

CARDIAC RESUSCITATION

Optimum CPR strategies clarified

Every year, more than 350,000 people in Canada and the USA experience a sudden cardiac arrest, and less than 10% survive. The results of a tandem study by the Resuscitation Outcomes Consortium (ROC), published in the *New England Journal of Medicine*, provide vital new information on the emergency treatment of these patients that could have practice-changing implications.

The ROC PRIMED trial involved 10 universities in Canada and the USA and their associated emergency medical service systems and was conducted between June 2007 and November 2009, when the study was terminated. The trial included individuals aged >18 years who experienced an out-of-hospital cardiac arrest that was not caused by trauma. Two separate comparisons were drawn; one on the use of early versus delayed rhythm analysis and the other testing the benefit of an impedance threshold device (ITD) used during ventilation.

“Traditionally, paramedics and firefighters have begun defibrillation for cardiac arrest as soon as possible, and provided only brief cardiopulmonary resuscitation (CPR) while preparing the defibrillator,” explains ROC investigator Dr Ian Stiell. “However, several studies over the past decade have suggested it may be better to provide a longer period of initial CPR (up to 3 min) before beginning defibrillation ... we conducted this large study to settle the controversy, so that we can make sure cardiac arrest patients are receiving the best possible care.”

In the first comparison, patients were randomly assigned to early (after 30–60 s CPR; $n=5,290$) or delayed (after 150–180 s CPR; $n=4,643$) rhythm analysis, with both chest compressions and ventilations being given before the electrocardiogram. In both groups, 5.9% of patients survived to hospital discharge with a modified Rankin score of ≤ 3 ($P=0.59$). No significant differences between the two strategies were reported in the secondary end points, or for any of the prespecified patient subgroups. In fact, among patients with an initial rhythm of ventricular tachycardia or ventricular fibrillation, a trend was observed towards declining survival with increasing delay to rhythm analysis. “Our study definitively shows that extending the period of CPR ... from 1 to 3 min provides no benefit,” says Dr Stiell. “Clinical guidelines will likely be clarified, to recommend that paramedics perform defibrillation as soon as possible, and provide CPR only while the defibrillator is being prepared.”

In the second analysis, 4,373 patients were randomly assigned to receive CPR with an ITD and 4,345 patients to treatment with an identical sham device. The ITD is intended to prevent passive in-flow of air to the chest during compressions, thereby improving venous return and cardiac output. As with the other analysis, the primary outcome measure was survival to hospital discharge with a modified Rankin score of ≤ 3 , which was achieved in 5.8% of patients in the active ITD group and 6.0% of those in the sham ITD group ($P=0.71$). No between-group differences were observed in the secondary or safety end points, or in subgroup analyses. The authors propose several hypotheses for the lack of benefit for the ITD, including absence of any physiological effect, or the presence of a physiological effect that does not translate into a clinical benefit. Dr Stiell concludes by saying that the ROC investigators “have a great deal of other data from this study that may point to other improvements in care for people suffering from cardiac arrest.”

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Original articles Stiell, I. G. *et al.* Early versus late rhythm analysis in patients with out-of-hospital cardiac arrest. *N. Engl. J. Med.* **365**, 787–797 (2011) | Aufderheide, T. P. *et al.* A trial of an impedance threshold device in out-of-hospital cardiac arrest. *N. Engl. J. Med.* **365**, 798–806 (2011)