Crystalloid or colloid for partial exchange transfusion in neonatal polycythaemia: a systematic review and meta-analysis

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CRD summary
This review found that crystalloid solutions are as effective as colloid solutions for partial exchange transfusion in newborn babies with polycythaemia. The authors’ conclusions are in line with the evidence presented, but should be treated with caution given that they were based on a few small studies (4 studies involving 200 patients).

Authors’ objectives
To assess the relative efficacy and safety of crystalloid and colloid solutions for partial exchange transfusion (PET) in the treatment of polycythaemia in newborn babies.

Searching
MEDLINE, EMBASE and the Cochrane Controlled Trials Register were searched from inception to 2004; the search terms were reported. Reference lists of retrieved articles, personal files and abstracts from the Society for Pediatric Research were also screened.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) and quasi-randomised trials were eligible for inclusion.

Specific interventions included in the review
Studies that compared the use of crystalloid and colloid solutions in PET designed to reduce central haematocrit to 55% or less were eligible for the review. The crystalloids used in the included studies were normal saline and Ringers lactate; the colloids were fresh frozen plasma, albumin and a serum preparation.

Participants included in the review
The participants were newborn babies with documented central polycythaemia (central haematocrit 65% or more). One included study covered only symptomatic patients; in the remaining studies, patients could be either symptomatic or asymptomatic.

Outcomes assessed in the review
The outcomes of interest were long-term neurodevelopmental outcomes, short-term clinical outcomes, physiological and laboratory findings, and adverse events.

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

Assessment of study quality
Validity was assessed on the basis of: clear inclusion and exclusion criteria; reliability of the method of randomisation; allocation concealment; masking of the intervention; and completeness of follow-up. The authors did not state how the validity assessment was performed.

Data extraction
The authors did not state how many reviewers performed the data extraction.

For dichotomous outcomes, data on numbers of events in each group were used to calculate the relative risk (RR) and
its associated 95% confidence interval (CI). For continuous data, sample size, mean and standard deviation were used to calculate the weighted mean difference (WMD) and its associated 95% CI.

**Methods of synthesis**

*How were the studies combined?*

The studies were combined by meta-analysis using a random-effects model.

*How were differences between studies investigated?*

Statistical heterogeneity was assessed using the I-squared statistic. Differences between the studies were discussed in the text.

**Results of the review**

Six studies (n at least 219) were identified; however, two of these studies did not contain sufficient data, thus four RCTs (n=200) were included in the review.

The four included studies were of similar methodological quality. None of the studies reported long-term outcomes. There were no significant differences between treatment groups in terms of short-term clinical outcomes, physiological changes or laboratory outcomes. Three of the included studies reported no adverse events, while the fourth did not report whether or not any occurred. None of the outcomes subjected to meta-analysis showed significant heterogeneity.

**Authors' conclusions**

Crystalloid solutions are as effective as colloid solutions in PET for the newborn with polycythaemia.

**CRD commentary**

This review addressed a clear question and the inclusion criteria were clear. The authors searched a number of databases and other sources. The number of search terms used was limited and unpublished studies were not sought, so it is possible that relevant studies could have been missed. Publication bias was not assessed. It was unclear whether the search was limited by language, which makes it difficult to assess the risk of language bias. Similarly, most review methods were not reported, so the risk of bias and errors during the review process is unclear. Adequate details of the included studies were presented. Validity was assessed using appropriate criteria and the results were used in the analysis. Statistical heterogeneity was assessed and clinical differences between the studies were discussed. The authors' conclusions are in line with the evidence presented, but should be treated with caution in view of the fact that they were based on a few small studies.

**Implications of the review for practice and research**

**Practice:** The authors stated that as crystalloid solutions are as effective as colloids, and are cheaper and more readily available, they should be the replacement fluids of choice for PET.

**Research:** The authors did not state any implications for further research.

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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.