Copublishing of the Pediatric and Neonatal Portions of the 2015 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations and the 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care

For 20 years, the American Heart Association (AHA) and American Academy of Pediatrics (AAP) have partnered in the evaluation of pediatric resuscitation science through the International Liaison Committee on Resuscitation (ILCOR), development of Emergency Cardiovascular Care (ECC) Guidelines, and implementation of educational programs. The new 2015 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations are copublished in Resuscitation (http://circ.ahajournals.org/lookup/doi/10.1161/CIR.0000000000000270) and Circulation (http://circ.ahajournals.org/lookup/doi/10.1161/CIR.0000000000000252). Additionally, the 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care are now available (http://circ.ahajournals.org/lookup/doi/10.1161/CIR.0000000000000252). In an effort to make the science and guidelines easily accessible to the pediatric community, the Pediatrics editorial board has co-published the pediatric and neonatal portions of these statements since 2000.

Readers of the following excerpts are encouraged to reference the full 2015 supplements. The full supplements include several other relevant topic areas including ethics, education and training, and first-aid.

TOWARD INTERNATIONAL CONSENSUS ON SCIENCE

The International Liaison Committee on Resuscitation (ILCOR) was formed in 1992 and currently includes representatives from the American Heart Association (AHA), the European Resuscitation Council, the Heart and Stroke Foundation of Canada, the Australian and New Zealand Committee on Resuscitation, Resuscitation Council of Southern Africa, the InterAmerican Heart Foundation, and the Resuscitation Council of Asia. The ILCOR mission is to identify and review international science and information relevant to cardiopulmonary resuscitation (CPR) and emergency cardiovascular care (ECC) and to offer consensus on treatment recommendations. Since 2000, researchers from the ILCOR member councils have evaluated and reported their International Consensus on CPR and ECC Science With Treatment Recommendations (CoSTR) in 5-year cycles.
EVIDENCE EVALUATION PROCESS

The 2015 evidence evaluation process began in 2012 when ILCOR representatives formed 7 task forces: Basic Life Support (BLS), Advanced Life Support (ALS), Acute Coronary Syndromes (ACS), Pediatric BLS and ALS, Neonatal Resuscitation, Education, Implementation and Training (EIT), and for the first time, First Aid. The 2015 CoSTR publication is not a comprehensive review of every aspect of resuscitation medicine; not all topics covered in 2010 were re-reviewed in 2015. All questions reviewed in 2010 in both International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care With Treatment Recommendations and the 2010 council-specific guidelines for CPR and ECC (including those published by the AHA) were reassessed by the Pediatric and Neonatal ILCOR Task Forces. The Pediatric and Neonatal ILCOR Task Forces formulated 21 and 26 (respectively) priority questions to address for the 2015 systematic reviews. Each task force performed detailed systematic reviews based on the recommendations of the Institute of Medicine of the National Academies and using the methodological approach proposed by the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) Working Group. Each task force identified and prioritized the questions to be addressed (using the PICO [population, intervention, comparator, outcome] format) and identified the outcomes to be reported. Then, with the assistance of information scientists, a detailed search for relevant articles was performed in each of 3 online databases (MEDLINE, Embase, and the Cochrane Library).

By using detailed inclusion and exclusion criteria, articles were screened for further evaluation. The reviewers for each question created a reconciled risk of bias assessment for each of the included studies, using state-of-the-art tools: Cochrane and GRADE for randomized controlled trials (RCTs), Quality Assessment of Diagnostic Accuracy Studies (QUADAS)-2 for studies of diagnostic accuracy, and GRADE for observational and interventional studies that inform both therapy and prognosis questions.

Using the online GRADE Guideline Development Tool, the evidence reviewers created evidence profile tables to facilitate evaluation of the evidence in support of each of the critical and important outcomes. The quality of the evidence (or confidence in the estimate of the effect) was categorized as high, moderate, low, or very low, based on the study methodologies and the 5 core GRADE domains of risk of bias, inconsistency, indirectness, imprecision, and other considerations (including publication bias).

These evidence profile tables were then used to create a written summary of evidence for each outcome (the Consensus on Science statements). These statements were drafted by the evidence reviewers and then discussed and debated by the task forces until consensus was reached. Whenever possible, consensus-based treatment recommendations were created. These recommendations (designated as strong or weak, and either for or against a therapy, prognostic tool or diagnostic test) were accompanied by an overall assessment of the evidence, and a statement from the task force about the values and preferences that underlie the recommendations.

Each systematic review’s CoSTR statement used wording consistent with the wording recommended by GRADE and used throughout the CoSTR publication. Weak recommendations use the word suggest, as in “We suggest…” Strong recommendations are indicated by the use of the word recommend, as in, “We recommend…”

Public comment was sought at 2 stages in the process. Initial feedback was sought about the specific wording of the PICO questions and the initial search strategies, and subsequent feedback was sought after creation of the initial draft consensus on science statements and treatment recommendations.

For a more thorough discussion of this process, the reader is referred to Part 2: Evidence Evaluation and Management of Potential Conflicts of Interest (http://circ.ahajournals.org/lookup/doi/10.1161/CIR.0000000000000271).

MANAGEMENT OF POTENTIAL CONFLICTS OF INTEREST

A rigorous conflict of interest (COI) management policy was followed at all times. Anyone involved in any part of the 2015 process disclosed all commercial relationships and other potential (including intellectual) conflicts; in total, the AHA processed more than 1000 COI declarations. These disclosures were considered during the assignment of task force co-chairs and members, writing group co-chairs, and other leadership roles. In keeping with the AHA COI policy, a majority of the members of each task force writing group had to be free of relevant conflicts. Commercial and potential intellectual relationships were also screened for conflicts in assigning evidence reviewers for each systematic review.

From Consensus on Science to Guidelines

ILCOR publishes international consensus statements that summarize the science of resuscitation and first aid and, wherever possible, treatment recommendations. ILCOR member organizations subsequently publish resuscitation guidelines that are consistent with the science in the consensus publication, but may be modified because of geographic, economic and system differences, the availability of medical devices and drugs, and the ease or difficulty of training. All ILCOR member organizations are committed to minimizing international differences in...
resuscitation practice and to optimizing
the effectiveness of resuscitation prac-
tice, instructional methods, teaching aids,
and training networks.

The recommendations of the ILCOR 2015
Consensus Conference confirm the safety
and effectiveness of various current ap-
proaches, acknowledge other approaches
as ineffective, and introduce new treat-
ments resulting from evidence-based
evaluation. Recommendations reviewed
and published in 2010 but not in 2015
remain the official positions of both
ILCOR and the AHA.

2015 AMERICAN HEART
ASSOCIATION GUIDELINES UPDATE
FOR CARDIOPULMONARY
RESUSCITATION AND EMERGENCY
CARDIOVASCULAR CARE

Publication of the 2015 American Heart
Association (AHA) Guidelines Update for
Cardiopulmonary Resuscitation (CPR)
and Emergency Cardiovascular Care
(ECC) marks 49 years since the first CPR
guidelines were published in 1966 by an
Ad Hoc Committee on Cardiopulmonary
Resuscitation established by the National
Academy of Sciences of the National Re-
search Council. Since that time, periodic
revisions to the Guidelines have been pub-
2015. The 2015 AHA Guidelines Update for
CPR and ECC focuses on topics with sig-
nificant new science or ongoing contro-
versy, and so serves as an Update to the
2010 AHA Guidelines for CPR and ECC rather
than a complete revision of the Guidelines.
The 2015 Guidelines Update marks the
beginning of a new era for the AHA
Guidelines for CPR and ECC, because the
Guidelines will transition from a 5-year

table 1. Applying class of recommendations and level of evidence to clinical strategies, interventions, treatments, or diagnostic testing in patient care

<table>
<thead>
<tr>
<th>CLASS (STRENGTH) OF RECOMMENDATION</th>
<th>LEVEL (QUALITY) OF EVIDENCE‡</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CLASS I (STRONG)</strong></td>
<td>Benefit &gt;&gt;&gt; Risk</td>
</tr>
<tr>
<td>Suggested phrases for writing recommendations:</td>
<td></td>
</tr>
<tr>
<td>▪ Is recommended</td>
<td></td>
</tr>
<tr>
<td>▪ Is indicated/useful/effective/beneficial</td>
<td></td>
</tr>
<tr>
<td>▪ Should be performed/administered/other</td>
<td></td>
</tr>
<tr>
<td>▪ Comparative-Effectiveness Phrases‡</td>
<td></td>
</tr>
<tr>
<td>† Treatment/strategy A is recommended/indicated in preference to treatment B</td>
<td></td>
</tr>
<tr>
<td>‡ Treatment A should be chosen over treatment B</td>
<td></td>
</tr>
<tr>
<td><strong>CLASS IIa (MODERATE)</strong></td>
<td>Benefit &gt;&gt; Risk</td>
</tr>
<tr>
<td>Suggested phrases for writing recommendations:</td>
<td></td>
</tr>
<tr>
<td>▪ Is reasonable</td>
<td></td>
</tr>
<tr>
<td>▪ Can be useful/effective/beneficial</td>
<td></td>
</tr>
<tr>
<td>▪ Comparative-Effectiveness Phrases‡</td>
<td></td>
</tr>
<tr>
<td>† Treatment/strategy A is probably recommended/indicated in preference to treatment B</td>
<td></td>
</tr>
<tr>
<td>‡ It is reasonable to choose treatment A over treatment B</td>
<td></td>
</tr>
<tr>
<td><strong>CLASS IIb (WEAK)</strong></td>
<td>Benefit &gt; Risk</td>
</tr>
<tr>
<td>Suggested phrases for writing recommendations:</td>
<td></td>
</tr>
<tr>
<td>▪ May/might be reasonable</td>
<td></td>
</tr>
<tr>
<td>▪ May/might be considered</td>
<td></td>
</tr>
<tr>
<td>▪ Usefulness/effectiveness is unknown/unclear/uncertain or not well established</td>
<td></td>
</tr>
<tr>
<td><strong>CLASS III: No Benefit (MODERATE)</strong></td>
<td>Benefit = Risk (Generally, LOE A or B are only)</td>
</tr>
<tr>
<td>Suggested phrases for writing recommendations:</td>
<td></td>
</tr>
<tr>
<td>▪ Is not recommended</td>
<td></td>
</tr>
<tr>
<td>▪ Is not indicated/useful/effective/beneficial</td>
<td></td>
</tr>
<tr>
<td>▪ Should not be performed/administered/other</td>
<td></td>
</tr>
<tr>
<td><strong>CLASS III: Hara (STRONG)</strong></td>
<td>Risk &gt; Benefit</td>
</tr>
<tr>
<td>Suggested phrases for writing recommendations:</td>
<td></td>
</tr>
<tr>
<td>▪ Potentially harmful</td>
<td></td>
</tr>
<tr>
<td>▪ Causes harm</td>
<td></td>
</tr>
<tr>
<td>▪ Associated with excess morbidity/mortality</td>
<td></td>
</tr>
<tr>
<td>▪ Should not be performed/administered/other</td>
<td></td>
</tr>
</tbody>
</table>

COR and LOE are determined independently (any COR may be paired with any LOE).
A recommendation with LOE C does not imply that the recommendation is weak. Many
important clinical questions addressed in guidelines do not lend themselves to clinical
trials. Although RCTs are unavailable, there may be a very clear clinical consensus that
a particular test or therapy is useful or effective.

* The outcome or result of the intervention should be specified (an improved clinical
outcome or increased diagnostic accuracy or incremental prognostic information).
‡ For comparative-effectiveness recommendations (COR I and IIa; LOE A and B only),
studies that support the use of comparator verbs should involve direct comparisons
of the treatments or strategies being evaluated.

© The method of assessing quality is evolving, including the application of standardized,
widely used, and preferably validated evidence grading tools; and for systematic reviews,
the incorporation of an Evidence Review Committee.

COR indicates Class of Recommendation; LOE, expert opinion; ED, limited data; LOE, Level of Evidence; NR, nonrandomized; R, randomized; and RCT, randomized controlled trial.
cycle of periodic revisions and updates to a Web-based format that is continuously updated. Moving forward, these Guidelines will be updated by using a continuous evidence evaluation process to facilitate more rapid translation of new scientific discoveries into daily patient care.

EVIDENCE REVIEW AND GUIDELINES DEVELOPMENT PROCESS

The AHA continues to partner with the International Liaison Committee on Resuscitation (ILCOR) in the evidence review process. The recommendations of the ILCOR 2015 CoSTR were used to inform the recommendations in the 2015 AHA Guidelines Update for CPR and ECC. The wording of these recommendations is based on the AHA classification system for evidentiary review.

The 2015 AHA Guidelines Update for CPR and ECC contains 7 pediatric, 29 PALS and 48 neonatal classified recommendations. There are 16 Class I recommendations (19%), 14 Class IIa recommendations (17%), 52 Class IIb recommendations (62%) and 2 Class III recommendation (2%). Overall, 1 are based on Level of Evidence (LOE) A, 3 are based on LOE B, 24 are based on LOE B-R, 7 LOE B-NR, 9 LOE C, 37 are based on LOE C-LD, and 13 are based on LOE C-EO. These results highlight the persistent knowledge gap in resuscitation science that needs to be addressed through expanded research initiatives and funding opportunities.

SUMMARY

This 2015 AHA Guidelines Update marks the transition from periodic review and publication of new science-based recommendation to a more continuous process of evidence evaluation and guideline optimization designed to more rapidly translate new science into resuscitation practice that will save more lives. Survival from both IHCA and OHCA has increased over the past decade, but there is still tremendous potential for improvement. It is clear that successful resuscitation depends on coordinated systems of care that start with prompt rescuer actions, require delivery of high-quality CPR, and continue through optimized ACLS and post-cardiac arrest care. Systems that monitor and report quality-of-care metrics and patient-centered outcomes will have the greatest opportunity through quality improvement to save the most lives.

REFERENCES


CONTRIBUTORS 2015 ILCOR NEONATAL EVIDENCE REVIEWERS

Khalid Aziz; David W. Boyle; Steve Byrne; Chris Colby; Peter Davis, Maria Fernanda de Almeida; Hege L. Ersdal; Marilyn B. Escobedo; Qi Feng; Ruth Guinsburg; Louis P. Halamek; Tetsuya Isayama; Vishal S. Kapadia; John Kattwinkel; Han-Suk Kim; Henry C. Lee; Helen G. Liley; Jane E. McGowan; Douglas D. McMillan; Lindsay Mildenhall; Susan Niermeyer; Colm P.F. O’Donnell; Jeffrey M. Perlman; Yacov Rabi; Steven A. Ringer; Nalini Singhal; Ben J. Stenson; Maryla Y. Strand; Takahiro Sugiuira; Edgardo