Impact of AHA Guidelines for CPR and ECC
- Accessible to all users on the world-wide web (2005 Guidelines accessed more than 2.4 million times)
- Provides science-based recommendations for resuscitation
  - Adopted by other resuscitation councils and/or health ministries
  - Incorporated into protocols and practice
- Basis for AHA training materials.

Guidelines Development Process
2010 AHA Guidelines for CPR and ECC

Achieving Consensus on Resuscitation Science
The American Heart Association and other member councils of International Liaison Committee on Resuscitation (ILCOR) complete review of resuscitation science every 5 years.

ILCOR: Mission Statement
- Review the international science and knowledge relevant to CPR and ECC
- Publish consensus statements on resuscitation science
- When possible, also publish treatment recommendations applicable to all member organizations around the world.
- Encourage coordination of guideline development and publication by its member organizations around the world.

Disclosures
- No Conflicts
- Note that some treatments (eg, therapeutic hypothermia, amiodarone for pediatric cardiac arrest) in AHA Guidelines are not yet approved by FDA
Process from Question to Guidelines

1. ILCOR Task Forces formulate questions
2. Worksheet authors perform structured evidence evaluation (with help from experts), present to Task Force
3. Task Forces debate, discuss, reach consensus, draft manuscripts
4. International Editorial Board, Councils review consensus, provide input to writing groups
5. Circulation obtains peer reviews
6. Consensus on Science published
7. Councils develop Guidelines

Council Guidelines

- Must consider:
  - Local factors and resources available
  - Educational challenges
  - Cost

2010 Consensus Timeline

2010 Guidelines Timeline

Strength of Evidence and Recommendation

- ILCOR used numerical Level of Evidence (LOE) to rate individual studies in Consensus on Science (i.e., LOE 5)
- AHA uses Class of Recommendation and alphabetical LOE for each guideline recommendation (i.e., Class IIb, LOE B)
- Provides internal consistency with other AHA evidence-based guidelines
Evidence Evaluation Process
- 411 scientific evidence reviews on 277 topics
- 313 participants at 2010 Consensus Conference (46% from outside US)
- COI questionnaires completed by all participants (802 collected and reviewed)
- Writing group members voted on each recommendation

Management of Potential Conflicts
- COI information posted with worksheets on website
- Industry employees excluded
- No industry support accepted for C2005 or C2010
- COI for each speaker projected during meetings
- COI printed in C2010 program and final Guidelines publication
- COI questionnaires completed by all participants

The Publications
2010 International Consensus on CPR and ECC Science with Treatment Recommendations
2010 AHA Guidelines for CPR and ECC

The ILCOR 2010 International Consensus on CPR and ECC Science With Treatment Recommendations
Simultaneously published in Circulation and Resuscitation
Documented review of tens of thousands of peer-reviewed resuscitation studies.

The ILCOR 2010 International Consensus on CPR and ECC Science With Treatment Recommendations
- Part 1: Executive Summary
- Part 2: International Collaboration in Resuscitation Science
- Part 3: Evidence Evaluation Process
- Part 4: Conflict of Interest Management Before, During and After the 2010 International Consensus Conference
- Part 5: Adult Basic Life Support
- Part 6: Defibrillation
- Part 7: CPR Techniques and Devices
- Part 8: Advanced Life Support
- Part 9: Acute Coronary Syndromes
- Part 10: Pediatric Basic and Advanced Life Support
- Part 11: Neonatal Resuscitation
- Part 12: Education, Implementation, and Teams (EIT)
- Part 13: First Aid

The 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care
- 17 chapters published in Circulation
- Foundation for ECC training materials

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2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science

Part 1: Executive Summary
Part 2: Evidence Evaluation and Management of Potential or Perceived Conflicts of Interest
Part 3: Ethics
Part 4: CPR Overview
Part 5: Adult Basic Life Support
Part 6: Electrical Therapies
Part 7: CPR Techniques and Devices
Part 8: Adult Advanced Life Support
Part 9: Post-Cardiac Arrest Care
Part 10: Acute Coronary Syndromes
Part 11: Adult Stroke
Part 12: Cardiac Arrest in Special Situations
Part 13: Pediatric Basic Life Support
Part 14: Pediatric Advanced Life Support
Part 15: Neonatal Resuscitation
Part 16: Education, Implementation, and Teams (EIT)
Part 17: First Aid

New AHA Adult Chain of Survival
- New 5th link – post-cardiac arrest care
- Links in the new adult Chain of Survival:
  - Immediate recognition and activation of emergency response system
  - Early CPR, w/emphasis on chest compressions
  - Rapid defibrillation
  - Effective advanced life support
  - Integrated post-cardiac arrest care

CPR Sequence
- Change:
  - From A-B-C to C-A-B
  - Initiate chest compressions before ventilations
- Why?
  - Goal: To reduce delay to CPR, sequence begins with skill that everyone can perform
  - Emphasize primary importance of chest compressions for professional rescuers

CPR Starts with Compressions
- Many adults with witnessed arrest have ventricular fibrillation (VF)/pulseless ventricular tachycardia (VT), and require:
  - chest compressions
  - early defibrillation
- Chest compressions can be started immediately (no equipment needed)
- Opening airway, providing ventilation may significantly delay other actions
- Ventilation delayed by 18 seconds or less
Primary Emphasis on Chest Compressions
- All rescuers should, at a minimum, provide chest compressions.
- If bystander not trained (adult arrest): Hands-Only CPR
- If bystander trained and able: perform compressions and ventilations at rate of 30:2
- Healthcare provider: perform compressions and ventilations at rate of 30:2
Note: For all pediatric arrest, compressions and ventilations still recommended

Emphasis on Chest Compressions
- Why?
  - Hands-Only CPR is easy to perform for adult victims and can be readily guided by EMS dispatchers over phone.
  - When all adult cardiac arrests reported, survival rates similar whether bystander provides Hands-Only CPR or traditional CPR

Universal Algorithm for Adult CPR
- Traditional algorithm updated
- Alternative graphic provided
- All graphics emphasize importance of uninterrupted periods of CPR

Adult Chest Compression Depth
- Change:
  - Compress at least 2 inches
  - 2005 recommendation was 1½ to 2 inches.
- Why?
  - Compressions of at least 2 inches are more effective than those of 1½ inches.
  - Rescuers often do not "push hard" enough.
  - Confusion may result when range of depth is recommended.

Chest Compressions Critical
- Without effective chest compressions
  - Oxygen flow to brain stops
  - Oxygen flow to heart stops
  - Drugs go nowhere.

Chest Compression Rate
- Change:
  - Compression rate at least 100 per minute.
  - 2005 recommendation: Compression rate about 100/min
- Why?
  - Absolute number of compressions delivered/minute has been linked with survival
  - Actual compression rate is often well below 100/min.
Elimination of “Look, Listen, and Feel” for Breathing

- Change:
  This action removed from the CPR sequence
  After delivery of 30 compressions, lone rescuer opens
  airway and delivers 2 breaths.
- Why:
  Rescuer checks for response and “no breathing or no
  normal breathing” in adult before beginning CPR
  Starting CPR with compressions minimizes delay to
  action

---

Healthcare Provider

ADULT BLS Sequence

- Recognize unresponsive adult with no breathing or
  no normal breathing (ie, only agonal gasps)
- Activate emergency response, retrieve AED (or send
  someone to do this)
- Check for pulse (no more than 10 seconds)
- If no pulse, begin sets of 30 chest compressions and
  2 breaths
- Use AED as soon as available

---

Cricoid Pressure

- Change:
  Routine use of cricoid pressure during CPR is generally NOT
  recommended.
- Why:
  Cricoid pressure can interfere
  with ventilation and advanced
  airway placement.
  Not proven to prevent
  aspiration or gastric insufflation
  during cardiac arrest.

---

Table 1

Summary of Key CPR Components for Adults, Children, and Infants

<table>
<thead>
<tr>
<th>Component</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognition</td>
<td>No breathing or no normal breathing; airway open</td>
</tr>
<tr>
<td>Airway</td>
<td></td>
</tr>
<tr>
<td>Breathing</td>
<td>Unresponsive per ABCs</td>
</tr>
<tr>
<td>CPR sequence</td>
<td>30 chest compressions, 2 rescue breaths</td>
</tr>
<tr>
<td>Compression depth</td>
<td>At least 2 inches (5 cm)</td>
</tr>
<tr>
<td>150-160/min</td>
<td></td>
</tr>
<tr>
<td>Airway</td>
<td></td>
</tr>
<tr>
<td>Breathing</td>
<td></td>
</tr>
<tr>
<td>CPR sequence</td>
<td>30 chest compressions, 2 rescue breaths</td>
</tr>
</tbody>
</table>

---

Team Resuscitation

- Change:
  Increased focus on using a team approach during
  resuscitations
- Why:
  Many CPR interventions performed simultaneously
  Collaborative work minimizes interruption in
  compressions
  Clear communication minimizes errors
Resuscitation Systems Must Institute CQI Processes
- Outcomes vary widely
- Each system must evaluate and improve outcomes

Devices for CPR
- The impedance threshold device (ITD) may be considered by trained personnel as a CPR adjunct in adult cardiac arrest (Class IIb, LOE B).
- Insufficient evidence to support or refute the routine use of mechanical piston devices (e.g. LUCAS) in the treatment of cardiac arrest.
- Insufficient evidence to support the routine use of load distributing band device (e.g. AutoPulse) in treatment of cardiac arrest.

Precordial Thump
- The precordial thump should not be used for unwitnessed out-of-hospital cardiac arrest.
- The precordial thump may be considered for patients with witnessed, monitored, unstable VT (including pulseless VT) if a defibrillator is not immediately ready for use, but it should not delay CPR and shock delivery.

Electrical Therapies
- Practice needed to minimize interruption in chest compressions to deliver shock.
- In-hospital use of AEDs may facilitate early defibrillation (goal: ≤ 3 minutes, monitor results).
- AEDs can now be used in infants if a manual defibrillator is not available.
- Defibrillation doses unchanged, adult cardioversion doses provided

Advanced Cardiovascular Life Support (ACLS)
- Foundation of successful ACLS is good BLS.
- Traditional cardiac arrest algorithm simplified and alternative conceptual design (both emphasize importance of high-quality CPR).
- Increased emphasis on continuous waveform capnography to verify endotracheal tube placement, optimize CPR quality and detect ROSC.
ACLS: Waveform Capnography

- **Change:**
  Quantitative waveform capnography is most reliable method to confirm and monitor correct ET tube placement (Class I, LOE A).

- **Why:**
  Unacceptably high incidence of unrecognized ET tube misplacement or displacement. Capnography has high sensitivity and specificity to identify correct endotracheal tube placement in cardiac arrest.

ACLS: Medications for Pulseless Arrest

- Atropine: deleted from pulseless arrest algorithm
- Epinephrine: dose, interval unchanged
- Vasopressin: dose, use unchanged
- Amiodarone: dose, indications unchanged
- Lidocaine: dose, indications unchanged
- Sodium Bicarbonate: Routine use not recommended (Class III, LOE B).
- Calcium: Routine administration for treatment of cardiac arrest not recommended (Class III, LOE B).

ACLS: Physiologic Monitoring During CPR

Post-Cardiac Arrest Care

- **Change:**
  New 5th link in the chain of survival

- **Why:**
  Emphasize importance of comprehensive multidisciplinary care through hospital discharge and beyond

- **Includes:**
  - Optimizing vital organ perfusion
  - Titration of FiO₂ to maintain O₂ sat ≥ 94%
  - Transport to comprehensive post-arrest system of care
  - Emergent coronary reperfusion for STEMI or high suspicion of AMI
  - Temperature control
  - Anticipation, treatment, and prevention of multiple organ dysfunction
Acute Coronary Syndromes (ACS)
- Support for STEMI systems of care
- Continue to implement prehospital 12-lead ECG program
- Triage to hospitals capable of performing PCI
- Supplementary oxygen is not needed for patients without evidence of respiratory distress if the oxyhemoglobin saturation is ≥ 94%.
- Use morphine with caution

Stroke
- Goal: minimize acute brain injury and maximize patient recovery
- Treatment is time sensitive; guidelines again emphasize the "D's of Stroke Care" (important steps and times of potential delays)
- Stroke systems of care significantly improve stroke outcome

Pediatric Resuscitation
- Revised pediatric chain of survival
- New post-arrest care link

Pediatric Basic Life Support
Similarities in pediatric BLS and adult BLS
- C-A-B rather than A-B-C sequence
- Continued emphasis on high-quality CPR
- Removal of "look, listen and feel"
- De-emphasis of pulse check for HCPs
- Use AEDs as soon as available
- AEDs may be used in infants, although manual defibrillation preferred

Pediatric Basic Life Support
Some differences between pediatric BLS and adult BLS
- Chest compression depth – at least 1/3 of the anterior-posterior diameter of chest
  - Infants: about 1½ inches
  - Children: about 2 inches
- Lone rescuer provides 2 minutes of CPR before activating emergency response
- Two rescuers use 15:2 compression to ventilation ratio
- Traditional CPR (compressions and ventilations) by bystanders associated with higher survival than chest compressions alone

Pediatric Advanced Life Support (PALS)
- Optimal energy dose for defibrillation of children unknown.
  - Initial dose 2-4 J/kg
  - Subsequent dose ≥ 4 J/kg
- Post-ROSC: titrate oxygen to limit hyperoxemia.
- Therapeutic hypothermia (to 32°C to 34°C) may be beneficial (studies in progress)
- Young victims of sudden, unexpected cardiac arrest should have a complete autopsy with genetic analysis of tissue to look for inherited channelopathy.
Neonatal Resuscitation

- For babies born at term, begin resuscitation with room air rather than 100% oxygen.
- Any oxygen administered should be blended with room air, titrated based on oxygen saturation measured from right upper extremity.
- Suctioning after birth reserved for infants with obvious airway obstruction, those requiring ventilation or non-vigorous babies with meconium.
- Therapeutic hypothermia recommended for babies near term with evolving moderate to severe hypoxic-ischemic encephalopathy.

Ethics

- Prehospital BLS and ALS termination of resuscitation rules provided, require contacting online medical control.
- Indicators of poor outcome after cardiac arrest used in the past may not be valid when therapeutic hypothermia used.
- Assessment of clinical neurologic signs, electrophysiologic studies, biomarkers and imaging recommended where available 3 days after cardiac arrest.

Education, Implementation, and Teams (EIT)

- New section focusing on methods to improve bystander willingness to act, education techniques, teamwork and leadership.
- Key Issues:
  - Current 2-year certification period for BLS, ACLS and PALS should include periodic refresher courses.
  - Hands-Only CPR should be taught for those unable or unwilling to perform conventional CPR.
  - Practice-while-watching is effective for BLS.
  - Allowing use of AED by untrained lay rescuers. Training should not be required for lay rescuers but it does improve performance.
  - Debriefing is effective.

First Aid

- First Aid Guidelines again co-sponsored with ARC.
- Unchanged: Oxygen administration (not recommended), aspirin for chest discomfort (recommended).
- Change in Epinephrine for anaphylaxis (allergic reaction):
  - If symptoms persist despite epinephrine administration, first aid providers should seek medical assistance before administering second dose.
- Pressure dressing now recommended for all types of venomous snakebites.
- Tourniquets still not recommended for first aid use (they are effective in battlefield).
- Recommendations added for jellyfish stings.

First Aid

- Hemostatic agents (new):
  - Routine use of hemostatic agents to control bleeding as a first aid measure not recommended at this time.
- Pressure points and elevation ineffective.
- Snakebites:
  - Applying a pressure immobilization bandage with pressure between 40-70 mm Hg in upper extremity and between 55 and 70 mm Hg in lower extremity around entire length of bitten extremity is an effective way to slow lymph flow and dissemination of venom.
- Jellyfish stings (new):
  - To inactivate venom load and prevent further envenomation, liberally wash stings with vinegar as soon as possible and for at least 10 seconds.
  - Pain from stings should be treated with hot water immersion when possible.

Systems of Care

- Change:
  - Communities and hospital-based resuscitation programs should monitor quality of care and outcomes.
- Why:
  - Provides information necessary to optimize care.
  - Narrow gaps between ideal and actual resuscitation performance.
Summary of 2010 Guidelines

- Many resuscitation systems and communities have documented improved survival from cardiac arrest.
- Too few victims of cardiac arrest receive bystander CPR.
- CPR quality must be high.
- Victims require excellent post–cardiac arrest care by organized, integrated teams.
- Education and frequent refresher training key to improving resuscitation performance.
- We must rededicate ourselves to improving the frequency of bystander CPR, the quality of all CPR and the quality of post–cardiac arrest care.

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The Products

2010 AHA Guidelines for CPR and ECC

2010 AHA Guidelines Reprint

- Can be purchased through www.heart.org/cpr

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Guidelines Highlights

- Summarizes key changes in the 2010 AHA Guidelines for CPR and ECC
- Available electronically in English and 12 other languages at: heart.org/cpr

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2010 Handbook of Emergency Cardiovascular Care for Healthcare Providers

- Valuable quick reference tool that incorporates the latest science and includes updated algorithms as well as information on therapeutic agents, stroke, and acute coronary syndromes.
- Available at AHA Sessions and heart.org/cpr

Educational and Training Materials

- Materials are being updated to reflect the new science.
- Currently in pilot testing with release planned in 2011:
  - CPR Anytime
  - Heartsaver First Aid, CPR & AED
  - Basic Life Support for Healthcare Professionals
  - Advanced Cardiovascular Life Support
  - Pediatric Advanced Life Support

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Questions

To view a copy of this presentation please go to www.heart.org/cprscience. To learn more about upcoming products and information related to CPR and ECC visit www.heart.org/cpr

What’s in the future

- It's not the fall that kills you, its.....
- Sex
- Bring out your dead!
- That sucks!
- Push and Pull
- And the cold.