Clinical question.
In adult patients with ROSC after cardiac arrest (prehospital or in-hospital) (P), does the use of a haemofiltration (I) as opposed to standard care (C), improve outcome (O) (eg. survival)?

This question addresses an intervention.
This is a proposed new topic.

Conflict of interest specific to this question
The authors listed above has no conflict of interest disclosures relevant to this worksheet.

Search strategy (including electronic databases searched).
MeSH-terms and text words:
advanced cardiac life support or cardiopulmonary resuscitation or cardio pulmonary resuscitation or reanimation or heart massage or heart arrest or cardiac arrest or circulatory arrest or heart standstill or death, sudden, cardiac
AND
hemofiltration or hemodiafiltration or haemodiafiltration or haemofiltration

Databases:
Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R)
Cochrane Central Register of Controlled Trials (2nd Quarter 2008)
Cochrane Database of Systematic Reviews (2nd Quarter 2008)
Ovid EMBASE
PubMed
ECC EndNote X Master library 24Mar08.Data

• State inclusion and exclusion criteria
Inclusion criteria:
Hemofiltration or hemodiafiltration or haemodiafiltration or haemofiltration
Randomized and non-randomized studies in adult humans after prehospital or in-hospital cardiac arrest with ROSC

Exclusion criteria:
abstract only studies, not peer reviewed, not answer question, reviews, case reports; letters; animal studies; children; infants

• Number of articles/sources meeting criteria for further review:
Total articles: 200; excluded articles: 198; articles met criteria for detailed review: 2
### Summary of evidence

#### Evidence Supporting Clinical Question

<table>
<thead>
<tr>
<th>Good</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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</thead>
<tbody>
<tr>
<td>Fair</td>
<td>Laurent, 2005, 432 BCD</td>
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<td>Poor</td>
<td>Huang, 2004, 3796 BD</td>
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#### Level of evidence

A = Return of spontaneous circulation  
B = Survival of event  
C = Survival to hospital discharge  
D = Intact neurological survival  
E = Other endpoint  

*Italics = Animal studies*
## Evidence Neutral to Clinical question

|   | Good |  |  |  |  |  |  |  |
|---|------|---|---|---|---|---|---|
|   | 1    | 2 | 3 | 4 | 5 | Level of evidence |

A = Return of spontaneous circulation  
B = Survival of event  
C = Survival to hospital discharge  
D = Intact neurological survival  
E = Other endpoint  
*Italics = Animal studies*

## Evidence Opposing Clinical Question

|   | Good |  |  |  |  |  |  |  |
|---|------|---|---|---|---|---|---|
|   | 1    | 2 | 3 | 4 | 5 | Level of evidence |

A = Return of spontaneous circulation  
B = Survival of event  
C = Survival to hospital discharge  
D = Intact neurological survival  
E = Other endpoint  
*Italics = Animal studies*
**REVIEWER’S FINAL COMMENTS AND ASSESSMENT OF BENEFIT / RISK:**

The post-resuscitation syndrome is characterized by systemic inflammation and shares many features with severe sepsis. Studies in experimental models of sepsis and ischemia/reperfusion injury suggest that high-volume hemofiltration removes molecules responsible for ischemia-reperfusion injury, and improves myocardial performance, hemodynamics, and survival. One cardiac arrest animal study demonstrated that hemofiltration ameliorated reperfusion injury. Based on this limited evidence in cardiac arrest models, two human studies assessed the potential benefits of hemofiltration used in patients admitted after cardiac arrest.

The Laurent-study was a methodologically good prospective randomized study, investigating the effect of isovolumic high-volume hemofiltration (HF, 200 ml/kg/hr for 8 hrs) alone or combined with mild hypothermia (HF+HT) as compared with standard treatment on survival after out-of-hospital cardiac arrest with initial ventricular fibrillation or asystole. The study showed that high-volume hemofiltration after cardiac arrest was associated with better six-month survival and a decreased risk of death from early intractable shock. Major limiting factors of the study are:

- Sample size calculation estimated the need for 90 patients to be randomized into the study. However, during the study, two other studies reported benefits from therapeutic HT after cardiac arrest, which led to halt the study out of concern that absence of therapeutic HT in the HF-only and control groups might be unethical. Thus, only 61 patients were included into the study.
- For the multivariate logistic regression model to look for associations between HF and the primary end point (survival at six months) and secondary end point (rate of death by intractable shock in patients who had a favorable Glasgow coma scales) both, the HF and HF+HT, groups were pooled.
- The inability of the investigators to blind the treating team to the study group

The Huang-study is written in Chinese, and only the abstract is available in English. This study investigated the clinical effect of high-volume HF on outcome following cardiopulmonary resuscitation. The study found that the treatment with HF improved prognosis in terms of mortality and Glasgow Outcome Scale (GOS 5=mild or no disability, 1=death, GOS 1+2 considered as good outcome). Major limiting factor in reviewing this study is that only the abstract is available, it is not clear, if:

- groups were randomized
- comparison groups were clearly defined
- outcomes were measured in the same, blinded, objective way in both groups
- known confounders were identified and appropriately controlled for

**Statistical summary of both studies:**

**Laurant 2005:**

- 244 patients assessed, 61 patients enrolled
- There was a statistically significant difference in Kaplan-Meier survival curves (log-rank p<0.018). Patients treated with HF (p<0.026) and HF+HT (p<0.018) differed significantly from patients in the control group.
- There was no statistically significant difference in the six-month survival rates: 45% (9/20) in the HF group, 32% (7/22) in the HF+HT group, and 21% (4/19) in the control group (p=0.28).
- There was no statistically significant difference in hospital survival rates: 45% (9/20) in the HF group, 45% (10/22) in the HF+HT group, 26% (5/19) in the control group.
- Multivariate logistic-regression model showed a significant association between HF (pooled groups) and six-month survival (OR 4.4, 95% CI 1.1-16.6), and death by intractable shock (OR 0.15, 95% CI 0.03-0.69).

**Huang 2004:**

- Unknown number assessed, 24 patients enrolled.
- There was a statistically significant difference in GOS 1+2 at 3 months: 64% (7/11) in the HF group, and 8% (1/13) (p<0.01).
- There was a statistically significant difference in mortality rate: 18% (2/11) in the HF group, and 62% (8/13) in the control group (p<0.05).

**Acknowledgements:**

none
Citation List


Level 2, poor, supportive. This study suggest in univariate analysis in few patients improved survival and neurologic outcome at three months in patients treated with HF after successful resuscitation from cardiac arrest. No comment about industry funding.


Level 1, fair, supportive. This study suggests in multivariate analysis an association between the treatment with high-volume hemofiltration and improved survival in patients after cardiac arrest. In multivariate analysis, the two groups with HF (hemofiltration only and hemofiltration plus hypothermia) were pooled for analysis. Six months survival curves of treatment groups and control group were statistically significant different, but survival rates were not. For this study, the hemofiltration circuits, catheters, and replacement fluid concentrates were provided by GAMBRO AB, with an estimated cost of €120 per patient treated by hemofiltration.