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[Intervention Review]

Active chest compression-decompression for cardiopulmonary resuscitation

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ABSTRACT

Background

Active compression-decompression cardiopulmonary resuscitation (ACDR CPR) uses a hand-held suction device, applied mid-sternum, to compress the chest then actively decompress the chest after each compression. Randomised controlled trials testing this device have shown discordant results.

Objectives

To determine the effect of active chest compression-decompression CPR compared to standard chest compression CPR on mortality and neurological function in adults with cardiac arrest treated either in-hospital or out-of-hospital.

Search methods

We updated the searches of CENTRAL in *The Cochrane Library* (Issue 12 of 12, 2012), MEDLINE (OVID, 1946 to January week 1 2013), and EMBASE (OVID, 1980 to week 1 2013) on 14 January 2013. We checked the reference list of retrieved articles, contacted experts in the field, and searched ClinicalTrials.gov.

Selection criteria

All randomised or quasi-randomised studies comparing active compression-decompression with standard manual chest compression in adults with a cardiac arrest who received cardiopulmonary resuscitation by a trained medical or paramedical team.

Data collection and analysis

We independently extracted data on an intention-to-treat basis. When needed, we contacted the authors of the primary studies. If appropriate, we cumulated studies and pooled relative risk (RR) estimates. We predefined subgroup analyses according to setting (out-of-hospital or in-hospital) and attending team composition (with physician or paramedic only).

Main results

In this update, 27 new related publications were found, but they did not all fulfil inclusion criteria or concerned participants already reported in previous publications. In the end, we included 10 trials in this review: Eight were in out-of-hospital settings; one was set inhospital only; and one had both in-hospital and out-of-hospital components. Allocation concealment was adequate in four studies. The

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two in-hospital studies were different in quality and size (773 and 53 participants). Both found no differences between ACDR CPR and STR in any outcome.

Out-of-hospital trials cumulated 4162 participants. There were no differences between ACDR CPR and STR for mortality either immediately (RR 0.98, 95% confidence interval (CI) 0.94 to 1.03) or at hospital discharge (RR 0.99, 95% CI 0.98 to 1.01). The pooled RR of neurological impairment of any severity was 1.71 (95% CI 0.90 to 3.25), with a non-significant trend to more frequent severe neurological damage in survivors of ACDR CPR (RR 3.11, 95% CI 0.98 to 9.83). However, assessment of neurological outcome was limited, and few participants had neurological damage.

There was no difference between ACDR CPR and STR with regard to complications such as rib or sternal fractures, pneumothorax, or haemothorax (RR 1.09, 95% CI 0.86 to 1.38). Skin trauma and ecchymosis were more frequent with ACDR CPR.

Authors' conclusions

Active chest compression-decompression in people with cardiac arrest is not associated with any clear benefit.

PLAIN LANGUAGE SUMMARY

Active compression-decompression using a hand-held device for emergency heart massage

During standard cardiopulmonary resuscitation (heart massage) for cardiac arrest (arrest of the heart), the chest is compressed manually and repeatedly by hand. This is a temporary method that pumps blood and oxygen to the brain via the heart. During standard cardiopulmonary resuscitation, the chest is not manually decompressed. Active chest compression-decompression is an alternative method of heart massage and uses a hand-held suction device to compress the chest, then decompress the chest after each compression. Comparison of these techniques showed active chest compression-decompression to have no advantage and some drawbacks compared to standard cardiopulmonary resuscitation.