Meta-analysis of randomized controlled trials investigating the risk of postoperative infection in association with white blood cell-containing allogeneic blood transfusion: the effects of the type of transfused red blood cell product and surgical setting

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Authors' objectives
To determine the incidence of post-operative infection in patients receiving non-white blood cell (WBC)-reduced or WBC-reduced allogeneic red blood cells (RBCs).

Searching
MEDLINE (up to 2001) and the references of retrieved articles were searched. The search was restricted to English language literature.

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 compared non-WBC-reduced allogeneic RBCs or whole blood with WBC-reduced allogeneic RBCs or whole blood were eligible for inclusion. The included studies compared whole blood versus WBC-reduced whole blood, RBCs versus WBC-reduced RBCs, or buffy-coat-reduced RBCs versus WBC-reduced RBCs.

Participants included in the review
There were no specific inclusion criteria for the participants. Those included were patients who underwent either colorectal, gastrointestinal or open-heart surgery.

Outcomes assessed in the review
Studies evaluating post-operative bacterial infection, where the odds ratio (OR) was given or could be calculated according to intention-to-treat, were eligible for inclusion.

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 selection.

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

Data extraction
The author did not state how the data were extracted for the review, or how many reviewers performed the data extraction. The numbers of patients in the treatment and control groups with post-operative infections were extracted.

Methods of synthesis
How were the studies combined?
Studies that were statistically and clinically homogeneous were combined in a meta-analysis using the random-effects method of DerSimonian and Laird to estimate summary ORs with 95% confidence intervals (CIs).

How were differences between studies investigated?
Statistical heterogeneity was determined using the Q test. The RBC product given to both groups (treatment and
control) and surgical setting were investigated as possible sources of heterogeneity by conducting stratified analyses.

**Results of the review**

Eight studies (n=3,961) met the inclusion criteria.

Based on 3 RCTs, non-buffy-coat-reduced allogeneic RBCs or whole blood was associated with a 77% increase in the odds of post-operative infection compared with WBC-reduced allogeneic RBCs (OR 1.77, 95% CI: 1.02, 3.09).

Based on 5 RCTs, buffy-coat-reduced allogeneic RBC transfusion did not increase the odds of post-operative infection compared with pre-storage filtered RBCs (OR 1.19, 95% CI: 0.87, 1.63).

Based on 4 RCTs, WBC-containing allogeneic blood transfusion led to a greater than 2-fold increase in the odds of infection compared with post-storage filtered allogeneic whole blood or RBCs (OR 2.25, 95% CI: 1.20, 4.25).

In 3 RCTs of patients undergoing heart surgery, buffy-coat-reduced allogeneic RBC transfusion did not increase the odds of post-operative infection compared with allogeneic RBCs filtered before storage (OR 1.30, 95% CI: 0.89, 1.89). In 2 RCTs of patients undergoing abdominal surgery, buffy-coat-reduced allogeneic RBC transfusion did not increase the odds of post-operative infection compared with allogeneic RBCs filtered before storage (OR 1.10, 95% CI: 0.60, 2.03).

**Authors’ conclusions**

The author concluded that the results of the review:

supported the hypothesis that any increased risk of post-operative infection when receiving WBC-containing allogeneic blood transfusion depends on the WBC content of the RBC product administered;

provided no evidence to support the hypothesis that RBC products filtered before storage rather than after, when given to the control group, are more effective in eliminating any increase in the risk of post-operative infection attributed to allogeneic blood transfusion-related immunomodulation; and

showed no benefit of pre-storage WBC reduction in comparison with post-storage WBC reduction.

**CRD commentary**

The review addressed a clear question, but the search for eligible studies was very limited. Publication and language bias may have been introduced, as there was no attempt to locate unpublished data and the search was restricted to literature in English. It was not possible to assess the methodological rigour of this review since there was no information on the methods for selecting the studies, assessing validity or extracting the data. Overall, the included studies showed clinical and statistical heterogeneity. The author's decision not to pool the ORs for all studies was, therefore, appropriate. The author's conclusions seem to be appropriate given the evidence provided.

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

**Practice:** The author did not state any implications for practice.

**Research:** The author suggested that further comparisons of recipients of buffy-coat-reduced versus pre-storage-filtered allogeneic RBCs should not be undertaken. Further RCTs, in which non-buffy-coat-reduced allogeneic RBCs are given in the treatment group, are also required to determine whether a deleterious immunomodulating effect of allogeneic blood transfusion exists.

**Bibliographic details**

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**Other publications of related interest**

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