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From Science to Guidelines: The Future for Resuscitation

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ABSTRACT

The periodic development and publication of treatment guidelines is integral to the field of cardiopulmonary resuscitation and emergency cardiovascular care. The methods for guideline development have evolved over the past few decades, and the process itself has become the subject of increasing scientific investigation. An internationally validated tool for assessing the quality of clinical practice guidelines is The Appraisal of Guidelines for Research and Evaluation (AGREE) instrument. Applying this tool to the ILCOR 2010 International Consensus on CPR (cardiopulmonary resuscitation) and ECC (emergency cardiac care) Science with Treatment Recommendations (CoSTR) and the resulting member council guidelines will be a valuable initial step in evaluating both the process and the product. By doing so, important strengths can be recognized as well as opportunities for improvement moving forward. Beyond validated tools to assess and improve the quality of the traditional guidelines process, a critical reassessment of the overall strategy for improving cardiac arrest outcomes is indicated. From the lay-provider perspective, innovative approaches to facilitate performance of bystander CPR are needed. This is likely to entail more individualized instructional methods that are titrated to the provider's capabilities for learning and performance. What the future might hold for professional providers is a more individualized treatment strategy titrated to real-time physiologic monitoring with mechanized delivery of therapies guided by real-time computer-aided medical decision-making. These individualized instructional and treatment strategies could revolutionize our approach to cardiac arrest resuscitation, and dramatically change how guidelines are developed, implemented and evaluated.

Keywords: cardiac arrest, cardiopulmonary resuscitation, CPR, guidelines

Introduction

Periodically updated guidelines have been integral to the field of cardiac arrest resuscitation since the first consensus publication of standardized treatment recommendations in 1966. (1) The first American Heart Association (AHA) "standards for resuscitation" were published in 1974, (2) an subsequently updated as "guidelines" in 1980, 1986, and 1992. The process became formally international when the International Liaison Committee on Resuscitation (ILCOR) published its first set of "advisory statements" in 1997. (3,4) In collaboration with the AHA, ILCOR produced the first International cardiopulmonary resuscitation (CPR) Guidelines in 2000 and an International Consensus on CPR (cardiopulmonray resuscitation) and ECC (emergency cardiac care) Science with Treatment Recommendations (CoSTR) in 2005. In the fall of 2010, the latest ILCOR CoSTR will be published. This consensus document will be used by ILCOR member councils to develop and disseminate their 2010 treatment guidelines.

Along with advances in the science of resuscitation, the process for developing clinical practice guidelines has changed dramatically over that past 44 years. In fact, the guidelines development process itself has become the subject of expanding scientific investigation. For resuscitation guidelines to have the greatest impact on patient outcomes, the science of guideline development should be embraced along with the science of resuscitation. With the latest 5-year cycle of evidence evaluation and guideline development completed, we have an valuable opportunity to reflect on the process and identify ways to advance the science of guideline development in the field of cardiopulmonary resuscitation and emergency cardiac care.

Looking Back: Evaluating the 2010 Guidelines Process

As mentioned above, the clinical practice guideline development process has become the subject of increasing scientific investigation. The Appraisal of Guidelines for Research and Evaluation (AGREE) instrument was developed and published by the AGREE

collaboration in 2003. (4) An updated version, AGREE II, was published in 2010. (5) AGREE is an internationally validated appraisal instrument for assessing the quality of clinical practice guidelines. AGREE II consists of 23 key items organized within 6 domains followed by 2 global rating items ("Overall Assessment"). Each domain captures a unique dimension of guideline quality (table 1). (6)

Using AGREE II to assess the 2010 ILCOR CoSTR and 2010 ILCOR member council guidelines will be an important initial step in planning for the next round of evidence evaluation and guideline development. Overall, the process and product is likely to score high marks. Particular strengths based on AGREE II criteria are likely to be a well-defined scope and purpose, the rigor of development, and editorial independence as it relates to conflict of interest management. Potential areas for improvement include stakeholder involvement, clarity of presentation, and applicability. Although relevant professional disciplines are well-represented on ILCOR task forces and the guidelines writing groups of member councils, the opportunity for input from lay providers, patients, and patient families is limited. The value of this input is becoming increasingly recognized. (7) In the clarity of presentation domain, it remains challenging to make specific and unambiguous recommendations in areas where the science is inadequate. A transparent process that clearly defines the quality and quantity of evidence supporting individual treatment recommendations is essential. (8) Finally, in the applicability domain, outlining key review criteria for monitoring and/or audit purposes has not been a traditional focus of the CPR and ECC guidelines process, despite the availability of detailed international guidelines for reporting clinical research results. (9,10) As a result, limited use of surveillance systems to monitor process and outcomes variables in the every day management of cardiac arrest remains a fundamental barrier to optimizing guideline implementation and evaluating the impact new guidelines on patient outcomes.

Table 1. AGREE II Evaluation Criteria. (6)

Domain	Items in Domain
1. Scope and purpose	The overall objective(s) of the guideline is (are) specifically described
	The clinical question(s) covered by the guideline is (are) specifically described
	The patients to whom the guideline is meant to apply are specifically described
2. Stakeholder involvement	The guideline development group includes individuals from all relevant professional groups
	The patients' views and preferences have been sought
	The target users of the guideline are clearly defined
	The guideline has been piloted among end users
3. Rigor of development	Systematic methods were used to search for evidence
	The criteria for selecting the evidence are clearly described
	The methods for formulating the recommendations are clearly described
	The health-related benefits, side effects and risks have been considered in formulating the recommendations
	There is an explicit link between the recommendations and the supporting evidence
	The guideline has been externally reviewed by experts prior to its publication
	A procedure for updating the guideline is provided
4. Clarity of presentation	The recommendations are specific and unambiguous
	The different options for management of the condition are clearly presented
	Key recommendations are easily identifiable
	The guideline is supported with tools for application
5. Applicability	The potential organizational barriers in applying the recommendations have been discussed
	The potential cost-related implications of applying the recommendations have been considered
	The guideline presents key review criteria for monitoring and/or audit purposes
6. Editorial independence	The guideline is editorially independent from the funding body
	Conflicts of interest of members of the guideline development group have been recorded

Looking Forward: The Future of CPR and ECC Guidelines

Moving forward, a critical appraisal of the one-size-fits all approach to instruction and treatment is indicated. If the ultimate goal is for every patient to have CPR initiated immediately once cardiac arrest is recognized, novel strategies are needed to empower the cardiac arrest witness to take effective action. Traditional CPR training courses continue to reach a limited audience, and both the effectiveness and efficiency of this process has come into question. Dispatcher assisted CPR, hands-only CPR, (11) and smart phone applications provide examples of innovative strategies. Optimizing these and other novel approaches to empower every potential cardiac arrest witness to act could have dramatic impact on out-of-hospital cardiac arrest outcomes.

For the professional provider, the one-size-fits all approach will eventually be recognized as a fundamental barrier to improving outcomes. Standardized treatment guidelines and algorithms attempt to define care that is optimal for the majority of patients with a given presentation. However, the tremendous variability in patients suffering cardiac arrest suggests that this approach might be optimal for only a minority of patients. To overcome this barrier, individualized treatment strategies titrated to real-time physiologic monitoring will be needed. This approach could be further enhanced by mechanized delivery of therapies that automatically adjust in real time to optimize physiologic parameters. Finally real-time computer-aided medical decision support based on multiple physiologic parameters might also be used to guide management. (12) Optimization of available physiologic monitoring techniques such as quantitative waveform capnography, VF (ventricular fibrillation) waveform analysis, and ECG filtering to removed CPR artifact will provide important initial steps. However, novel techniques for real-time continuous monitoring of organ-specific metabolism during CPR, especially for the heart and brain, might be the breakthrough needed to drive a true paradigm shift. Once this is achieved, an individualized goal-directed approach to cardiac arrest resuscitation could revolutionize the way treatment guidelines are developed, implemented and evaluated.

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