Guidelines 2005 for Basic Life Support

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ABSTRACT

The International Liaison Committee on Resuscitation (ILCOR) published an evidence-based scientific basis for resuscitation guidelines in November 2005. This paper describes the process involved, and how the results have been used to produce guidelines for basic life support by resuscitation councils throughout the world.

THE ILCOR PROCESS

The 2005 Guidelines for Resuscitation were produced by the International Liaison Committee on Resuscitation (ILCOR), an association of six (mainly) multinational resuscitation councils: American Heart Association (AHA), European Resuscitation Council (ERC), Stroke & Heart Foundation of Canada, Inter American Heart Foundation (South America), Australia & New Zealand Resuscitation Council, and the Resuscitation Council of Southern Africa. ILCOR met approximately twice a year from 2000 until 2005 to oversee a process of evidence evaluation, known as the Consensus on Science and Treatment Recommendations (CoSTR). The work was carried out by task forces representing the subdivisions of resuscitation: basic life support (BLS), advanced life support, paediatric life support, neonatal life support, and interdisciplinary (covering such subjects as education). The task forces reviewed the then current guidelines (2000) and determined which areas needed review: because new scientific evidence was known to have been published, because the topic was of particular clinical importance, or because there were controversies regarding treatment. Each topic was then given to 2 or 3 international experts. These experts used structured worksheets to record the available published literature, to determine how strong each piece of evidence was, and, from this, to come to a conclusion as to the need, or otherwise, to recommend changes in treatment. In all, 281 experts completed 403 worksheets on 276 topics.

In January 2005, the worksheet compilers, members of ILCOR, and invited international experts (350 in all) met in Dallas, Texas, USA to discuss each topic and to come to a consensus conclusion as to the recommended scientific basis for guidelines on resuscitation (International Liaison Committee on Resuscitation 2005 (a, b). Following publication, these CoSTR recommendations were used by the individual resuscitation councils as the basis for their own 2005 guidelines. Although each council is an independent body, the fact that they were working from the same scientific base, and because they had all had representatives at the Dallas conference, the resulting guidelines were very similar.

Basic Life Support

The BLS Task Force started its CoSTR work by looking at the statistical evidence that, although bystander CPR doubles the chances of survival of victims of out-of-hospital cardiac arrest, internationally the overall survival rate is only about 5%. The two main reasons for this appear to

be poor acquisition and retention of CPR skills by lay and healthcare rescuers, and too many interruptions in chest compression.

Published evidence suggests that people do not learn CPR well because the sequence of actions is too complicated; simplifying the sequence has been shown to improve both acquisition and retention (Handley & Handley 1998).

Chest compression is the most important part of CPR, keeping the heart (and victim) alive until a defibrillator is available, hopefully to restore a normal heart rhythm. Interruptions in compression can occur for a number of reasons, for example, delay in assessing the need for CPR, pauses to deliver rescue breaths, or for further checks on the victim. Such interruptions have been shown to be highly detrimental to the outcome of cardiac arrest (Sato et al 1997; Berg et al 2001; Steen et al 2003).

Thus, the underlying principle for the Task Force when reviewing the techniques involved in BLS was to simplify the process where possible, and to attempt to avoid unnecessary interruptions in chest compression.

GUIDELINE CHANGES

The 5 main BLS changes between Guidelines 2000 and Guidelines 2005 were: diagnosis of cardiac arrest; hand position on chest; ventilation volume and rate; compression:ventilation ratio; infants and children.

Diagnosis of Cardiac Arrest

Guidelines 2000 required the rescuer to assess for responsiveness, check breathing for up to 10 seconds, give 2 rescue breaths, then check for signs of a circulation for a further 10 seconds. This all delayed starting CPR and no evidence was found that checking for signs of a circulation was any more accurate that checking for a pulse, a method of diagnosis of cardiac arrest previously shown to be inaccurate (Ruppert et al 1999; Perkins et al 2005). Therefore, the guideline was changed to: ‘a diagnosis of cardiac arrest should be made if a casualty is unresponsive and not breathing normally’. This fulfilled the requirements both to simplify the sequences and to reduce delay before starting chest compression.

Hand Position on Chest

The longstanding method for finding the correct place on the chest to give compressions consisted of identifying the lower rib margin, running a finger up to where the ribs join, identifying the lower end of the sternum, placing two fingers there, and running the other hand down the sternum to meet the fingers. This was very time consuming. There is evidence that demonstrating the correct hand position and instructing trainees to ‘place your hand in the centre of the chest’ results in less delay both in starting chest compression, and in returning to the chest after each ventilation (Handley 2002). This, again, fulfills the requirements both to simplify the sequences and to reduce delay before starting chest compression.

Ventilation Volume and Rate

Over the years, the recommendations regarding rescue breathing have been changed, with guidelines asking for quick, deep, slow, or gentle breaths. Studies by Aufderheide and colleagues (2004; 2005) have shown that too large a volume of expired air, and too fast a delivery, decreases the chances that a victim of cardiac arrest will recover with intact brain function. For this reason, Guidelines 2005 recommend that each rescue breath should be given over 1 second rather than 2

seconds, watching for the chest to rise as in normal breathing. As well as improving the outcome of BLS, the time saved when giving rescue breaths reduces interruptions in chest compression.

Compression:ventilation Ratio

At the CoSTR meeting in Dallas, this was one of the most controversial topics discussed. No convincing evidence was presented that any single compression:ventilation ratio was better than another as far as outcome from cardiac arrest is concerned. For the reasons discussed already, it was accepted that the aim should be to increase the number of chest compressions given to a victim of cardiac arrest at the expense of reducing the number of ventilations.

The 'ideal' way of eliminating interruptions in chest compression would be to given continuous compressions, with no pauses for ventilation. This is possible during advanced life support by healthcare professionals, when the victim's airway is protected by a tube in the trachea (intubation), so that ventilation can take place safely whilst compressions continue uninterruptedly. During BLS, there have to be pauses for rescue breaths – but how often?

Compression-only CPR has been shown to be effective if the victim is an adult, who has had a sudden cardiac arrest due to a cardiac problem, usually a heart attack, and receives defibrillation within a few minutes of collapse (Becker et al 1997). This is not the ideal treatment for children (who usually have a breathing problem that leads to cardiac arrest), cases of drowning, drug or alcohol intoxication, or injury. These victims require, first and foremost, restoration of their oxygen supply.

A solution had to be found, and it was agreed that the available evidence supported a universal compression:ventilation ratio of 30:2, suitable for all victims, including infants and children (Dorph & Wik 2002). This fulfills the requirements both to simplify the sequences and to reduce interruptions in chest compression.

Infants and Children

It was recognized that laypeople, in particular, tend to avoid or delay resuscitation of children for fear of doing harm. This fear is unfounded. The adoption of a compression:ventilation ratio of 30:2 was, in part, designed to allow this to be 'universal' for resuscitation of adults, children, and infants. To underline this, the following message was given: 'For ease of teaching and retention ... laypeople should be taught that the adult sequence may also be used for children'. This means that those attending BLS classes can be taught a single sequence of actions, suitable for use whoever the victim is, thus fulfilling the need for simplicity.

As far as those with a special responsibility for the care of children are concerned (and this would include lifeguards), some simple modifications to the BLS sequence make it even more suitable when the victim is a child: (a) after determining that the child is not breathing normally, give 5 initial rescue breaths before starting chest compressions *, (b) if you are on your own, give 1 minute of CPR before leaving to call the emergency services, (c) use 2 fingers or one hand as appropriate to compress the chest, (d) compress the chest by one-third of its depth, and (e) practise on an infant and/or child manikin.

Have the Guideline Changes Been Successful?

There is already some evidence to suggest that the objectives of simplification, and reduction in interruptions of chest compressions have been achieved. A recent study by Roessler and colleagues (2007) consisted of teaching a group of volunteers the 2000 BLS guidelines and the 2005 guidelines in random order. The volunteers were then tested as to their skills and ability to follow the sequences of action correctly. Fifteen percent of those tested on the 2000 guidelines

performed the sequence correctly, against 41% of those using the 2005 guidelines. When it came to determining the delay from start to first chest compression, those following the 2000 guidelines took, on average, 37 seconds, against 21 seconds for the 2005 guidelines.

It is early days to say for sure that the new, evidence-based, guidelines are going to save more lives, but early indications are encouraging. Certainly, the continuing quest for scientific evidence on which to base resuscitation guidelines seems to be paying dividends.

ILCOR is already working on the next set of recommendations, due to be published at the end of 2010.

TAKE-HOME MESSAGES

1. International guidelines for resuscitation are based on the science evaluation by the International Liaison Committee on Resuscitation (ILCOR).
2. The changes in BLS guidelines in 2005 were based on the importance of simplicity and the need for reducing interruptions in chest compression.
3. The major changes involved:
    a. Diagnosis of cardiac arrest
    b. Hand position on chest
    c. Ventilation volume and rate
    d. Compression:ventilation ratio
    e. Unification of adult and child BLS

FOOTNOTE

* It should be noted that the European Resuscitation Guidelines recommend that CPR should start with 30 compressions before 2 rescue breaths are give, whereas the American Heart Association recommends that in all cases 2-5 rescue breaths are given as soon as the victim has been assessed as not breathing normally.

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