Cochrane Library

Cochrane Database of Systematic Reviews

Pre-hospital versus in-hospital initiation of cooling for survival and neuroprotection after out-of-hospital cardiac arrest (Review)

Arrich J, Holzer M, Havel C, Warenits AM, Herkner H

Arrich J, Holzer M, Havel C, Warenits AM, Herkner H.
Pre-hospital versus in-hospital initiation of cooling for survival and neuroprotection after out-of-hospital cardiac arrest.
Cochrane Database of Systematic Reviews 2016, Issue 3. Art. No.: CD010570.
DOI: 10.1002/14651858.CD010570.pub2.

www.cochranelibrary.com

WILEY

[Intervention Review]

Pre-hospital versus in-hospital initiation of cooling for survival and neuroprotection after out-of-hospital cardiac arrest

Jasmin Arrich[1], Michael Holzer[1], Christof Havel[1], Alexandra-Maria Warenits[1], Harald Herkner[1]

[1]Department of Emergency Medicine, Medical University of Vienna, Vienna, Austria

Contact address: Jasmin Arrich, Department of Emergency Medicine, Medical University of Vienna, Währinger Gürtel 18-20 / 6D, Vienna, 1090, Austria. jasmin.arrich@meduniwien.ac.at.

Editorial group: Cochrane Anaesthesia, Critical and Emergency Care Group.
Publication status and date: New, published in Issue 3, 2016.
Review content assessed as up-to-date: 5 March 2015.

Citation: Arrich J, Holzer M, Havel C, Warenits AM, Herkner H. Pre-hospital versus in-hospital initiation of cooling for survival and neuroprotection after out-of-hospital cardiac arrest. *Cochrane Database of Systematic Reviews* 2016, Issue 3. Art. No.: CD010570. DOI: 10.1002/14651858.CD010570.pub2.

ABSTRACT

Background

Targeted temperature management (also known under 'therapeutic hypothermia', 'induced hypothermia'", or 'cooling') has been shown to be beneficial for neurological outcome in patients who have had successful resuscitation from sudden cardiac arrest, but it remains unclear when this intervention should be initiated.

Objectives

To assess the effects of pre-hospital initiation of cooling on survival and neurological outcome in comparison to in-hospital initiation of cooling for adults with pre-hospital cardiac arrest.

Search methods

We searched CENTRAL, MEDLINE, EMBASE, CINAHL, BIOSIS, and three trials registers from inception to 5 March 2015, and carried out reference checking, citation searching, and contact with study authors to identify additional studies.

Selection criteria

We searched for randomized controlled trials (RCTs) in adults with out-of-hospital cardiac arrest comparing cooling in the pre-hospital setting to in-hospital cooling. Our primary outcomes were survival and neurological outcome; our secondary outcomes were adverse events, quality of life, and length of stay in the intensive care unit (ICU) and in the hospital.

Data collection and analysis

We used Cochrane's standard methodological procedures.

Main results

We included seven RCTs (2369 participants randomized) on the induction of pre-hospital cooling in comparison to in-hospital cooling. There was considerable methodological heterogeneity and risk of bias mainly due to deficits in the administration of cooling, therefore we refrained from pooling the results for survival and neurological outcome and we presented the results for each study separately. Adverse events were rare: based on four studies with 1713 adults pre-hospital induction of cooling may increase the risk of cardiac re-arrests. Risk of bias within the seven individual studies was generally moderate. Overall the quality of the evidence was very low. This was mainly driven by inconsistency and low precision.

Authors' conclusions

Currently, there is no convincing evidence to clearly delineate beneficial or harmful effects of pre-hospital induction of cooling in comparison to in-hospital induction of cooling. This conclusion is based on very low quality evidence.

PLAIN LANGUAGE SUMMARY

Should patients experiencing sudden cardiac death be cooled to lower their body temperature prior to or after admission to hospital?

Review question

We reviewed the current available evidence in order to answer the question of whether early cooling in people who receive basic life support for sudden cardiac death influences survival and brain damage compared to cooling that is started after their admission to hospital. Early cooling means the cooling of the person quickly by the ambulance staff, paramedics or doctors, in the field. We included seven studies meeting the Cochrane requirements in this review.

Background

Population

This review deals with people who receive basic life support for sudden cardiac death. Sudden cardiac death means that the heart and subsequently the circulation stops. If these people do not receive early cardiopulmonary resuscitation then their brain cells begin to be irreversibly damaged and subsequently they die. If basic life support is successful, one form of therapy that may help to prevent further cell damage is to cool the body for several hours to 32°C to 36°C. This therapy has been shown to be beneficial in reducing brain damage and is recommended in international guidelines for the treatment of people that have been brought back to life after sudden cardiac death.

Intervention

The optimal timing for the initiation of cooling is unclear. This review compares people who had their cooling therapy started before hospital admission to those who had their cooling therapy started after admission to a hospital.

Outcomes

The effects of the intervention were measured by survival and brain damage, together with side effects, quality of life, and length of hospital stay.

Search date

We completed the review searches in March 2015.

Study characteristics

The seven studies included had a total of 2369 participants and compared the effects of cooling before and after being admitted to the hospital. The mean age of the participants in the studies was between 59 and 68 years with the majority being male. People that were not included in the trials were generally those with trauma, those with a terminal disease, those at the natural end of their life, pregnant women, and those that already had a low body temperature.

Study funding sources

Two out of seven studies were funded by the medical industry, four received funding from the government or non-profit organizations, and one study did not receive any funding.

Key results

None of the studies found any evidence for a benefit of pre-hospital cooling versus in-hospital cooling. However, we discovered that in almost all studies a relevant amount of participants did not receive pre-hospital cooling or in-hospital cooling or cooling according to the guidelines at all. The reasons for this were not clearly stated. The question of whether the decision to cool participants may have been influenced by other factors cannot be reliably answered. Proper design and conduct of the included studies was of concern,

therefore to avoid making misleading interpretations we did not pool the results of the single studies. We found that in adults that received pre-hospital cooling the heart was slightly more likely to stop again before they were admitted to the hospital.

Quality of the evidence

Many of the included studies were of limited use because they focused on the practicability and safety of pre-hospital cooling without specifically emphasising cooling therapy. Other factors that contributed to a downgrading of the quality of the evidence were that the information came from different study populations and from different time points of applying pre-hospital cooling. In addition, there was risk of bias within the studies. The quality of the individual studies was moderate. In summary, the quality of the evidence to answer our review question was very low.