GOAL DIRECTED RESUSCITATION FOR POST CARDIAC ARREST SYNDROME

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DISCLOSURES

• None
# BACKGROUND

- Cardiac Arrest Incidence in the US

## Table 16-1. Incidence and Outcome of Out-of-Hospital Cardiac Arrest in the United States

<table>
<thead>
<tr>
<th></th>
<th>Overall (95% CI)</th>
<th>Adults (95% CI)</th>
<th>Children (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Incidence (per 100,000)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMS assessed</td>
<td>126.4 (124.0–128.8)</td>
<td>147.7 (144.8–150.7)</td>
<td>11.0 (9.6–12.4)</td>
</tr>
<tr>
<td>EMS treated</td>
<td>63.8 (62.1–65.4)</td>
<td>80.1 (77.9–82.2)</td>
<td>8.8 (7.6–10.1)</td>
</tr>
<tr>
<td>Bystander-witnessed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>shockable rhythm (including VT, VF, shockable by AED)</td>
<td>10.0 (9.4–10.6)</td>
<td>9.8 (9.0–10.6)</td>
<td>0.3 (0.1–0.5)</td>
</tr>
<tr>
<td><strong>Survival to discharge, %</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMS assessed</td>
<td>4.8 (4.4–5.2)</td>
<td>5.3 (4.9–5.7)</td>
<td>6.3 (3.3–9.3)</td>
</tr>
<tr>
<td>EMS treated</td>
<td>9.5 (8.8–10.2)</td>
<td>9.8 (9.0–10.6)</td>
<td>7.8 (4.2–11.5)</td>
</tr>
<tr>
<td>Bystander-witnessed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>shockable rhythm</td>
<td>28.4 (25.1–31.8)</td>
<td>28.4 (25.1–31.8)</td>
<td>57.1 (20.4–93.8)</td>
</tr>
</tbody>
</table>

Cl indicates confidence interval; EMS, emergency medical services; VT, ventricular tachycardia; VF, ventricular fibrillation; and AED, automated external defibrillator. Source: Resuscitation Outcomes Consortium Investigators, unpublished data, June 20, 2012.

Heart Disease and Stroke Statistics—2013 Update: Chapter 16
POST CARDIAC ARREST SYNDROME
PROBLEM

• Reported Mortality rates for patients after cardiac arrest range between 60-85% and have not changed significantly over the past 50 years despite significant improvements in many other disease processes.

• Why?
  • A unique and complex combination of pathophysiological processes resulting from Cardiac Arrest
    • Post-cardiac arrest brain injury
    • Post-cardiac arrest myocardial dysfunction
    • Systemic ischemia/reperfusion response
    • Unresolved pathological process that caused the cardiac arrest
PROBLEM

• Comprehensive post-arrest care is needed
  • No formal, descriptive guidelines
    • Needs to be multi-disciplinary
  • No quality control

• Major barriers to comprehensive care
  • Multi-disciplinary treatment teams are involved with individual priorities resulting in significant variation in treatment and outcomes

• A growing body of knowledge that individual components of the post-cardiac arrest syndrome are treatable, i.e. Therapeutic hypothermia
POSSIBLE SOLUTION

• Bundled Care incorporating treatment goals for each aspect of the post cardiac arrest syndrome
POST CARDIAC ARREST SYNDROME MANAGEMENT

ROSC After Cardiac Arrest

STEMI

Yes

Cath Lab

No

Comatose

Yes

Goal Directed Resuscitation For PCAS

No

Supportive Care
GOAL DIRECTED RESUSCITATION FOR PCAS

Post Cardiac Arrest Neurologic Injury

Therapeutic Hypothermia with Sedation and Paralysis
- Goal Temperature 33⁰ within 4 hrs of ROSC
  {Any method that is available for practice area}
- Wean FiO₂ to maintain SaO₂ of 92%(PO₂ goal 60-90)
  {Avoid Hypoxia}
- Maintain PCO₂ 40-45
  {Avoid Hypocapnea(PCO₂ <30) or Hypercapnea(PCO₂ >50)}
  {Brain over Lung for the first 24 hours}
- Continuous EEG monitoring to evaluate for seizures
  {Keppra/Depakote Agents of choice for treatment}
- MAP > 70
- Avoid Early Prognostication, wait at least 72 hours

Wean FiO₂ to maintain SaO₂ of 92%(PO₂ goal 60-90)
{Avoid Hypoxia}

Post Cardiac Arrest Myocardial Dysfunction/Ischemia-Reperfusion Injury

Place CVC for CVP/ScVO₂ monitoring

Persistent Precipitating Pathology
- Consider PCI even w/o STEMI
- Consider Massive PE
- Consider other treatable causes

Other Supportive Measures
- DVT/GI prophylaxis
- Glycemic control
- Consider Adrenal insufficiency
GOAL DIRECTED RESUSCITATION FOR PCAS

Post Cardiac Arrest Myocardial Dysfunction/Ischemia-Reperfusion Injury

Post-Cardiac Arrest Early Goal Directed Therapy

Who needs this?
- Resuscitated patients with:
  - Pulseless < 40 min
  - LVEF < 30%
  - ACS with cardiac etiology
  - No other reason for coma
  - If pregnant consult OB/Gyn

Getting Started
- Stat ECG, 12-lead EKG, and cardiology consult
- Stat head CT if indicated
- Insert arterial pressure monitoring line in radial or femoral artery
- Initiate therapeutic hypothermia if indicated (refer to local protocol)
- Notify ICU for MICU bed and EEG fellow for EEG

MAP > 100
- Start IV NTG or 10 mcg/min. Titrage to MAP > 100. Adjust adequate CVP
- Consider furosemide if CHF
- Tachycardic or 'ACE' w/ normal EF & ScvO2 then consider esmolol

MAP, CVP, ScvO2 goals achieved
- Monitor serial lactate to rule out inadequate organ perfusion
- ACS=Acute coronary syndrome

Gaieski, Resuscitation 2009
PROPOSED TRIAL DESIGN

• Prospective Randomized trial
  • Patient to be Randomized to intervention arm (Follow the predesigned goal directed algorithm) versus control arm (typical standard of care for the institution)
  • Both arms will have documentation of all the interventions completed

• Inclusion Criteria
  • Age > 18 yrs, i.e. Adults
  • Comatose survivor after out-of hospital arrest, as defined by GCS Motor score of ≤ 5.

• Exclusion Criteria
  • Terminal disease with life expectancy < 6 months
  • Previous advance directives stating no aggressive care
  • Pre-morbid poor functional status, i.e. bed bound, advanced dementia, etc
PROPOSED TRIAL DESIGN

• Consent Process
  • Study does not involve any specific experimental intervention, and all the care falls within the realm of standard of care, so could be a waiver of consent
  • However, because of randomization, would consider obtaining consent for data collection and utilization. So would recommend EFIC process

• Follow up plan
  • All patients followed for the first 24 hours of hospitalization with documentation of all interventions, and then daily till discharge, with assessment of neurologic status with Pittsburgh CPC score and mRS at discharge. Follow up at 6 months for repeat assessment of neurologic status with same measures.

• Endpoints and outcomes
  • Primary: 1) Favorable Neurologic Outcome at 6 months, 2) Survival to discharge and at 6 months.
WHY DO THIS TRIAL?

• Current epidemiology \(\rightarrow\) 400,000 arrests/year \(\rightarrow\) 30% ROSC(120,000 patients) \(\rightarrow\) 10% survival to discharge (40,000 patients) \(\rightarrow\) Survival with good neurologic outcomes < 5% (<20,000 patients)

• Even small improvements in outcomes result in significant number of lives saved, i.e. improvement of survival from 10% \(\rightarrow\) 15% = 20000 lives saved annually for just out of hospital cardiac arrest

• If survival with favorable Neurologic outcomes improve, that not only means increased number of lives saved but a greater impact of cost of health care for the survivors.

• Relatively Easy trial to conduct, especially with the infra-structure and experience that NETT has in conducting successful Clinical trials.
QUESTIONS?

Thank you