Albumin administration: what is the evidence of clinical benefit? A systematic review of randomized controlled trials

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CRD summary
This review assessed whether albumin confers significant clinical benefit in acute illness compared with other fluid regimens. The authors concluded that albumin does confer benefits in a wide array of clinical settings. The authors’ overall conclusion appears reliable, but the lack of an assessment of study quality and the limited reporting of individual studies make it difficult to assess the evidence presented.

Authors' objectives
To assess whether albumin confers significant clinical benefit in acute illness compared with other fluid regimens.

Searching
MEDLINE, EMBASE, the Cochrane Controlled Trials Register and the Cochrane Medical Editors Trial Amnesty of unpublished clinical trials were searched. No language restrictions were applied. The authors also handsearched general medical journals and Index Medicus, along with reference lists of completed reviews and protocols in the Cochrane Database of Systematic Reviews, other meta-analyses, review articles and reports of studies involving albumin. The authors of published albumin trials and the medical directors of albumin suppliers were contacted for additional relevant studies.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) were eligible for the review.

Specific interventions included in the review
Studies that compared albumin with crystalloids, artificial colloids, no albumin or lower dose albumin were eligible for inclusion. A variety of doses and regimens of albumin and control fluids were used; these were described in detail in the review.

Participants included in the review
Studies of patients from one of the following clinical indications were eligible for the review: cardiac surgery, non-cardiac surgery, hypoalbuminaemia, ascites, sepsis, burns and brain injury. The studies included both adult and paediatric patients.

Outcomes assessed in the review
The authors did not state any inclusion criteria relating to the outcomes. The included studies assessed a range of outcomes; these were described in detail in the review.

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
The authors did not state that they assessed validity.

Data extraction
Two reviewers independently extracted the data, with any disagreements resolved through discussion. Data on the clinical setting, fluid regimen and results were extracted.

Methods of synthesis
How were the studies combined?
The studies were grouped according to the category of clinical indication and summarised in a narrative. The authors stated that a quantitative meta-analysis was not attempted in view of the diversity of the end points addressed.

How were differences between studies investigated?
Heterogeneity was not formally assessed.

Results of the review
Seventy-nine RCTs with a total of 4,755 participants were included in the review.

In 14 of the 79 included trials there were potential confounding factors, such as the administration of concomitant albumin to all groups, or significantly higher baseline serum albumin levels in the control groups. The presence of these factors might have reduced the true treatment effects.

In 58 trials there was some form of clinical benefit in the albumin group compared with the control group, in 20 trials there was no significant difference between groups, and in one trial there was a negative effect in the albumin group compared with the control group.

Cardiac surgery (31 trials, 1,559 participants): albumin administration resulted in lower fluid requirements, higher colloid oncotic pressure, reduced pulmonary oedema with respiratory impairment and greater haemodilution compared with crystalloids; albumin reduced post-operative bleeding compared with hydroxyethylstarch.

Non-cardiac surgery (17 trials, 999 participants): albumin administration resulted in lower fluid requirements and reduced pulmonary and intestinal oedema compared with crystalloids.

Hypoalbuminaemia (9 trials, 536 participants): higher doses of albumin administration resulted in reduced morbidity.

Ascites (10 trials, 942 participants): albumin administration resulted in reduced haemodynamic derangements, morbidity and length of stay, and improved survival after spontaneous bacterial peritonitis.

Sepsis (4 trials, 104 participants): albumin administration resulted in reduced pulmonary oedema and pulmonary dysfunction compared with crystalloids; hydroxyethylstarch induced abnormalities of haemostasis.

Burns (4 trials, 197 participants): albumin administration resulted in decreased complications compared with crystalloids.

Brain injury (4 trials, 418 participants): albumin administration resulted in reduced mortality, disability and neurological deficits.

Authors’ conclusions
Albumin confers benefits in a wide array of clinical settings. Further trials to delineate optimal fluid regimens in particular indications, such as hypoalbuminaemia and burns, are warranted.

CRD commentary
The review question was clear in terms of the study design, participants and interventions of interest. The search strategy was comprehensive, reducing the potential for publication bias. The data extraction was performed in duplicate, thus reducing the potential for error or reviewer bias. However, the authors did not describe the process used to select the studies and study validity was not formally assessed. Details of the primary studies were tabulated. The narrative synthesis was appropriate given the heterogeneity between studies. The authors’ overall conclusion appears reliable, but the lack of study quality assessment and the limited reporting of individual studies make it difficult to assess the evidence presented.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that further trials are warranted to delineate optimal fluid regimens in particular
indications (e.g. hypoalbuminaemia and burns), and to define more precisely the appropriate roles for albumin in particular indications and populations.

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