WBC-containing allogeneic blood transfusion and mortality: a meta-analysis of randomized controlled trials

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CRD summary
This review assessed whether there was an association between allogeneic blood transfusions (ABT) and mortality across different clinical settings. The author found no association between ABT and mortality. The conclusion appears consistent with the data presented, but the lack of both a quality assessment and details of the included studies makes it difficult to determine the reliability of the findings.

Authors' objectives
To assess through meta-analysis whether there was an association between allogeneic blood transfusion (ABT) and mortality across different clinical settings.

Searching
MEDLINE was searched from January 1992 to August 2002 for English language studies. In addition, the bibliographies of all retrieved articles were checked and the supplements of transfusion medicine, haematology and anaesthesiology journals were handsearched (between 1997 and 2002) for relevant abstracts.

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

Specific interventions included in the review
Studies that had administered non-white blood cell (WBC)-reduced allogeneic red blood cells (RBCs) or whole blood to the treatment arm, and either WBC-reduced allogeneic RBCs (or whole blood) and/or autologous blood obtained by pre-operative autologous blood donation, acute normovolemic haemodilution, intra-operative blood recovery and/or post-operative blood recovery, were eligible for inclusion.

Participants included in the review
No inclusion criteria were specified in relation to the participants. The participants came from a number of clinical settings, including patients for open-heart surgery, colorectal surgery, aortic aneurysm repair, resection of gastrointestinal malignancies, burn trauma surgery, HIV-seropositive and general hospitalised patients.

Outcomes assessed in the review
Studies that had assessed an adverse immunomodulatory effect of ABT (including cancer recurrence, post-operative infection, mortality or virus activation), and had reported the odds ratio (OR) of mortality from all causes in the treatment versus the control arm, were included.

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 assessment.

Assessment of study quality
The author did not state that they assessed validity.

Data extraction
The author stated that the data were extracted using a standardised data abstraction form, but did not report how many
reviewers were involved in this process. Data were extracted on the clinical setting, sample size, RBC products given to the intervention and control groups, the length of follow-up and overall mortality. The OR for mortality in the treatment versus the control group, along with 95% confidence intervals (CIs), were calculated for each study according to an intention-to-treat analysis.

Methods of synthesis
How were the studies combined?
The studies were combined in a meta-analysis using a random-effects model.

How were differences between studies investigated?
The studies were assessed for heterogeneity of the results using the Q test statistic (P>0.10). In the trials reporting short-term mortality, differences between the studies were investigated by stratifying the studies according to the clinical setting in which the trial had been conducted; the RBC component given to the treatment and control arms; and whether mortality had been recorded as a primary or secondary end point in the trial. Differences between the RCTs reporting on long-term mortality were not assessed because only 3 studies were available for analysis.

Results of the review
Fourteen RCTs (n=8,638) were included.

There was no evidence of significant statistical heterogeneity between either the 12 RCTs that reported on short-term mortality, or the 3 RCTs that assessed long-term mortality.

There were no significant associations between either ABT and short- or long-term mortality; the ORs were 1.20 (12 RCTs; 95% CI: 0.87, 1.65) and 0.87 (3 RCTs; 95% CI: 0.64, 1.19), respectively. RCTs using autologous blood, or conducted in abdominal or vascular surgery patients, showed no difference in mortality. Three RCTs in patients undergoing open-heart surgery showed a significant increase in short-term mortality (OR 2.26, 95% CI: 1.31, 3.90), while the 7 RCTs that compared recipients of non-WBC-reduced versus WBC-reduced allogeneic RBCs filtered before storage showed a significant increase in mortality for the latter (WBC-reduced allogeneic RBCs) (OR 1.45, 95% CI: 1.00, 2.11).

Authors’ conclusions
There was no significant association between ABT and either short- or long-term mortality across different clinical settings and transfused RBC components. However, subgroup analyses suggested that there might be a significant association between WBC-containing ABT and short-term mortality in open-heart surgery patients, where WBC-reduced allogeneic RBCs filtered before storage were used.

CRD commentary
The review question was clear in terms of the study design, intervention and outcomes. An adequate number of sources were searched for relevant studies. No attempts were made to minimise language bias, but some attempts were made to reduce publication bias. The methods used to select the studies and assess quality were not described, so it is not known whether any efforts were made to reduce errors and bias. In addition, since a validity assessment was not undertaken, it is not possible to comment on whether the quality of the primary studies could have affected the results of the review. The data were appropriately combined in a meta-analysis and heterogeneity was assessed. Differences between the studies were adequately explored in subgroup analyses. Overall, the author’s conclusions are consistent with the evidence reviewed and appears valid.

Implications of the review for practice and research
Practice: The author did not state any implications for practice. Research: The author stated that further trials of the association of ABT with mortality should focus on patients undergoing open-heart surgery, and should administer allogeneic RBCs filtered before storage to the control arm.
Bibliographic details

PubMedID
12823758

Indexing Status
Subject indexing assigned by NLM

MeSH
Blood Component Removal; Blood Transfusion, Autologous; Cardiac Surgical Procedures /mortality; Colorectal Neoplasms /surgery; Erythrocyte Transfusion /mortality; HIV Seropositivity /therapy; Humans; Leukocytes; Odds Ratio; Randomized Controlled Trials as Topic; Transplantation, Homologous; Vascular Surgical Procedures

AccessionNumber
12003001379

Date bibliographic record published
31/07/2005

Date abstract record published
31/07/2005

Record Status
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.