Cardiopulmonary resuscitation: effectiveness, training and survival

It is easy to see why cardiopulmonary resuscitation (CPR) was accepted as an important advance when first introduced [1]. It seemed self-evident that people who collapse need to be resuscitated; the technique appeared to be effective, straightforward to teach and easy to remember [2]. On the assumption that the intervention is valuable it was disappointing to find on testing that doctors [3–5], nurses [6] and even staff employed to train others in CPR [7], cannot perform it proficiently. The response has been to call for more training, for recruiting resuscitation training officers and adopting uniform, high standards for all who carry out CPR. Is this compatible with the evidence?

First, what is the best way to provide training? Training improves doctors' proficiency in carrying out CPR [8,9], though it is not clear which elements of training are most worthwhile. Who should provide the training; how often should it be repeated; what is the most effective balance between theoretical and practical training; is it more important to train key staff to a high level or spread basic knowledge throughout the hospital or the community it serves? Resources for training are scarce and not knowing the answers to these questions means that they are used less effectively than they might be. Our ignorance of how to train effectively reflects our ignorance of why skilled professionals have such difficulty remembering how to carry out such a relatively simple task. Doctors retain skills no better than nurses [10], neither does better than the lay public [6], and even emergency medical technicians who regularly perform CPR, retain their skills poorly [11].

Second, showing that training leads to improved performance on manikins and closer adherence to protocols is not enough. Little evidence exists for this intervention's effectiveness in materially prolonging life: one Canadian study [12] showed no difference in survival between a hospital with a CPR training programme and one without, another [13] found no change in the proportion of patients surviving to discharge after a training programme was started, and a study from Scotland [14] had no impact on survival from six hours of training for house officers. These studies were small, but show not even a trend towards better survival. It is possible that a few simple skills are critical for effectiveness and therefore more extensive training is less cost-effective than more widespread but basic training [15]. Alternatively, proficient resuscitation may be so rare that it is impossible to assess its effectiveness: in the Canadian study, the physicians' proficiency in the 'training' hospital had deteriorated to pre-training levels after six months, making it unlikely that their patients' received treatment was markedly superior to that of patients attending the control hospital. Despite efforts to improve the quality of training, the rate of successful CPR has not changed in 30 years [16].

This lack of convincing evidence also exacerbates the controversy [17] about decisions not to resuscitate patients. If patients and their relatives are to share in making the decision, it is unreasonable to put such difficult and weighty questions to them without giving them such information to help them decide. Such information should include the likelihood of leaving hospital at least no worse than before admission and would reflect the influence of age, diagnosis and co-morbidity on the capacity to benefit from CPR.

Certain group treatments do poorly, eg in some studies only a tiny minority of the elderly left hospital alive [18,19]. Undermining all studies with poor outcome is the undoubted rarity of proficiently executed CPR. Is CPR in the elderly ineffective because of the patient or the doctor? Are doctors less determined with elderly patients, and would greater skill in resuscitation overcome the greatest difficulties posed by the elderly? When the third National Confidential Enquiry into Perioperative Deaths [20] showed unduly high mortality among elderly patients with strangulated hernias operated on out-of-hours by junior surgeons, the call was for more training and senior support, and for better surgical facilities, not for the operation to be abandoned in this group. Until one can be confident that a treatment is correctly applied by proficient staff, it is premature to make judgements about different groups' capacity to benefit. None of the major studies on outcomes after CPR have included training doctors and others to ensure that the intervention under examination was competently executed.

CPR is not a benign intervention. Gillon has described it as 'violent, damaging, painful, alarming and undignified' [21]. Futile or inappropriate attempts at resuscitation are distressing for relatives, other patients and staff. They are also common; the large BRESUS study found that only 18% of resuscitated patients left hospital alive and only 12.5% were alive at 12 months [22].

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Because of its heroic nature, its seeming simplicity and the ethical problems of researching it, CPR has become established as part of medical practice before we have acquired a full understanding of how best to learn, perform and select patients for it. As a result, some patients are subjected to CPR with little prospect of benefit, much staff time is wasted on training with little evidence of gain in proficiency, and the public grows anxious. Existing studies are either uncontrolled or not randomised, often both. We need randomised trials of different methods of training, linked to studies of outcomes. They could then be used in discussions with patients and relatives. Until then, we should be more cautious about the training we provide and the groups we consider likely to benefit from CPR.

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