Resuscitation 95 (2015) e203–e224

Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Part 8: Education, implementation, and teams 2015 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science with Treatment Recommendations☆

Judith C. Finn*,[1], Farhan Bhanji[1], Andrew Lockey, Koenraad Monsieurs, Robert Frengley, Taku Iwami, Eddy Lang, Matthew Huei-Ming Ma, Mary E. Mancini, Mary Ann McNeil, Robert Greif, John E. Billi, Vinay M. Nadkarni, Blair Bigham, on behalf of the Education, Implementation, Teams Chapter Collaborators[2]

ARTICLE INFO

Keywords:
Automated external defibrillator
Cardiopulmonary resuscitation
Medical emergency team
Training

Introduction

Current evidence demonstrates considerable variability in cardiac arrest survival in and out of hospital and, therefore, substantial opportunity to save many more lives.[1–3] The Formula for Survival[4] postulates that optimal survival from cardiac arrest requires high-quality science, education of lay providers and healthcare professionals, and a well-functioning Chain of Survival[5] (implementation).

The Education, Implementation, and Teams (EIT) Task Force of the International Liaison Committee on Resuscitation (ILCOR) set out to define the key PICO (population, intervention, comparator, outcome) questions related to resuscitation education (including teamwork skills) and systems-level implementation that would be reviewed by 2015. The selection of questions was supported through the use of an online anonymous task force member–only voting process where the results were considered in the ultimate consensus decisions of the task force. Topics from the 2010 evidence review process were scrutinized for relevance, the potential to improve outcomes, and the likelihood of new evidence being published since 2010. Finally, PICO questions for which the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) process was not as well developed at the time of PICO selection were deferred until at least after the 2015 cycle. We planned to reduce the total number of PICO questions reviewed to provide more in-depth and evidence-based reviews of the included questions. New topics were determined on the basis of the evolving literature and changes in resuscitation practice. Input on the selection of PICO questions was sought from the general public through the ILCOR website and from ILCOR member resuscitation councils through their council chairs and individual task force members.

The GRADE process

The EIT Task Force performed detailed systematic reviews based on the recommendations of the Institute of Medicine of the National Academies[6] and using the methodological approach proposed by the GRADE Working Group.[7] After identification and prioritization of the questions to be addressed (using the PICO format),[8] with the assistance of information specialists, a detailed search for relevant articles was performed in each of 3 online databases (PubMed, 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

☆ This article has been copublished in Circulation.

* Corresponding author.
E-mail address: judith.finn@monash.edu (J.C. Finn).

[1] Co-chairs and equal first co-authors.

[2] See Acknowledgements for the list of members in Education, Implementation, and Teams Chapter Collaborators.

http://dx.doi.org/10.1016/j.resuscitation.2015.07.046

included studies, using state-of-the-art tools: Cochrane for randomized controlled trials (RCTs),[9] Quality Assessment of Diagnostic Accuracy Studies (QUADAS)-2 for studies of diagnostic accuracy,[10] and GRADE for observational studies that inform both therapy and prognosis questions.[11]

GRADE Evidence Profile tables[12] were then created to facilitate an 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,[13] based on the study methodologies and the 5 core GRADE domains of risk of bias, inconsistency, indirectness, imprecision, and other considerations (including publication bias).[14]

These evidence profile tables were then used to create a written summary of evidence for each outcome (the Consensus on Science statements). Whenever possible, consensus-based treatment recommendations were then created. These recommendations (designated as strong or weak) 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.

Further details of the methodology that underpinned the evidence evaluation process are found in "Part 2: Evidence Evaluation and Management of Conflicts of Interest."

To our knowledge, this is the first time that GRADE has been applied on a large scale to education literature in health. Detailed review of the evidence, the Consensus on Science statements, and treatment recommendations occurred within the task force, and most final recommendations reflect the consensus of the task force. In some instances, the task force could not reach consensus and a vote was required; greater than 50% agreement was adequate for standard decisions on wording, and 70% agreement was required for treatment recommendations that were discordant with the quality of evidence.

The EIT Task Force spent considerable time deliberating on the scoring of the importance of outcomes according to the GRADE approach, particularly with respect to educational studies. In contrast to clinical studies, where direct patient outcomes are commonly measured, in educational research, which often include manikin studies, participant learning outcomes are very common. After considerable task force discussion, for education PICO questions, patient-related outcomes and actual performance in the clinical setting were deemed the critical outcomes, with learning-related outcomes (immediate and longer retention) classed as important. Kirkpatrick's classic model of Program Evaluation[15] as well as McGaghie's[16] T1 to T3 for simulation research both align with the notion that patient-related (and system-related) outcomes are more relevant than transfer of learning from the education programs to the clinical environment, which in turn is more important than isolated demonstration of learning in a training setting. Recognizing the considerable body of evidence demonstrating a decay of resuscitation skills within weeks to months after a course, long-term retention of learning was considered a more robust outcome than learning assessed at the time of the training. Similarly, resuscitation is considered a (psychomotor or leadership/teamwork) skill; therefore, "skills" were considered to be higher-level outcomes than "knowledge." The published resuscitation education literature and subsequent GRADE analysis were frequently limited by the heterogeneous nature of the interventions (with frequent downgrades for inconsistency) and the quality of the assessment tools (outcome measures). In keeping with systematic review methodology, meta-analysis was conducted in specific PICO questions only when studies of similar design, interventions, and target populations reported comparable outcomes.

The EIT Task Force reviewed 17 PICO questions, which was a reduction of 15 questions from 2010. The questions selected included the following:

Basic Life Support Training

- Cardiopulmonary resuscitation (CPR) instruction methods (self-instruction versus traditional) (EIT 647)
- Automated external defibrillator (AED) training methods (EIT 651)
- Timing for basic life support (BLS) retraining (EIT 628)
- Resource-limited settings (EIT 634)
- BLS training for high-risk populations (EIT 649)
- Compression-only CPR training (EIT 881)

Advanced Life Support Training

- Precourse preparation for advanced life support (ALS) courses (EIT 637)
- High-fidelity manikins in training (EIT 623)
- Team and leadership training (EIT 631)
- Timing for advanced resuscitation training (EIT 633)

Implementation

- Implementation of guidelines in communities (EIT 641)
- Cardiac arrest centers (EIT 624)
- Social media technologies (EIT 878)
- Measuring performance of resuscitation systems (EIT 640)
- CPR feedback devices in training (EIT 648)
- Debriefing of resuscitation performance (EIT 645)
- Medical emergency teams (METs) for adults (EIT 638)

Summary of new treatment recommendations

The following is a summary of the most important new reviews or changes in recommendations for education, implementation, and teams since the last ILCOR review, in 2010:

Training

- High-fidelity manikins may be preferred to standard manikins at training centers/organizations that have the infrastructure, trained personnel, and resources to maintain the program.
- CPR feedback devices (providing directive feedback) are useful for learning psychomotor CPR skills.
- One- to 2-year retraining cycles are not adequate to maintain competence in resuscitation skills. The optimal retraining intervals are yet to be defined, but more frequent training may be helpful for providers likely to encounter a cardiac arrest.

Systems Level

- You can't improve what you can't measure, so systems that facilitate performance measurement and quality improvement initiatives are to be used where possible.
- Data-driven performance-focused debriefing can help improve future performance of resuscitation teams.
- Out-of-hospital cardiac arrest (OHCA) victims should be considered for transport to a specialist cardiac arrest center as part of a wider regional system of care.
- There have been advances in the use of technology and social media for notification of the occurrence of suspected OHCA and sourcing of bystanders willing to provide CPR.

BLS training

BLS is foundational in the care of cardiac arrest victims. For the OHCA victim, the goal is to increase rates of bystander CPR and