. VF: 79%</td>
<td>Hypothermia, PCI, goal-directed therapy, glucose control not stated (n=55)</td>
<td>Standard care (n=54)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outcome for VF subgroup*</td>
<td>CPC 1 or 2 at discharge: 20 (37%)</td>
<td>CPC 1 or 2 at discharge: 6 (11%); P=0.004</td>
</tr>
<tr>
<td>Sunde et al 2009</td>
<td>Case-control</td>
<td>Prop. VF: 90%</td>
<td>Hypothermia, PCI, goal-directed therapy, glucose control (n=61)</td>
<td>Standard care (n=58)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CPC 1 or 2 at discharge: 56%</td>
<td>CPC 1 or 2 at discharge: 20%; P=0.001</td>
</tr>
<tr>
<td>Knebel et al 2010</td>
<td>Case-control</td>
<td>STEMI</td>
<td>Hypothermia, PCI, goal-directed therapy, glucose control not stated (n=40)</td>
<td>Standard care (n=32)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prop. VF: 100%</td>
<td>CPC 1 or 2 at discharge: 53%</td>
<td>CPC 1 or 2 at discharge: 19%; P=0.001</td>
</tr>
<tr>
<td>Wolntrum et al 2011</td>
<td>Case-control</td>
<td>STEMI</td>
<td>Hypothermia, PCI, goal-directed therapy, glucose control not stated (n=16)</td>
<td>Standard care (n=17)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prop. VF: 100%</td>
<td>CPC 1 or 2 at discharge: 69%</td>
<td>CPC 1 or 2 at discharge: 47%; P=0.3</td>
</tr>
<tr>
<td>Galecki et al 2012</td>
<td>Case-control</td>
<td>Prop. VF: 50%</td>
<td>Hypothermia, PCI, goal-directed therapy, glucose control (n=20)</td>
<td>Standard care (n=18)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CPC 1 or 2 at discharge: 8 (40%)</td>
<td>CPC 1 or 2 at discharge: 4 (22%)</td>
</tr>
</tbody>
</table>

Prop. VF indicates proportion with ventricular fibrillation; PCI, primary percutaneous coronary intervention; and CPC, cerebral performance category.

* Hemodynamic goals achieved within 6 hours of presentation in emergency department.
A collection of articles on why patients should take a trip to the lab post-arrest:


RESOURCES

Check out the ED Critical Care Blog and Podcast at http://emcrit.org or search itunes for “emcrit”

Find all of the articles mentioned on the hypothermia website: nychypothermia.org

CONTACT ME

me@emcrit.org
**Inclusion Criteria (Must have All)**

- Post Cardiac Arrest (Any rhythm as cause of arrest is eligible)
- ROSC < 30 min from EMS/Code Team Arrival
- Time now < 6 hrs from ROSC
- Comatose (Does not follow commands)
- MAP > 65 on no more than one vasopressor (Relative)
  
  Note: inotropes don’t count as vasopressors and if pt stabilizes, you may start protocol at that point

**Exclusion Criteria**

- Pt has DNR, MOLST, poor baseline status, or terminal disease
- Age ≥ 80 y/o (Relative)
- Cryoglobulinemia (Relative)
- Uncontrollable Bleeding or Traumatic etiology for arrest
- Intracranial Bleeding (Relative - Consult Neurosurgery)
- Pregnancy (Relative - Consult OB/Gyn)
- Recent Major Surgery (Relative)
- Severe Sepsis/Septic Shock as cause of Arrest (Relative)

---

**Neurologic Exam**

<table>
<thead>
<tr>
<th>Eye Opening</th>
<th>Verbal</th>
<th>Motor</th>
<th>Brainstem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spontaneous</td>
<td>Oriented 4</td>
<td>Obeys 6</td>
<td>Pupils React yes no</td>
</tr>
<tr>
<td>Voice</td>
<td>Confused 3</td>
<td>Localizes 5</td>
<td>Corneal yes no</td>
</tr>
<tr>
<td>Pain</td>
<td>Inappropriate 2</td>
<td>Withdraws 4</td>
<td>Spont. Resps yes no</td>
</tr>
<tr>
<td>None</td>
<td>Sounds 2</td>
<td>Decorticate 3</td>
<td>Doll’s Eyes yes no</td>
</tr>
<tr>
<td></td>
<td>None 1</td>
<td>Decerebrate 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intubated 1</td>
<td>None 1</td>
<td></td>
</tr>
</tbody>
</table>

**Plantar Reflex:**

- L          R
- Inclusion Criteria (Must have All)
- Exclusion Criteria

If any Starred (*) Item is checked off on the neuro exam, the patient is ineligible for the protocol.

---

**Protocol**

- If there is a question regarding eligibility, discuss Case with the ICU Fellow or Attending
- List Initial Arrest Rhythm:  
- List Number of Minutes from Start of CPR to ROSC: 
- Send blood for: CMP, LFTs, Superstat I, Lactate, CBC, PT/PTT, CK/MB/Troponin, Lipase, Phosphate
- Completely expose patient and place cooling blankets or gel pads with nothing between blankets/pads & skin.
- Place temp probe in **mid-esophagus** (~4 cm above xiphoid via oral/nasal); if unable to place in esophagus, probe can be placed rectally (5 cm)
- Hook blankets/pads and the temperature probe to the same hypothermia machine.
- Set temperature to 33º C and Set the machine to “Automatic Mode”.
- List time Now (Starting Protocol):  
- List Initial Patient Temperature: º C
- If initial temperature is < 33º C, allow patient to warm to 33º C.
- Begin shivering & sedation protocols (See page 3). Titrate to RASS Score -3/-4 (Ramsay Score 4/5 in the ICU).
- Infuse refrigerated crystalloid, preferably through large bore, peripheral IV.
  
  Administer at ~100 ml per minute using pressure bag (evacuate air first). Maximum initial infusion is 30 cc/kg; if patient not < 34º C after this amount, wait 15 minutes before giving further 250 cc boluses Q 10 minutes.
- Administer Tylenol 650 mg GT Q 6 hours unless pt has allergy.
- If during induction, pt has any shivering unresolved by the above meds or is not dropping temperature at the expected rate, Vecuronium 0.1 mg/kg x 1 or Cisatracurium (Nimbex) 0.15 mg/kg x 1 should be used
- Total Cold Crystalloid Infused:  
- Time that Pt reaches 34º C:  
- If patient’s temperature rises above 34º C, infuse 250 cc boluses of cold crystalloid Q 10 min until <34º C.
- Assess for shivering Q 15 minutes. If any signs of shivering, see the protocol on page 5.
- Maintain temperature 32-34º C for 24 hours (ideal temperature is 33º C).
- If significant bleeding or severe hemodynamic instability, consider rewarming. See ehced.org for protocol.
- Time of Rewarming:  
- Reason Necessary:  
- Maintain MAP>80: Multiple Pressors and/or Dobutamine may be used during protocol, if fluid loading ineffective.
Induction of Hypothermia
See First Page

Procedures
- Full sterile neck line with CVP monitoring
- Full sterile femoral arterial line (Axillary if femoral contraindicated/unsuccessful)
- Foley Catheter with hourly urine monitoring
- Orogastric Tube on suction

Ventilation
- Position the head of the bed to at least 30° unless contraindicated
- Place patient on AC Mode
- Set Vt to 8 ml/kg Ideal Body Weight (see last page)
- Set IFR to 60 lpm
- Set Initial rate to 16 bpm
- Set Initial O2 to 50%
- Titrate FiO2/PEEP to achieve ABG Oxygen Saturation 90-94%
- Often pulse ox will not read well due to peripheral vasoconstriction
- Send an ABG, DO NOT INDICATE THE PATIENT’S TEMPERATURE ON THE ABG ORDER
  Adjust ventilatory parameters to yield uncorrected \( \text{PaCO}_2 \) of \(~45\), pH ~ 7.35, \( \text{PaO}_2 \) of at least 80 and preferably 100-120 mm Hg

Hemodynamic Goals
- Ensure Adequate Preload
  Assess by passive leg raise, pulse pressure variation, or echo. CVP may provide some indication of fluid depletion if very low. Use normal saline, lactated ringers, or isolyte boluses. Use room temperature fluid if patient at goal temperature. Replace patient’s urine losses 1:1
- MAP \( \geq 65 \) at all times, MAP \( \geq 80 \) is preferred to augment cerebral perfusion
  Preferred initial pressor is norepinephrine, may add vasopressin if necessary
  If MAP is < 80 and CVP > 10 perform passive straight leg raise to assess fluid responsiveness.
  If MAP > 100, start nitroglycerin infusion after ensuring adequate pain control and sedation.
- ScvO2 \( \geq 75\% \)
  Send blood gas as mixed venous blood uncorrected for temperature.
  (Goal of 75 rather than 70% is the correction for pt’s hypothermia.)
  If ScvO2 < 75 and HB < 7 (some would advocate <10 as trigger), transfuse patient
  If HB \( \geq 7 \), evaluate echocardiogram and consider inotropes vs. balloon pump/revascularization
- Lactate
  Hypothermia will raise lactate levels and post-arrest patients will have high lactate. Send a baseline level after the patient achieves goal temperature. From this point on, the lactate should stay the same or drop. If lactate is increasing, the patient is under-resuscitated or seizing

Cardiac Testing
- Get EKG immediately upon arrival; at the start of hypothermia induction; and Q 2 hours for the first 4 hours
- If possible, get a bedside transthoracic echo at the start of induction. In the ED, this should be performed by the emergency physician or cardiology. Look specifically for qualitative LV function, RV function, pericardial effusion/tamponade, & gross valve function
Sedation & Pain Control

- To gain the full benefits of hypothermia, it is imperative that the patient is adequately sedated
- Optimize fentanyl infusion rate first (Start @25 mcg/hour; titrate as per EHCED drip sheet)
- Add on propofol (start @ 5 mcg/kg/min, titrate as per EHCED drip sheet) midazolam, or dexmedetomidine if necessary
- Titrate to RASS Score -3/-4 (Ramsay Score of 4/5 if in the ICU)

Richmond Agitation Sedation Scale (RASS)

<table>
<thead>
<tr>
<th>Score</th>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>+4</td>
<td>Combative</td>
<td>Overtly combative, violent, immediate danger to staff</td>
</tr>
<tr>
<td>+3</td>
<td>Very agitated</td>
<td>Pulls or removes tube(s) or catheter(s); aggressive</td>
</tr>
<tr>
<td>+2</td>
<td>Agitated</td>
<td>Frequent non-purposeful movement, fights ventilator</td>
</tr>
<tr>
<td>+1</td>
<td>Restless</td>
<td>Anxious but movements not aggressive vigorous</td>
</tr>
<tr>
<td>0</td>
<td>Alert and calm</td>
<td></td>
</tr>
<tr>
<td>-1</td>
<td>Drowsy</td>
<td>Not fully alert, but has sustained awakening</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(eye-opening/eye contact to voice (≥10 seconds))</td>
</tr>
<tr>
<td>-2</td>
<td>Light sedation</td>
<td>Briefly awakens with eye contact to voice (&lt;10 seconds)</td>
</tr>
<tr>
<td>-3</td>
<td>Moderate sedation</td>
<td>Movement or eye opening to voice (but no eye contact)</td>
</tr>
<tr>
<td>-4</td>
<td>Deep sedation</td>
<td>No response to voice, but movement or eye opening</td>
</tr>
<tr>
<td></td>
<td></td>
<td>to physical stimulation</td>
</tr>
<tr>
<td>-5</td>
<td>Unarousable</td>
<td>No response to voice or physical stimulation</td>
</tr>
</tbody>
</table>

Labs & Electrolytes

- Send Superstat I (ABG with Electrolytes) and Lactate Q 1 hour for first 4 hours, then Q 4 hours
- On arrival, send CMP, CBC, Lytes, PT/PTT, Lipase, Cardiac Enzymes, Phosphate. Type and Hold, & Pan-Cultures
- Send CMP (complete metabolic panel) and CBC Q 4 hours
- Send Cardiac Enzymes Q 6 hours
- Keep Magnesium at high-normal at all times with aggressive IV repletion
- Replete Potassium if < 3.4 with IV KCl
- Keep iCal at high normal at all times
- Keep Sodium at least 140 at all times, 150 is preferable
- Keep Glucose < 200 with Insulin Drip (preferred) or Subcutaneous Regular Insulin

DVT Prophylaxis

- If no contraindication, Heparin 5000 units subcutaneous Q 8 hours

Stress Ulcer Prophylaxis

- Protonix 40 mg IVSS x 1

VAP Prophylaxis

- Head of bed to 30°
- Place in-line closed suction and perform aggressive pulmonary toilet
Additional Testing

- Consider Head CT if possible neurologic cause to arrest. Note: even an intracranial bleed is not a contra-indication to continuation of induced hypothermia. Consider letting the patient drift to 34°C and administration of dDAVP.
- If there is a question of brain death, consider a CTA of the brain to assess for flow.
- Consider CTA Chest if there is a strong suspicion of PE as the cause of arrest. Bedside dopplers by EP or sono technician may be a good first step
- EEG if seizures (convulsive or non-convulsive) are suspected

Revascularization for STEMI

- PCI is preferred, consult with CPORT fellow/attending and CCU fellow. Hypothermia does not need to be discontinued for PCI.
- If PCI is not available or will be delayed, thrombolysis should be administered. Thrombolysis can be given during hypothermia. CPR performed prior to ROSC should not preclude reperfusion therapy. Use standard doses of Retevase. Consult with CPORT fellow/attending.

Transport to radiology or ICU

- Disconnect the hypothermia machine and leave the blankets and temperature probe in place.
- If the patient returns to the ED, hook the machine back up.
- If the patient’s temperature is >34°C, infuse 250 cc boluses of cold crystalloid Q 10 min until <34°C
Division of ED Critical Care

Post-ROSC Care Package

Shivering Protocol After Induction

Bedside Shivering Assessment (BSAS) (Neurocrit Care 2007;6:213)
0-None, no shivering. Must not have shivering on EKG or palpation.
1-Mild-localized to neck/thorax. May only be noticed on palpation or EKG.
2-Moderate-intermittent involvement of upper extremities +/- thorax
3-Severe-generalized shivering or sustained upper extremity shivering

• All patients receive: **Acetaminophen** 650 mg GT Q 6 hours unless allergic

• If BSAS > 1, add **Fentanyl Drip** (Start @ 25 mcg/hour; titrate as per EHCED drip sheet)

• If BSAS still > 1, add **Propofol Drip** (Start @ 5 mcg/kg/min; titrate as per EHCED drip sheet)

• If BSAS still > 1, add **Bair Hugger Device** for counterwarming on both of patient’s arms

• If BSAS still > 1, administer **MgSO4** 2 grams IVSS, then 0.5-1 gram/hr for target serum Mg 3 mg/dl

• If BSAS still > 1, administer **Dexmedetomidine** 1 μg/kg over 10 minutes followed by an infusion

• If BSAS still > 1, change **goal temperature to 32° C**

• If BSAS still > 1, administer **Ketamine** 0.5 mg/kg IVP, may start drip at same dose per hour

• If BSAS still > 1 after titration of above meds, add **Nimbex** 0.15 mg/kg IV Q 1 hour PRN

Paralysis after induction should only be necessary under extraordinary circumstances!

---

Division of ED Critical Care

Modified ARDSNet Vent Protocol

OXYGENATION GOAL: Uncorrected PaO2 80-120/ SpO2 88-95%
Use incremental FiO2/PEEP combinations below to achieve goal

<table>
<thead>
<tr>
<th>FiO2</th>
<th>0.3</th>
<th>0.4</th>
<th>0.4</th>
<th>0.5</th>
<th>0.5</th>
<th>0.6</th>
<th>0.7</th>
<th>0.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEEP</td>
<td>5</td>
<td>5</td>
<td>8</td>
<td>8</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FiO2</th>
<th>0.7</th>
<th>0.8</th>
<th>0.9</th>
<th>0.9</th>
<th>1.0</th>
<th>1.0</th>
<th>1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEEP</td>
<td>14</td>
<td>14</td>
<td>16</td>
<td>18</td>
<td>20</td>
<td>22</td>
<td>24</td>
</tr>
</tbody>
</table>

PLATEAU PRESSURE GOAL: ≤ 30 cm H2O
Check Pplat (0.5 second inspiratory pause), SpO2, Total RR, TV and pH (if available) at least q 4h and after each change in PEEP or TV.

If Pplat > 30 cm H2O: decrease TV by 1 ml/kg steps (minimum = 4 ml/kg).
If Pplat < 25 cm H2O: TV < 6 ml/kg, increase TV by 1 ml/kg until Pplat > 25 cm H2O or TV = 6 ml/kg.
If Pplat < 30 cm H2O and breath stacking occurs: may increase TV in 1 ml/kg increments (maximum = 8 ml/kg).

---

PART I: VENTILATOR SETUP AND ADJUSTMENT
1. Calculate predicted body weight (PBW)
   - Males = 50 + 2.3 [height (inches) - 60]
   - Females = 45.5 + 2.3 [height (inches) -60]
2. Select Assist Control Mode
3. Set initial TV to 8 ml/kg PBW
4. Reduce TV by 1 ml/kg at intervals ≤ 2 hours until TV = 6ml/kg PBW.
5. Set initial rate to approximate baseline VE (not > 35 bpm).
6. Adjust TV and RR to achieve pH and plateau pressure goals below.
7. Set inspiratory flow rate above patient demand (usually > 80L/min)

---

This package outlines suggestions for the care of the Post-Arrest patient. It does not set a standard of care and individual patient circumstances should always be taken into account when making treatment decisions.
Regionalization of Cardiac Arrest Care:
Project Hypothermia in New York City

Why should you listen to what I have to say?

ED Intensivist

Elmhurst

Insane Number of Post Arrests

FDNY

“Expertise comes when you have made all the mistakes possible in your field”
---Niels Bohr
Objective:
To allow you to understand the benefits and pitfalls of creating a regional system to care for Post-Cardiac Arrest Patients
Regional Systems of Care

The missing link in the chain

Systems-Based Approach

Lay Public

CPR Education

Public Access AEDS

EMS
High Performance BLS

Early Defib

Transport to a Cardiac Arrest Center

The Future

Cardiac Arrest Centers

Therapeutic Hypothermia

Treatment of the Post-Arrest Syndrome

What are Cardiac Arrest Centers Actually Doing?
Multifaceted Approach VF/VT

11% to 37%
26% to 56%
19% to 53%
47% to 69%
22% to 40%

CPC 1/2

Protocols
Hypothermia
Specialized ICUs
PCI
cEEG
Balloon Pumps
Hawthorne Effect

Crazy Stuff

CRRT

Balloon Pumps

Multimodal Neurological Monitoring

Implementation of a standardised treatment protocol for post resuscitation care after out-of-hospital cardiac arrest

Kjetil Sunde1,*, Morten Pytte2, Dag Jacobsen1, Arild Mangerud1, Lars Petter Jersven1, Christian Smidsrud1, Tomasz Draegert3, Petter Andreas Steen3

Recommendations (2009) 33, 28

Circulation

Protocols
Hypothermia
Specialized ICUs
PCI
cEEG
Balloon Pumps
Hawthorne Effect

CRRT

Multimodal Neurological Monitoring

ECMO
Early PCI

Any patient without a clear non-cardiac etiology should get early PCI

References in the Handout

Level I CRC vs.
Level II CRC

AICDs

Case Volume & Outcome

Carr et al

40
Carr et al

Shin et al

External Validation

New York City

Callaway et al

David Prezant

John Freese
Intentional two-phase approach

Phase I: Facilitated transport of post-ROSC patients to "Cardiac Arrest Centers"

Phase II: Intra-arrest cooling with facilitated transport to "Cardiac Arrest Centers"

Phase I

Adult Non-Traumatic Arrest with ROSC in the Field

The "Chain of Survival" – Post-Resuscitation Care

Timeline

Phase II

NYC Project Hypothermia

NYC Project Hypothermia

NYC Project Hypothermia

NYC Project Hypothermia

NYC Project Hypothermia

NYC Project Hypothermia
NYC Project Hypothermia

Phase I
- 11,592 attempted resuscitations
- 418 traumatic arrest
- 262 pediatric arrests
- 10,912 non-traumatic, adult arrests
- 2,756 transported to Cardiac Arrest Centers post-ROSC

NYC Project Hypothermia

Use of Therapeutic Hypothermia Among Admitted Patients

NYC Project Hypothermia

Etiology of Arrest for TH Patients

NYC Project Hypothermia

Survival Among Admitted Patients

** = p < 0.05

NYC Project Hypothermia

Survival Among Admitted Patients

** = p < 0.05

NEW HYPOTHERMIA RELATIVE EXCLUSION CRITERIA
1. ROSC after >60 minutes of on-going resuscitation efforts.
2. Age ≥ 80 years.
3. Significant major medical co-morbidity
4. Neurologic condition / disorder resulting in moderate or greater disability (i.e. CVA, Alzheimer’s, Parkinson’s, multi-infarct dementia, etc).
5. Initial serum lactate > 10 or arterial pH < 7.0 following appropriate initial stabilization.
NEW HYPOTHERMIA

RELATIVE EXCLUSION CRITERIA

1. ROSC after >60 minutes of on-going resuscitation efforts.
2. Age ≥ 80 years.
3. Significant major medical co-morbidity
4. Neurologic condition / disorder resulting in moderate or greater disability (i.e. CVA, Alzheimer’s, Parkinson’s, multi-infarct dementia, etc).
5. Initial serum lactate > 10 or arterial pH < 7.0 following appropriate initial stabilization

Intra-Arrest Hypothermia

Impact on Defibrillation

for mild hypothermia:
- increased first shock efficacy
- lower defibrillation threshold
- lower number of defibrillatory shocks for later VF / VT

Post-Arrest Myocardial Dysfunction

Question of How to Cool
- Ice cold saline
- Ice packs
- Simple external cooling
- External cooling device
- Intranasal cooling
- Endovascular cooling

NYC Project Hypothermia

Phase II Prelim Data

Wake County

Rhino

Chill

NYC Project Hypothermia

Large Volume Infused Cold Saline
- 30cc/kg bolus
- maximum 2L
- contraindications
  - trauma
  - pulmonary edema
  - hypothermia
  - discontinued for pulmonary edema
**Meta-Discussion**

**FDNY**

**Public CPR**

**Cases Per Year among NYC Cardiac Arrest Centers**

**Low Volume Centers?**

**Inclusive Approach**

**Self-Certified**

Many centers are buying their way in

**What you need in the ED?**
ED Resus ICU Team Rapid Up

Only STEMI goes to PCI Centers

PCI

Thrombolytics

Summary

Elmhurst

My Shop

The RaCC
How we Started

2003

Our First Post-Arrest Hypothermia

196-198 post-arrests

> 85% of our Arrests in 2010 were not VF/VT

VF 51%
CPC 1 or 2
Non-VF 7% CPC 1 or 2

Vegetative Fatigue

Other Hospitals’ Nursing Home Patients

Prognostication in the ED

A large majority of my hypothermia patients come in with no brainstem reflexes

Most of them gain something back during the first few hours

Most of these folks do very poorly

All Rhythms?

> 80 (relative)
FHCDA

Palliative Care

Prognostication in the ICU

72 hours

My 61 y/o Pt

Spread out into all units

Lack of Post-Arrest Experience

Bradycardia

PCI
Started Cheap, Now Expensive

How to fix my issues

My dream unit

Need a cEEG Program

Need a Neuro-Intensivist

Summary

To bring it home

Need PCI

CPR Education
EMS can drive care in the hospitals

Regionalization for Post-Arrest makes intuitive sense

But that doesn’t make it easy

Prognostication

VF/VT Patients should get the works

Problem is some of the other folks do well

But until we know which ones any busy center is going to be in trouble...

Low Volume Centers?

Reimbursement?
All refs and slides at:

NYChypothermia.org

Contact me at:

me@emcrit.org

Handout

emcrit.org/maine

Increased Survival