“Cool It”- Therapeutic Hypothermia
The Miracle On Ice 2010
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Development Director, Systems of Cardiac Emergency Care

The Main Concepts a Cardiac Emergency Program

ACCESS   TRANSPORTATION   STREAMLINE CARE
DATA COLLECTION   FEEDBACK   RESEARCH
Prehospital   Outstate Hospital   EMS Transport   Tertiary Center
Cambridge Medical Center, Cambridge Minnesota

45 miles ground distance; 20 min air transport
DA 43 yr old male

ED COURSE:
- Patient arrived dead. Code called at 2310 but chest compressions begun prior to code being called and while Lucas was being hooked up. Multiple ribs cracked and started chest compressions. He was initially in ventricular fibrillation. He was shocked 4 times; I intubated him and saw the tube pass through cords and confirmed with air in the tube, CO2 which was low, breath sounds. Nurse anesthetist confirmed placement by visually checking to see if tube through the cords. The following were ordered epo, vasopression 40, amio 300, amio 150. Pulse returned at 2333. Level I called, Helicopter called by HUC. Amio gtt, heparin gtt ordered. Asa per rectum ordered. NG ordered. Dopamine gtt ordered. Patient with some movement and trying attempting to breath on own. Ativan and morphine ordered.

- Additionally Foley, rectal temperature, blood sugar, cooling and NG all ordered. Plavix ordered down the NG.

- I spoke with Dr. Memon the on-call cardiologist.

IMPRESSSION and PLAN:
- Cardia and respiratory arrest: patient revived after 24 minutes of cpr utilizing Lucas and intubated. Sent by helicopter with amio gtt and dopamine gtt per dosage per orders.
Where you start counts!!!

ASK does ECG have ST elevation? Yes: Level 1/Coolit Cath lab direct

Ask if ECG has ST elevation? NO: Coolit page (H4200/direct)

If there is concern for head bleed: CT can be done prior to any further treatment, but with cooling started

Patient Meets Eligibility Requirements

Eligible patients:
> Post non-traumatic cardiac arrest
> Cardiac arrest for < 60 minutes from collapse to return of spontaneous circulation (ROSC)
> Unresponsive

Excluded Patients:
> SBP < 90 mm Hg for >30 minutes after ROSC despite the use of pressors
> Active bleeding
> Comatose or vegetative state before cardiac arrest
> DNR/DNI

Call 3-3900 to page “COOL IT”

ICU charge RN
- Identify available ICU bed/room prep

ED charge RN
- Prepare if coming to ED

Admin Rep
- Assist with bed placement as needed

Pt Placement
- Assign Pt to ICU bed, assign staff as needed

Pharmacy
- Prepare for stat Med Prep

Resource RN
- CVL/ED/Unit will page when needed

ADT/RRT Nurse
- Provide backup to Resource Nurse

Chaplin
- Provide support to family

Security
- Provide support to family and staff in ED

Pt Placement
- Assign Pt to ICU bed, assign staff as needed

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**Communication Tool**

**Arrival Time**

- **Arrival to ECG**: 8 min
- **Air called**: 12 min

**Meds given**

- 00:49 Pt arrived via helicopter
- 00:51 Vitals taken
- 00:55 Pads applied
- 01:03 Procedure start
- ANW to Balloon inflates LAD 21 min
### Pharmacy Role in med prep

<table>
<thead>
<tr>
<th>Time</th>
<th>Medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>00:00</td>
<td>All meds given peri ORR by Dr. Chavez</td>
</tr>
<tr>
<td>00:05</td>
<td>Heparin/Liposome (1 mg/kg) given to Beatrix RN</td>
</tr>
<tr>
<td>00:50</td>
<td>Phen 200 mg given in Cambridge</td>
</tr>
<tr>
<td>01:02</td>
<td>ASA 325 mg given in Cambridge</td>
</tr>
<tr>
<td>01:32</td>
<td>Abciximab drip started at 1 mg/h, given to Beatrix (IV) RN</td>
</tr>
<tr>
<td>01:33</td>
<td>Atorvastatin 4 mg/kg started at 4 mg/kg, given to Beatrix (IV) RN</td>
</tr>
<tr>
<td>01:35</td>
<td>Atorvastatin 1 mg/kg</td>
</tr>
<tr>
<td>01:44</td>
<td>Furosemide drip started at 50 mg/kg, given to Beatrix (IV) RN</td>
</tr>
<tr>
<td>01:58</td>
<td>Dextran 70 20 mg/kg started at 50 mg/kg, given to Beatrix (IV) RN</td>
</tr>
<tr>
<td>02:03</td>
<td>Fentanyl 50 mcg given to Beatrix (IV) RN</td>
</tr>
<tr>
<td>02:04</td>
<td>Amiodarone 4 mg/kg started at 8 mg/kg, given to Beatrix (IV) RN</td>
</tr>
<tr>
<td>02:08</td>
<td>Heparin 1000 units/kg given to Beatrix (IV) RN</td>
</tr>
<tr>
<td>02:10</td>
<td>Sodium Bicarbonate 20 meq/kg given to Beatrix (IV) RN</td>
</tr>
<tr>
<td>02:15</td>
<td>Heparin 1000 units/kg given to Beatrix (IV) RN</td>
</tr>
<tr>
<td>02:20</td>
<td>Intralipid 3.5% mg/kg given to Beatrix (IV) RN</td>
</tr>
<tr>
<td>02:25</td>
<td>Amiodarone 0.5 mg/kg given to Beatrix (IV) RN</td>
</tr>
<tr>
<td>02:30</td>
<td>Intralipid 3.5% mg/kg given to Beatrix (IV) RN</td>
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<tr>
<td>02:35</td>
<td>Sodium Bicarbonate 10 meq/kg given to Beatrix (IV) RN</td>
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<tr>
<td>02:40</td>
<td>Furosemide 20 mg/kg given to Beatrix (IV) RN</td>
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<td>02:50</td>
<td>Norepinephrine 0.05 mcg/kg given to Beatrix (IV) RN</td>
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<tr>
<td>02:55</td>
<td>Lactulose 200 mg/kg given to Beatrix (IV) RN</td>
</tr>
<tr>
<td>03:00</td>
<td>Amiodarone 1 mg/kg given to Beatrix (IV) RN</td>
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### Vascular Access

<table>
<thead>
<tr>
<th>Time</th>
<th>Access</th>
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<tbody>
<tr>
<td>00:07</td>
<td>Right femoral 9 Fr. standard sheath inserted</td>
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</table>
1. Direct to cath lab
2. Equipment in Cath Lab
3. Pads ready
4. Pads applied
5. Groin access
6. Leg application
7. Drape as usual
8. Machine on

Average time: 6 minutes

Artic SUN  temperature control and access
Door to Balloon 104 min
24 min of before ROSC
ROSC to Balloon 80 min
• EF at 35% at time of angio
• PTCA Balloon to LAD
• Thrombectomy to LAD
• BMS to LAD
• BMS to Mid LAD
• Home with Life vest after
• CR at Cambridge
• ICD placed
Transportation
New Paradigm for CV Emergency

- Trauma Model
- “Golden Hour”

Red–Zone II (90–120 mins)
Blue–Zone I (< 90 mins)

Helicopter Locations 2010
In Response to the STEMI Program at MHI
Volunteer First Responders
Treatment starts where the Arrest occurs

*When you have seen 1 EMS system, you have seen 1 EMS system*

Renville County Hospital and Clinics
- No inhouse physician
- No Helipad at hospital
- 3 miles from hospital, crew picked up by local volunteers and driven to get patient
- Avg Census is 4

Volunteers 1st Responders
Space for Helipad
Drills for Time
Intercepts
Ground to Air
Local Politics
Flight arrivals
Cost vs Practical
Weather
Transfers

- Standardized protocol known to all Air medical and ground ALS services
- Esophageal temperature probe placed
- Radio contact to Cardiologist for any change
- “Expose patient”
- Ice packs
- Frequent repeat of ECG during transportation
Case Presentation - CRF

- 43 yr old female
- No previous cardiac history
- Ventricular fibrillation arrest
- Transport from Montgomery to New Prague
- 1 EMS shock & ROSC 30 min after arrest
Early Cooling is Critical

<table>
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<tr>
<th>Source</th>
<th>Chi Square</th>
<th>DF</th>
<th>P-value</th>
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<tr>
<td>Time ROSC to First Cooling</td>
<td>5.0785</td>
<td>1</td>
<td>0.0242</td>
</tr>
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</table>

If the time to first cooling increases by an hour the hazard of death increases 25%.
Ice packs placed during resuscitation

Case Presentation - CRF

- Ice packs within 45 min of arrest
- 33°C at arrival at ANW ~2 after arrest
- CV lab determined etiology non-ischemic
- LVEF 25-30%; increased to 45-50% at 4 hrs after arrest
- Cooling continued for 24 hrs
Case Presentation CRF

- Returned to baseline temp 33 hours after cooling started
- Regained consciousness six days following arrest
- ICD implanted for ARVD
- Normalized ventricular function
- Anoxic encephalopathy

Spiritual Care Progress Note

Met at Christine’s bedside with her husband and daughters. Their hope is their mom will wake up and “walk out of here.” They want her home so she can take them to their parades. The twins are Czechoslovakian royalty and do many parades. They are trying to maintain some normal life with going to college class, doing homework, washing dishes and doing laundry.

We prayed over Chris. They said, “Our whole town is praying for her.”
Follow up for both the head and the heart!

(31272) Hypothermia Post Therapeutic Phase 4 – Prep for DC

Please note bolded orders are pre-selected as EXCELLIAN

**Diagnosis**

**Nursing Discharge**
- Provide DC Instructions per Post Hypothermia Booklet

**After Discharge Orders**

**Post Discharge Follow Up and Appointments**
- AMB Occupational Therapy Eval and Treat
- Follow Up with Neuropsychology (Specify)
- MR Cardiac w/without Contrast - for patients WITHOUT ICD
- Echoes completed prior to appointment
- Follow Up With Cardiologist with MRI Echo

**Additional Orders**
- Post 'Cool It Hypothermia' patient.
- Schedule follow-up appointment in [ ] day(s) with [ ]
- Schedule MRI appointment in 4-6 weeks.
- Schedule ECHO appointment in 4-6 weeks.
- Schedule follow-up appointment in 4-6 weeks with Cardiologist. Post 'Cool It Hypothermia' patient.

**RESTRICTIONS**
- She is not to drive at this time until felt to be recovered from her anoxic encephalopathy. Other physical recommendations as per rehabilitation specialist.

The patient should see Dr. Burkland in the next 7 to 10 days for clinical assessment. At that visit, I make sure that her appropriate physical therapy, occupational therapy, and speech therapy has been arranged. She has been working with social services during this admission. I would also have her follow up with cardiology in approximately one month. In terms of her medications, she will need gradual titration of her Coreg and ACE inhibitor to maximally tolerated doses. These can be adjusted in the future depending on her clinical course and may not necessarily be required long-term. Again, her ejection fraction appears to have normalized prior to her discharge from the hospital.

Admit 7/21 D/G 8/1 “Home with attendance of family”
### Case Presentation - CRF

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>10:30</td>
<td>July 21 Unwitnessed Cardiac Arrest</td>
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<tr>
<td>10:39</td>
<td>July 21 EMS at Scene (BLS)</td>
</tr>
<tr>
<td>10:43</td>
<td>July 21 Initial Shock (AED)</td>
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<tr>
<td>11:00</td>
<td>July 21 ROSC</td>
</tr>
<tr>
<td>11:08</td>
<td>July 21 Arrive Queen of Peace - New Prague</td>
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<tr>
<td>11:13</td>
<td>July 21 Ice Packs Applied 1st Cooling</td>
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<tr>
<td>12:36</td>
<td>July 21 Target Temp on Arrival at ANW</td>
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<tr>
<td>12:45</td>
<td>July 21 Cooling Device applied</td>
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<tr>
<td>13:00</td>
<td>July 22 Cooling Discontinued</td>
</tr>
<tr>
<td>20:00</td>
<td>July 22 Return to Baseline</td>
</tr>
<tr>
<td>9:28</td>
<td>July 27 Regained Consciousness</td>
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<td>August 1</td>
<td>Discharged to Home</td>
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### Hypothermia Treatment Statistics

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<th>2011</th>
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<td>Age</td>
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<td>Facility</td>
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<td>Hosp. Mortality</td>
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<td>60</td>
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<td>Anesthesia</td>
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<td>Total Length</td>
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<table>
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<tr>
<th>Hypothermia Treatment Statistics</th>
<th>2010</th>
<th>2011</th>
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<tr>
<td>Median</td>
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<td>6</td>
</tr>
<tr>
<td>To Scene</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>From Scene to First Hospital</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>From First Hospital to ANW</td>
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<td>14</td>
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<tr>
<td>Median</td>
<td>5</td>
<td>101</td>
</tr>
<tr>
<td>TD to Scene</td>
<td>4</td>
<td>21</td>
</tr>
<tr>
<td>Between Initial Shock and ROSC</td>
<td>5</td>
<td>13</td>
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<tr>
<td>Between ROSC and 1st Cooling</td>
<td>5</td>
<td>111</td>
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<tr>
<td>TD to Anescess</td>
<td>5</td>
<td>211</td>
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<tr>
<td>To Reversal Abnormal</td>
<td>5</td>
<td>510</td>
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<tr>
<td>To Reversal Coupled</td>
<td>3</td>
<td>138, 10</td>
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When a heart attack isn’t just a heart attack

Can you provide STEMI care simultaneously with Cardiac Resuscitation and do it within a “System of Care”?
MHI@ Abbott
Northwestern Hospital
System of CV Emergency Care

Clinical Support Services
- Advanced Imaging
- Vascular Surgeons
- Hemodynamic Support
- 24/7 Intensivist Hospitals
- Cardiac/Transplant Surgeons
- Rehabilitation

Research Education Publications

Extensive Education for Patients, Community & Providers

Support Neurology, CT surgery to provide Supportive Care available within 30 mins of notification

Head CT perfusion And/or MRI on 24 for basis with Rapid radiology interp

Electrophysiologist/“SHOCK” Cardiologist

In-house Intervention/Cardiologist team 24/7 for comprehensive Intravenous management

Surgical intervention Emergent Cardiac bypass/VAECMO Within 1 hour Of determination of need

Able to perform high-quality Human or mechanical CPR or 20-30 min

Pre Hospital EMS Transferring EMS Educational support Ongoing feedback

Data assistance

Cath Lab 24/7 meets standards and experience for performing TH as Lab in combination

“BAR” Neurocognitive Recovery plan

Community Education Awareness

Resuscitation Center Of Excellence

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To maximize benefits, cooling should be initiated as soon as possible. 

Cardiovascular Emergency Centers
1. Advanced care for the complex cardiac emergency patient
2. Extensive training with protocolized care
3. Collaboration on presenting patient
4. Interhospital transfer systems
5. Interdisciplinary teams and approach
6. Data collection/evaluation/improvements
7. Care across continuum
8. Communication methods (FEEDBACK)
9. Research