**Part 2: International Collaboration in Resuscitation Science**

**2010 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations**

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With the founding of the International Liaison Committee on Resuscitation (ILCOR) in 1992, an international collaboration of clinicians and researchers was convened to identify, evaluate, and interpret the most valid resuscitation science. This supplement to *Circulation* (simultaneously published in *Resuscitation*) presents the results of ILCOR’s most recent and extensive efforts to reach consensus on interpretation of resuscitation science and treatment recommendations. ILCOR continues to strive to reach a common goal of universal resuscitation guidelines. Building on the 2005 International Consensus on CPR and ECC Science With Treatment Recommendations,1,2 the 2010 International Consensus Conference held in Dallas, Texas, in February 2010 involved 313 experts from 30 countries. During the 2 years leading up to this conference, over 350 worksheet authors reviewed several thousand relevant, peer-reviewed publications to address more than 400 specific resuscitation questions, each in standard PICO (Population, Intervention, Comparison, Outcome) format. The experts reviewed, summarized, and categorized several thousand relevant, peer-reviewed publications into level of evidence grids, proposed consensus on science statements, and where possible, provided evidence-based treatment recommendations.3 Key knowledge gaps were also identified and documented, with the purpose of stimulating further research in those areas. Ultimately scientific consensus was achieved by continuous discussion and debate in multiple face-to-face meetings and webinars, and finally through focused discussions of the evidence evaluation worksheets during the 3 days of the International Consensus Conference. Particular attention was paid to recognizing applicable advances in resuscitation science, while managing potential conflicts of interest among participants and identifying topics that lacked good evidence to support or change current practice.

The year 2010 marks the 50th Anniversary of cardiopulmonary resuscitation (CPR). The original reports of rescue breathing,4 closed-chest compressions,5 and the effective combination of the two likely created an immediate demand for CPR training and resuscitation guidelines. In 1966, the Institute of Medicine (in the United States) convened the first conference to specifically review available evidence and to recommend standards for CPR and emergency cardiovascular care (ECC) techniques.6 The American Heart Association (AHA) sponsored subsequent conferences in 1973 and 1979.8,9 Parallel efforts occurred internationally as other resuscitation organizations faced a growing demand for CPR training.10 Inevitably variations in resuscitation techniques and training methods began to emerge from countries and regions of the world.

Increasing awareness of these variations in resuscitation practices sparked interest in gathering international experts at a single location with the aim of achieving consensus in resuscitation techniques. The AHA convened such a meeting in 1985, inviting resuscitation leaders from many countries to observe the process by which the AHA reviewed evidence to create guidelines for CPR and ECC.11 Observation by these international guests, many of whom were passionately devoted to improving resuscitation outcomes in their own countries, soon led to the realization that much could be learned from international collaboration.

By 1992, when the AHA convened their next Guidelines Conference, more than 40% of the participants were from outside the United States.12 During this 1992 conference, a panel on international cooperation on CPR and ECC endorsed the need to foster a multinational base of evidence for resuscitation practices. What was lacking was a focused and structured mechanism with which to capture and assess this growing body of published evidence. That panel strongly recommended that an expanded group of international experts initiate a systematic review of the world’s resuscitation...
literature. At a milestone meeting following the European Resuscitation Council’s (ERC) first International CPR Conference in Brighton, England, on November 22, 1992, ILCOR was formed. The inaugural cochairs were Douglas Chamberlain and Richard Cummins, and the founding member organizations were the AHA, the ERC, the Heart and Stroke Foundation of Canada, the Resuscitation Council of Southern Africa (RCSA), and the Australian Resuscitation Council (ARC). These organizations were later joined by the Consejo Latino-Americano de Resuscitación (which now forms part of the InterAmerican Heart Foundation), the New Zealand Resuscitation Council (which now forms part of the Australia and New Zealand Committee on Resuscitation [ANZCOR]), and the Resuscitation Council of Asia (RCA). With the shared vision of international cooperation, ILCOR began to systematically assess the supportive evidence for resuscitation standards and guidelines. During this process, ILCOR experts identified numerous national and regional differences in the practices of basic life support, advanced life support, pediatric life support, newborn resuscitation, acute coronary syndromes as well as in education and implementation. To date, ILCOR has published 22 scientific advisory statements with the goal of endorsing evidence-based resuscitation science that can be adopted by regional councils to formulate resuscitation guidelines. While some regional differences in guidelines are inevitable because of varying implementation issues or resources, the overarching goal of ILCOR is to provide a unified consensus on the science of resuscitation and the science of resuscitation education/implementation. Compared with the 2005 International Consensus, the 2010 International Consensus Conference paid considerably more attention to the science of education/implementation.

Between 1992 and 2010, ILCOR convened 30 official international meetings, rotating its meeting sites among its member organizations. The goal of ILCOR meetings was to support the evaluation of international science by a dedicated group of experts with the aim of achieving the single best set of evidence-based resuscitation guidelines and practices. This goal defined the international CPR and ECC evidence evaluation conferences held in 2000, 2005, and 2010, as well as several interim international consensus statements. The 2000 Guidelines Conference, the first major assembly under the auspices of ILCOR, adopted a sophisticated process for gathering and assessing evidence; this process evolved further in 2005 and was refined for 2010.

The mission statement of ILCOR was updated in 2005: “ILCOR will provide a mechanism by which the international science and knowledge relevant to CPR and ECC is identified and reviewed. ILCOR will periodically develop and publish a consensus on resuscitation science. When possible, ILCOR will publish treatment recommendations applicable to all member organizations. This consensus mechanism may be used by member organizations to provide consistent guidelines on resuscitation. ILCOR will encourage coordination of guideline development and publication by its member organizations. While the major focus will be on evaluation of CPR and ECC science, ILCOR will also address the effectiveness of education and training, and approaches to the organization and implementation of emergency cardiovascular care.”

The goal of a single best set of international CPR and ECC guidelines has not yet been achieved. In general, consensus on resuscitation science has been reached, but local variations in treatment recommendations are inevitable because of differences in epidemiology, models of care, implementation, and cultural or economic factors. These variations will be reflected by some subtle differences in regional and national resuscitation guidelines. Undoubtedly, international cooperation has enabled a more thorough collection and analysis of the scientific evidence, even though that evidence has not always led to standardized training and practice. Reasons for failure to achieve truly universal guidelines include

1. Absence of high-level evidence in the form of randomized controlled clinical trials: For some interventions, such evidence may never be available, because of the nature of resuscitation and its treatment.
2. Inconsistent or contradictory evidence: Ventilation during CPR is one example of this obstacle. Discussion of the optimal timing and provision of oxygen and ventilation in relation to chest compressions consumed considerable time and energy at the 2010 Guidelines Conference. The experts debated numerous ventilation variables and airway devices for field and hospital use by lay rescuers and professionals, respectively. Many resuscitation experts argued that compression-only CPR may be more effective and that perhaps rescue breathing should be eliminated from the initial resuscitation actions of bystanders when they witness sudden cardiac arrest in adults. The need for ventilation during initial resuscitation actions for other groups of patients, eg, adult cardiac arrest of noncardiac etiology and child cardiac arrest, remains under debate, generating further consideration on the need and method of ventilation training for lay rescuers.
3. Evolution of resuscitation practice over 50 years: Many of the practices originally recommended were based on the best available evidence and the opinions of experts at the time. Unfortunately this has resulted in the promulgation of some unproven scientific methodologies. The resuscitation experts in ILCOR 2010 had many long discussions about what was acceptable as “grandfather practice” and what should now be removed. These interventions were often supported by minimal, contradictory, or ambiguous evidence. These discussions strengthened the resolve of all involved to continue to encourage research in all aspects of resuscitation. Failure to translate research findings into daily practice is a well-recognized problem. The development of good guidelines does not ensure that they will be adopted in clinical practice, and passive methods of disseminating and implementing guidelines (eg, publication in journals) are unlikely to change professional behavior. Recent evidence suggests that full implementation of new resuscitation guidelines can take 18 months to 5 years. Resuscitation organizations have a primary responsibility for disseminating and implementing resuscitation guidelines; this will require significant resources. Resuscitation guidelines can be disseminated effectively through the internet, through national scientific meetings, and by local meetings held in hospitals and in the community. Resuscitation training materials should be updated as rapidly as possible to reflect the new guidelines.
Standardized courses play a crucial role in disseminating resuscitation guidelines. Evaluation and verification of the implementation of new guidelines is achieved through audit.

The science of resuscitation is evolving rapidly. It would not be in the best interests of patients if resuscitation experts were to wait 5 or more years to inform healthcare professionals of therapeutic advances in this field. Some groups have advocated reviewing guidelines as frequently as every 2 years, or even establishing a continuous evidence evaluation process with guideline updates. However, frequent changes in recommendations that do not have a major impact on outcome might undermine the process, because teaching and learning new guidelines takes time and resources. New science must be reviewed continually; if major new research evidence is published, groups such as ILCOR should publish interim consensus advisory statements to update treatment guidelines. Large, multicenter registries that use Utstein-style consensus definitions of the process of care and outcomes following resuscitation will track the dissemination of new techniques and interventions from science to guidelines to practice, and lead to further refinements in the guidelines. Ideally, important interventions and practices could be taught and reviewed rapidly, giving feedback on quality of performance for all healthcare providers. The interface between resuscitation research and continuous quality improvement (audit) is becoming more blurred.

ILCOR and international collaboration has continued to mature. The quest for a single set of universal guidelines is idealistic: many problems in resuscitation require local modifications and solutions. The common goal of the resuscitation community is to reduce the rates of morbidity and mortality from cardiovascular disease. The consensus statements and treatment recommendations in this publication are based on the most comprehensive review of resuscitation science ever undertaken, and this has been achieved by active and effective international collaboration.

Disclosures

Guidelines Part 2: International Collaboration in Resuscitation Science: Writing Group Disclosures

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<thead>
<tr>
<th>Writing Group Member</th>
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This table represents the relationships of writing group members that may be perceived as actual or reasonably perceived conflicts of interest as reported on the Disclosure Questionnaire, which all members of the writing group are required to complete and submit. A relationship is considered to be “significant” if (a) the person receives $10,000 or more during any 12-month period, or 5% or more of the person’s gross income; or (b) the person owns 5% or more of the voting stock or share of the entity, or owns $10,000 or more of the fair market value of the entity. A relationship is considered to be “modest” if it is less than “significant” under the preceding definition.

*Modest.
†Significant.

References


**KEY WORDS:** arrhythmia ■ cardiac arrest ■ emergency department ■ resuscitation
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