Inducing hypothermia to decrease neurological deficit: literature review
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CRD summary
This review evaluated the impact of inducing hypothermia on neurological deficit in out-of-hospital cardiac arrest. It concluded that, in line with current recommendations of the Advanced Life Support Task Force, this method should be adopted in practice. Limitations in the review process and evidence presented mean that this conclusion is not supported and cannot be considered reliable.

Authors' objectives
To determine the effectiveness of inducing hypothermia to decrease neurological deficit after out-of-hospital cardiac arrest.

Searching
MEDLINE (1966 to 2004), BIOSIS Previews (1993 to 2004), CINAHL (1982 to 2004), HealthSTAR (1975 to 2004), Wilson Applied Science and Technology (1983 to 2004) and MD Consult (1983 to 2004) were searched for articles published in the English language; the search terms were reported. The reference lists of included studies were also checked.

Study selection
Study designs of evaluations included in the review
Explicit inclusion criteria were not reported. The included studies were randomised controlled trials (RCTs) and prospective controlled studies with historical controls.

Specific interventions included in the review
Studies of induced hypothermia were eligible for inclusion. The hypothermic temperature was 32 to 34 degrees C. The techniques used for cooling were surface cooling with ice packs, cooling blankets, cooling mattresses, alcohol baths, or a combination of other methods. Sedative and paralytic agents were administered. Re-warming was conducted by either passive or active means. Further details on the techniques used were reported. Comparison groups were treated according to standard hospital protocols.

Participants included in the review
Studies of those who had an out-of-hospital cardiac arrest were eligible for inclusion. The participants in the included studies were aged from 33 to 89 years and most were male.

Outcomes assessed in the review
Studies assessing neurological deficit were eligible for inclusion. The outcomes assessed varied and included the Glasgow Outcome Scale, rehabilitation specialist evaluation for discharge location, Pittsburgh Cerebral Performance Categories, Cerebral Performance Categories, discharge disposition, modified Rankin score and Mini-Mental Status Examination. The complications evaluated in the included studies were sepsis, coagulopathies, neutropenia, thrombocytopenia, arrhythmias and electrolyte abnormalities.

How were decisions on the relevance of primary studies made?
The author did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The author did not state that they assessed validity.
Data extraction
The author did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

Data on the proportion of patients with a ‘good’ or ‘poor outcome’ were extracted. Good outcomes included discharge to home or an acute rehabilitation facility with normal neurological function and minimal disability. Poor outcomes included discharge to a long-term nursing facility, severe neurological disability or death. Information on complications was also extracted.

Methods of synthesis
How were the studies combined?
The results of the included studies were tabulated and discussed in a narrative synthesis, based on outcome criteria.

How were differences between studies investigated?
Differences between the studies were apparent from the tables of included studies.

Results of the review
Six studies were included in the review: 2 RCTs (n=362) and 4 consecutive prospective studies with historical controls (n>114).

A higher proportion of patients treated with hypothermia were shown to have a ‘good outcome’ at follow-up compared with those in the normothermic group (49 to 55% compared with 14 to 39%) and lower mortality (41 to 51% versus 55 to 77%). Other poor outcomes, including severe disability and vegetative state, appeared to be similar in both groups, where reported.

Induced hypothermia was not associated with any statistically or clinically significant complications compared with normothermia. Complications associated with hypothermia included decreases in heart rate, increase in systemic vascular resistance, and increased potassium and glucose on re-warming. Increased rates of infection were also noted.

Authors’ conclusions
Based on this review, and the Advanced Life Support Task Force of the International Liaison Committee on Resuscitation, advanced practice nurses should promote inducing hypothermia. However, further research is needed on specific treatment recommendations.

CRD commentary
The review addressed a clear research question but, since the inclusion criteria were poorly defined, it was possible that some subjective decisions were made in the inclusion of studies. Several sources were searched for relevant studies, although only English language studies were eligible and it was unclear whether attempts were made to locate unpublished studies; it is therefore possible that some relevant studies might have been overlooked. It was not clear whether methods were used to minimise reviewer error and bias in the study selection and data extraction processes. No systematic assessment of validity was performed, thus it was difficult to determine the reliability of the evidence presented. The author did not account for differences in study design in the synthesis of the results. Details presented on each included study highlighted clinical and methodological differences across studies, suggesting that the decision to combine in a narrative was appropriate. However, these apparent differences were not adequately reflected in the author’s conclusion. Overall, limitations in the reporting of review process, the absence of a validity assessment, and inherent bias in some of the included studies mean that the author’s conclusion needs to be substantiated by further research. Furthermore, it is not possible to comment on the recommendations made by the Advanced Life Support Task Force of the International Liaison Committee on Resuscitation.

Implications of the review for practice and research
Practice: The author stated that, based on the studies presented and the recommendations of the Advanced Life Support Task Force of the International Liaison Committee on Resuscitation, advanced practice nurses should consider recommending and adopting this practice in collaboration with other health care providers.

Research: The author stated that further research to define the actual practice of inducing hypothermia is needed. In addition, large RCTs that include different populations in different geographical locations should also be conducted.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.