New international consensus on cardiopulmonary resuscitation

Guidelines recommend CPR with a compression to ventilation ratio of 30:2

This week authoritative new international guidelines for managing cardiopulmonary arrest have been published. They arise from global cooperation coordinated by the International Liaison Committee on Resuscitation.¹ The committee was established in 1992, and in 2000 produced the first guidelines intended for global use.² The new recommendations for 2005 are described as a "consensus on science," and they reflect the growing recognition that different countries and regions have varied resources and needs.

The consensus statement provides both content and a framework that the main international councils can use and adapt to produce their own broadly similar guidelines with a common core of key recommendations for resuscitation from cardiopulmonary arrest. Both the consensus statement and the European Resuscitation Council guidelines drawn from it can be downloaded from www.erc.edu.^{3 4} The American Heart Association published the consensus statement and their own guidelines simultaneously.^{5 6}

The European guidelines have been adopted by the Resuscitation Council (UK) without modification (www.resus.org.uk).⁷ The principal changes in the European guidelines since 2000 are both welcome and, on the basis of the available science, broadly as expected. The principal new thrust, supported by

much new evidence, is a greater emphasis on the optimal performance of chest compressions. Many believe that the failure to show any appreciable increase in survival rates over recent decades⁸ has largely been a result of attention diverted away from fundamental basics to new developments that have often proved ineffective in isolation.

Chest compressions, which provide circulatory support during cardiac arrest, hold the key to survival when definitive treatment cannot be given within four or five minutes. This is almost universally the case for resuscitation out of hospital, where at least 80% of unexpected cardiac arrests occur, but also frequently, and often inexcusably, in hospitals. Many studies in recent years have shown that the number, rate, and quality of compressions are usually far from optimal.

The number of compressions may be the most important factor and is certainly the easiest to correct. Compressions are interspersed with artificial ventilations, at a ratio that was set previously at 15:2 with a compression rate of 100 per minute. But the number of compressions delivered in a minute is important too. A recent study in the United Kingdom was typical: in the 90 cardiac arrests in which compressions could be counted the median rate was 120 per minute, and so faster than the guideline recommendation, but the average number of compressions delivered per minute was only 38.⁹ The discrepancy was due to excessive time taken to deliver ventilations, to delays and pauses by rescuers, and to the analysis time required by automated defibrillators.

The revised UK guidelines emphasise the need for training to avoid unnecessary delays. In addition, they recommend a ratio of 30:2 to give more time for chest compressions, describe more simply how to place the hands on the chest correctly and quickly, and no longer recommend that rescuers give initial ventilations before starting compressions. Manufacturers of automated defibrillators are also working to shorten the time spent by their devices on analysing cardiac rhythms.

When the response interval (the time taken for professional help to arrive) to a cardiac arrest out of hospital is more than 4-5 minutes, the guidelines suggest the option of giving compressions for up to three minutes before attempting defibrillation, a

The Resuscitation Council (UK) now recommends:

For adults:

- CPR with a chest compression to ventilation ratio of 30:2
- no initial ventilations before starting compressions
- when professional help is delayed for more than 4-5 minutes, one option is to give compressions for up to three minutes before attempting defibrillation
- compressions for two minutes after defibrillation
- if coordinated rhythm is not restored by defibrillation, second and further shocks should be given only after additional cycles of chest compressions

For children:

- solo lay rescuers should give CPR with a compression to ventilation ratio of 30:2
- two rescuers (usually healthcare professionals) should use a ratio of 15:2

For neonates:

- will almost certainly be anoxic, so still need a ratio of 3:1

change based on compelling data in animals supported by two human studies. Until quite recently, accepted wisdom dictated defibrillation at the earliest opportunity, but this did not take into account two factors: the loss of metabolic substrate that can be ameliorated by a partial restoration of coronary flow, and the ventricular dilatation in the arrested heart that hinders effective contraction—a problem that cardiac surgeons have long known about.¹⁰

The new guidelines also recommend compressions for two minutes after defibrillation to assist the recovery of effective cardiac contractions, even before checking cardiac rhythm. They no longer recommend giving a set of three successive shocks if coordinated rhythm is not restored by defibrillation: now second and further shocks should be given only after additional cycles of compressions.

Paediatric guidelines have also been modified to place more emphasis on compressions. Solo lay rescuers of children with cardiopulmonary arrest out of hospital should use the same new compression to ventilation ratio of 30:2, whereas two rescuers (usually healthcare professionals) should use a ratio of 15:2. Neonates, who will almost certainly be anoxic, still need a ratio of 3:1.

Many recommendations on cardiopulmonary resuscitation, even in the new guidelines, are based on uncertain science. For example, there are no human data to guide us in using adrenaline in cardiac arrest. The evidence on benefits has been extrapolated from animal studies, mostly in hearts that are not severely ischaemic. Some strategies in the new guidelines on resuscitation in hospital, peri-arrest arrhythmias, and post-resuscitation care are well supported by evidence, such as inducing hypothermia for unconscious adult patients with a spontaneous circulation after out of hospital ventricular fibrillation. Other aspects, including metabolic control, are necessarily more tentative.

In some ways the collaboration underlying these guidelines is as important to note as the scientific basis. The International Liaison Committee on Resuscitation aims to provide “a consensus mechanism by which the international science and knowledge relevant to emergency medicine can be identified and reviewed ... to provide consistent international guidelines on emergency cardiac care for basic life support (BLS), paediatric life support (PLS) and advanced life support (ALS).”

The committee comprises representatives from the American Heart Association, the European Resuscitation Council, the Heart and Stroke Foundation of Canada, the Australian and New Zealand Committee on Resuscitation, the Resuscitation Council of Southern Africa, and the Inter-American Heart Association acting for Latin America. The committee also maintains close contact with physicians in other parts of the world that currently lack large multinational organisations.

The 2005 consensus statement and guidelines offer welcome steps forward that are likely to improve outcomes. The acceptance that many treatments are not supported by strong evidence should increase motivation for research—provided that the current barriers relating to consent in incapacitated individuals can be overcome.¹¹

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