Update in 2015

• What do we know?
• Current Quality of CPR is Poor
  – ABC vs. CAB
  – Slow and shallow compressions
  – Frequent and lengthy pauses
  – Hyperventilation
• Quality Improvement Initiatives
Pediatric Cardiac Arrest
Lots of work to do!

Outcomes are improving!
40% Survive to discharge

Vs.

60%
Don’t make it home!
Conditions in pediatric CPR patients

Sepsis (26%)
Respiratory Failure (18%)
Heart Failure (5%)

Arrhythmia (15%)

~ 50%

Data from ~ 3M hospitalizations
Welcome

It is a pleasure to welcome you to this new website, which is dedicated to the activities of the International Liaison Committee on Resuscitation (ILCOR). This site will provide a single location at which all relevant outputs from ILCOR can be accessed. Some documents will be downloadable directly from this site; others will be accessed via a link to alternative sites. In this way, ILCOR scientific statements, consensus on cardiopulmonary resuscitation science statements and treatment recommendations, and news about ILCOR’s activities can be obtained efficiently.

Vinay Nadkarni
Jerry Nolan
ILCOR Co-chairs

www.ilcor.org
Update in 2015

• What do we know?
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• Quality Improvement Initiatives
Not as good as we thought…

Sutton, Pediatrics 2009

CPR Quality Targets

Rate
Goal: >90 and <110 CC/min
56.9
43.1

Depth
Goal: >38 and <51mm or >1.5 and <2 in
63.9
36.1

Leaning Force
Goal: < 10% of CC
63.2
36.8
And we still have work to do…

Sutton, Resuscitation 2013

**Epochs Achieving Targets (%)**

<table>
<thead>
<tr>
<th>Category</th>
<th>2005</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate</td>
<td>91</td>
<td>69</td>
</tr>
<tr>
<td>Depth</td>
<td>72</td>
<td>25</td>
</tr>
<tr>
<td>CPR fraction</td>
<td>68</td>
<td>80</td>
</tr>
<tr>
<td>Leaning</td>
<td>74</td>
<td>85</td>
</tr>
</tbody>
</table>

Sutton, Resuscitation 2013
The Top 10 Everything of 2010

In 50 wide-ranging lists, TIME surveys the highs and lows, the good and the bad, of the past 12 months

TOP 10 MEDICAL BREAKTHROUGHS

5. Taking the Resuscitation Out of CPR

By Alice Park | Thursday, Dec. 09, 2010

For 50 years, ever since cardiopulmonary resuscitation (CPR) was first described in 1960, rescuers have been saving lives the same way, by combining mouth-to-mouth resuscitation with chest compressions to revive unresponsive victims. But after new data showed that chest compressions alone were just as effective as traditional CPR in rescuing victims of cardiac arrest, the American Heart Association (AHA) decided to update the decades-old process. The new rules for CPR put more emphasis on the chest compressions, and in some cases do away with resuscitating breaths altogether.

In recent years, several studies have found that untrained bystanders are more comfortable performing chest compressions, without mouth-to-mouth — even with the help of an automated external defibrillator (AED) — and are more likely to do CPR.

Haraz N. Ghanbari / AP
## Bystander CPR for Pediatric OHCA

### 30-day Good Neuro Survival

Non-cardiac Cause: 71% of 5178 OHCAs

<table>
<thead>
<tr>
<th></th>
<th>CC+RB</th>
<th>CC only</th>
<th>No CPR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>45/624*</td>
<td>6/380*</td>
<td>53/2719</td>
</tr>
<tr>
<td></td>
<td>7.2%</td>
<td>1.6%</td>
<td>1.9%</td>
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</tbody>
</table>

* OR 5.5, CI 2.5-17.0

CC+RB vs CC

Kitamura, Lancet 2010
Bystander CPR for Pediatric OHCA

30-day Good Neuro Survival

Cardiac Cause: 29% of 5178 OHCAs

<table>
<thead>
<tr>
<th></th>
<th>CC+RB</th>
<th>CC only</th>
<th>No CPR</th>
</tr>
</thead>
<tbody>
<tr>
<td>28/282*</td>
<td>14/158*</td>
<td>14/339</td>
<td></td>
</tr>
<tr>
<td>9.9%</td>
<td>8.9%</td>
<td>4.1%</td>
<td></td>
</tr>
</tbody>
</table>

* OR 2.2, CI 1.1-4.5

CC+RB & CC vs No CPR

Kitamura, Lancet 2010
Breathing too Fast

We ventilate a lot!

1 / 5 events at CHOP have ventilation rates more than DOUBLE AHA guidelines!
Excessive Ventilation is Lethal

Mean Intrathoracic Pressure

Coronary Perfusion Pressure

Right Atrial Diastolic Pressure

DECREASED SURVIVAL

Ventilation Rate

Mean Intrathoracic Pressure

Coronary Perfusion Pressure

Right Atrial Diastolic Pressure

Aufderheide, Circulation 2004
Push Hard = Better Pediatric BPs

Blood Pressure (mmHg)

Systolic
Mean
Diastolic

SBP > 80
MBP > 50
DBP > 30

Percent Anterior-Posterior Chest Depth

SBP > 80
MBP > 50
DBP > 30

Systolic
Mean
Diastolic
Table 4: Relative odds of attaining threshold values of systolic blood pressure (≥ 80 mmHg) and diastolic blood pressure (≥ 30 mmHg) according to CPR quality thresholds. Data presented as odds ratios (CI95); all odds ratios relative to poor CPR quality (rate < 100 CC/min and depth < 38 mm). SBP indicates systolic blood pressure; DBP, diastolic blood pressure. *p=0.02; †p<0.001; ║p=0.042.

<table>
<thead>
<tr>
<th></th>
<th>SBP ≥ 80</th>
<th>DBP ≥ 30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate Only ≥ 100 CC/min</td>
<td>1.32 (1.04, 1.66)</td>
<td>2.15 (1.65, 2.80)</td>
</tr>
<tr>
<td>Depth Only ≥ 38mm</td>
<td>1.04 (0.63, 1.71)</td>
<td>0.97 (0.52, 1.79)</td>
</tr>
<tr>
<td>Rate and Depth</td>
<td>2.02 (1.45, 2.82)</td>
<td>1.48 (1.01, 2.15)</td>
</tr>
</tbody>
</table>
Coronary Perfusion Pressure during 15:2 CPR
(Ao diastolic - RA diastolic)

Berg, Circulation 2001
Update in 2015

• What do we know?
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• Quality Improvement Initiatives
Focused Efforts to Improve Skills

- Low Intensity
- High Frequency

Environment

Team

Individual

Performance Debriefing

Performance Feedback
Early Recognition and Response

Rapid Response Teams (RRT)
Medical Emergency Teams (MET)

Assess individual risk

- Complex chronic conditions
- Acute conditions
- Ongoing treatments
- Length of stay
- Previous ICU admissions

Recognize and judge severity of deterioration

- Physiologic changes
- Signs of evolving clinical concern

Action

Take action

- Routine care
- Floor-based interventions
- MET activation
Key Factors Affecting Outcome

Quality of CPR!

Targeted Temp Management
Blood Pressure
Oxygen
Sedation
Seizures

Patient Factors
Event Factors
System Factors

Event Factors
System Factors

PROTOCOL Compliance

Outcome

Data

Patient Factors

Data

System Factors

Quality of Life

ROSC
Organ Recovery?

Intact Neurologic Survival

Short term Survival
Discharge Survival
Challenges Today

Knowledge Discovery → Knowledge Processing → Knowledge Transfer

Data
- Level of Evidence
  - Quality of evidence
- Continuous review

Teach
Learn
Remember
Act
Act well

Data
- Can it work?
- Is it feasible and safe?
- Does it work?
- Quality of Life
- Intact Neurologic Survival
Debriefings

Monthly or Bi-Weekly

- Quality of care
- Latent and obvious errors
- Examples of excellence
- Clinical issues
- System issues
- Team performance