Resuscitation Guidelines update

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EuSEM Vice president
There are no COIs to disclose in this presentation.
CPR Mile Stones

1958 - William Kouwenhoven, cardiac massage.


1992 CPR Guidelines

First International Meeting

- Sodium Bicarbonate in CPR.
- Early Public Access Defibrillation.
- Chain of survival.
- ILCOR foundation.
2000 CPR Guidelines

The world’s first international to produce International Resuscitation Guidelines.

- Simplification of Adult BLS Ratio 100xˈ 15:2.
- Treatment of cardiac arrest with a "shockable" rhythm, deliver up to three "stacked" shocks without CPR between the shocks.
- Comparable Effectiveness: Bag-Mask Device May Be as Effective as Tracheal Tube.
- Death Pronouncement in the Field, the Futility of Transport of Patients Needing Continued CPR
2005 CPR Guidelines

International Consensus on Cardiopulmonary Resuscitation (CPR) and Emergency Cardiovascular Care (ECC) with Treatment Recommendations (CoSTR).

- The ratio of compressions-to-ventilations has been changed to 30:2.
- Rescuers now deliver 1 shock (360J monophasic) followed by CPR, not 3 shocks.
- Lay rescuers no longer check for circulation.
- Other algorithms have been simplified.
2010 CPR Guidelines

International Consensus on Cardiopulmonary Resuscitation (CPR) and Emergency Cardiovascular Care (ECC) with Treatment Recommendations (CoSTR).

• An adjustment to the CPR process from A – B – C (Airway – Breathing – Compressions) to C – A – B.

• An increased emphasis on High – Quality CPR.

• Revoking previous recommendations for performing cricoid pressure.
2015 Guidelines

• Goals
  – Reduce inventory of science with much more frequent “focused updates.”
  – Adopt an internationally recognized, transparent system for evaluating scientific evidence.
  – Encourage broad participation in the process.
    • Enhance quality of scientific reviews.
    • Speed development of revised guidelines.
ILCOR Taskforces for 2015

1. Advanced Life Support
2. Basic Life Support
3. Paediatric Life Support
4. Neonatal Life Support
5. Acute Coronary Syndromes
6. Education, Implementation & Teams
7. First Aid (new for 2015)
8. (Methodology Group)
2015 Guidelines: Methodology

ILCOR, Scientific Evidence Evaluation and Review System (SEERS)

1. Questions PICO
   - PICO stands for Patient/population, Intervention, Comparison and Outcome.
   - 2015 169 (Picos)
   - “In community dwelling adults, how effective is hands-only CPR, versus hands plus breathing CPR, at preventing mortality?”

2. Evaluation of the evidence: Grading of Recommendations Applicability, Development and Evaluation (GRADE)
2015 Guidelines: Methodology GRADE

Quality of evidence
- High
- Moderate
- Low
- Very low

Strength of recommendation
- “We recommend using…”
- “We suggest using…”
- “We recommend against using…”
- “We suggest against using…”

Guatt GH. BMJ 2008;336:924-6
Guidelines Implementation

• Guidelines must take into account:
  – Science
  – Education issues
  – Cost effectiveness
  – Cultural differences
2015 CPR Guidelines

• New Guidelines Questions
  – High-Quality CPR. A “sweet spot” for the rate of chest compressions of 100 – 120 may be established.
  – Supporting research has shown a slower compression rate may restrict the heart muscles from perfusion, while a faster compression rate puts providers at risk of performing less effective compressions, and/or making mistakes during the CPR process.
Cardiac Arrest Compression rate

- The AHA Guidelines for CPR

<table>
<thead>
<tr>
<th>Year</th>
<th>Compression to ventilation rate</th>
<th>Rate of compression</th>
<th>Initial breaths</th>
<th>Ventilation rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974</td>
<td>1 rescuers: 15:2 2 rescuers: 5:1</td>
<td>60/min</td>
<td>“4 staircase”</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Same as 1974</td>
<td>60/min</td>
<td>“4 staircase”</td>
<td>12</td>
</tr>
<tr>
<td>1986</td>
<td>Same as 1974</td>
<td>80-100/min</td>
<td>2 “full” breaths</td>
<td>12</td>
</tr>
<tr>
<td>1992</td>
<td>Same as 1974</td>
<td>80-100/min</td>
<td>2 “full” breaths</td>
<td>10-12</td>
</tr>
<tr>
<td>2000</td>
<td>1 &amp; 2 rescuers: 15:2</td>
<td>100/min</td>
<td>2 breaths</td>
<td>10-12</td>
</tr>
<tr>
<td>2005</td>
<td>1 &amp; 2 rescuers: 30:2</td>
<td>100/min</td>
<td>2 breaths</td>
<td>8-10 advanced airway</td>
</tr>
<tr>
<td>2010</td>
<td>1 &amp; 2 rescuers: 30:2</td>
<td>At least 100</td>
<td>C-A-B</td>
<td>8-10 breaths/min</td>
</tr>
</tbody>
</table>
Cardiac Arrest Compression rate

2010 Guidelines Chest compressions at least 100/min.

• About half of responders are giving chest compressions too fast, with about a third above 120 compressions per minute, and 20 percent above 140 per minute.

• Idris: Data from the Resuscitation Outcomes Consortium. Prehospital Resuscitation.
  – Pool of 13,469 patients. First 5 min CPR.

<table>
<thead>
<tr>
<th>Chest compressions</th>
<th>Survival to hospital discharge</th>
<th>ROSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;140</td>
<td>-4%</td>
<td>-5%</td>
</tr>
<tr>
<td>120-139</td>
<td>-2%</td>
<td>9%</td>
</tr>
<tr>
<td>100-119</td>
<td>Control</td>
<td>Control</td>
</tr>
<tr>
<td>80-99</td>
<td>-2%</td>
<td></td>
</tr>
<tr>
<td>&lt;80</td>
<td>-1%</td>
<td></td>
</tr>
</tbody>
</table>

Increase in rate decrease in deepness.

ROSC

JEMS. 2012 Sep; 37(9): 4–9.
Crit Care Med. 2015
Treatment Recommendation:

- We suggest a manual chest compression rate of 100 to 120 compressions per minute for adults in cardiac arrest in any setting (weak recommendation, very low quality of evidence).
Cardiac Arrest Hypothermia

2010 Guidelines “In summary, we recommend that comatose adult patients with ROSC after out-of-hospital VF cardiac arrest should be cooled to 32°C to 34°C for 12 to 24 hours.” (Class I, LOE B).

• When
• How
• How long
• At what level..
Cardiac Arrest Hypothermia

- Mild Therapeutic Hypothermia to Improve the Neurologic Outcome after Cardiac Arrest
- Cardiac Arrest Trial, two branches (Shockabel rhythms)
  - 32-34º (137)(24 h)
  - Normothermia (138)

<table>
<thead>
<tr>
<th>OUTCOME</th>
<th>NORMOTHERMIA</th>
<th>HYPOthermia</th>
<th>RISK RATIO (95% CI)*</th>
<th>P VALUE†</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAVORABLE NEUROLOGIC OUTCOME†</td>
<td>54/137 (39)</td>
<td>75/136 (55)</td>
<td>1.40 (1.08–1.81)</td>
<td>0.009</td>
</tr>
<tr>
<td>Death</td>
<td>76/138 (55)</td>
<td>56/137 (41)</td>
<td>0.74 (0.58–0.95)</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Cardiac Arrest Hypothermia

Niklas Nielsen

- Cardiac Arrest Trial two branches (GCS <8)
  - 33º (24 h)
  - 36º

<table>
<thead>
<tr>
<th>Outcome</th>
<th>33°C Group</th>
<th>36°C Group</th>
<th>Hazard Ratio or Risk Ratio (95% CI)(^{\dagger})</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary outcome: deaths at end of trial</strong></td>
<td>235/473 (50)</td>
<td>225/466 (48)</td>
<td>1.06 (0.89–1.28)</td>
<td>0.51</td>
</tr>
<tr>
<td><strong>Secondary outcomes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neurologic function at follow-up(^{\dagger})</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPC of 3–5</td>
<td>251/469 (54)</td>
<td>242/464 (52)</td>
<td>1.02 (0.88–1.16)</td>
<td>0.78</td>
</tr>
<tr>
<td>Modified Rankin scale score of 4–6</td>
<td>245/469 (52)</td>
<td>239/464 (52)</td>
<td>1.01 (0.89–1.14)</td>
<td>0.87</td>
</tr>
<tr>
<td>Deaths at 180 days</td>
<td>226/473 (48)</td>
<td>220/466 (47)</td>
<td>1.01 (0.87–1.15)</td>
<td>0.92</td>
</tr>
</tbody>
</table>

Francis Kim: “Effect of Prehospital Induction of Mild Hypothermia on Survival and Neurological Status Among Adults With Cardiac Arrest.”

- Cardiac Arrest Trial, Four branches, Out of Hospital cooling.
  1. Ventricular Fibrillation.
     1. Cold Fluids
     2. Standard
  2. Non Ventricular Fibrillation.
     1. Cold Fluids
     2. Standard

### Table 2. Status at Time of Discharge

<table>
<thead>
<tr>
<th></th>
<th>With Ventricular Fibrillation</th>
<th>Without Ventricular Fibrillation</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 583)</td>
<td>(n = 776)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No. (%) [95% CI]</td>
<td>No. (%) [95% CI]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intervention (n = 292)</td>
<td>Control (n = 291)</td>
<td></td>
</tr>
<tr>
<td>Dead</td>
<td>109 (37.3) [32.0-43.0]</td>
<td>104 (35.7) [30.5-41.4]</td>
<td>.69</td>
</tr>
<tr>
<td>Alive</td>
<td>183 (62.7) [57.0-68.0]</td>
<td>187 (64.3) [58.6-69.5]</td>
<td>.69</td>
</tr>
<tr>
<td></td>
<td>320 (80.8) [76.6-84.4]</td>
<td>318 (83.7) [79.6-87.1]</td>
<td>.30</td>
</tr>
<tr>
<td></td>
<td>76 (19.2) [15.6-23.4]</td>
<td>62 (16.3) [12.9-20.4]</td>
<td>.30</td>
</tr>
</tbody>
</table>
Hypothermia 2015 Guidelines

Treatment Recommendation:
• We recommend selecting and maintaining a constant, target temperature between 32°C and 36°C for those patients in whom temperature control is used (strong recommendation, moderate-quality evidence). Whether certain subpopulations of cardiac arrest patients may benefit from lower (32-34°C) or higher (36°C) temperatures remains unknown, and further research may help elucidate this.

https://emedcert.com/blog/expectations-for-the-2015-aha-guidelines
## Algorithms structure

### Simple (circular, linear)

<table>
<thead>
<tr>
<th>SIMPLE CIRCULAR</th>
<th>SIMPLE LINEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unresponsive Not breathing normally</td>
<td>Unresponsive Not breathing normally</td>
</tr>
<tr>
<td>Send or go for AED Call 112</td>
<td>Send or go for AED Call 112</td>
</tr>
<tr>
<td>CPR (30:2)</td>
<td>CPR 30:2</td>
</tr>
<tr>
<td>Follow instructions</td>
<td>Attach AED</td>
</tr>
<tr>
<td>Attach AED</td>
<td>Follow instructions</td>
</tr>
</tbody>
</table>

### Detailed (circular, linear)

<table>
<thead>
<tr>
<th>DETAILED CIRCULAR</th>
<th>DETAILED LINEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unresponsive</td>
<td>Unresponsive</td>
</tr>
<tr>
<td>Call help</td>
<td>Call help</td>
</tr>
<tr>
<td>Open airway Not breathing normally</td>
<td>Open airway Not breathing normally</td>
</tr>
<tr>
<td>Send or go for AED Call 112</td>
<td>Send or go for AED Call 112</td>
</tr>
<tr>
<td>CPR 30:2</td>
<td>CPR 30:2</td>
</tr>
<tr>
<td>AED assesses rhythm</td>
<td>AED assesses rhythm</td>
</tr>
<tr>
<td>Immediately resume CPR 30:2 for 2 min*</td>
<td>Immediately resume CPR 30:2 for 2 min*</td>
</tr>
<tr>
<td>Follow AED instructions</td>
<td>No shock advised</td>
</tr>
<tr>
<td>Shock if indicated</td>
<td>Shock advised</td>
</tr>
<tr>
<td>1 shock</td>
<td>1 shock</td>
</tr>
<tr>
<td>Immediately resume CPR 30:2 for 2 min*</td>
<td>Immediately resume CPR 30:2 for 2 min*</td>
</tr>
<tr>
<td>*Continue CPR until victims starts to wake up, to move, open eyes and breathe normally</td>
<td>*Continue CPR until victims starts to wake up, to move, open eyes and breathe normally</td>
</tr>
</tbody>
</table>

Algorithms structure

The algorithm is suitable for lay persons
Algorithms structure

The algorithm is suitable for healthcare professionals

- Simple circular
- Simple linear
- Detailed circular
- Detailed linear

Legend:
- Green: Strongly disagree
- Light blue: Disagree
- Yellow: Neutral
- Dark gray: Agree
- Dark blue: Strongly agree
CPR Outcomes

Have the latest CPR guidelines improved cardiac arrest outcomes

Denmark

Cardiac arrest survival in London

Cardiac Arrest Survival in Seattle & King County, 2002-2013

2015 Guidelines

To be Publish Oct 2015.... ¡¡¡¡¡
Circulation and Resuscitation on October 15, 2015.

Thanks for your attention