Leukodepleted-ABO-identical blood components in the treatment of hematologic malignancies: a cost analysis

Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
ABO-identical, filtered leukodepleted transfusions.

Type of intervention
Treatment

Economic study type
Cost-effectiveness analysis

Study population
Adults with acute leukaemia or relapsed lymphoma.

Setting
Hospital. The economic analysis was performed in New York, USA.

Dates to which data relate
Effectiveness and resource data was taken from 1985-1992. 1992 prices were used.

Source of effectiveness data
Based on a single study.

Link between effectiveness and cost data
Costs were collected retrospectively to the same patient population as that used in the effectiveness analysis.

Study sample
No power calculations were reported. For patients undergoing autologous bone marrow transplantation for lymphoma 20 patients received ABO-unmatched-unfiltered transfusions (average age 35); 29 patients received only ABO-identical-filtered leukodepleted blood (average age 38). For patients receiving remission induction therapy for acute leukaemia 65 patients received ABO-unmatched-unfiltered (average age 57), 22 received ABO-identical-unfiltered (average age 22) and 33 received ABO-identical-filtered transfusions (average age 50).

Study design
Historical case-control study, single centre. Duration of follow-up was not specified. There was no loss to follow-up.
Analysis of effectiveness
Analysis was conducted on intention to treat basis. Main outcomes were platelet and red cell transfusion requirements. Comparability of groups was addressed and adjustment was made for confounding variables.

Effectiveness results
The ABO-identical-filtered leukodepleted group affected by lymphoma showed a reduction in the use of platelet concentrates (71 U vs 143; p = 0.0008) and in the use of red cells (9 U vs 16; P = 0.02). The three groups of patients affected by leukaemia required similar numbers of red cell transfusions. Mean platelets transfused decreased from 146 (ABO-unmatched - unfiltered) to 117 (ABO - identical - unfiltered) to 83 (ABO - identical -filtered) (p = 0.014).

Measure of benefits used in the economic analysis
Platelet and red cell transfusion requirements.

Direct costs
Costs and quantities were analysed separately. Costs included in the analysis were all hospital charges. Costs were broken down into room charges and ancillary services charges (microbiology, haematology, chemistry, anatomic pathology, blood gases, blood bank, respiratory therapy and pharmacy). In order to convert charges from one year to comparable data for another year, a number of approaches were taken: (1) the actual number of charges issued for each cost element were analysed (2) a rounded, compounded, overall inflation factor (medical care component of the Consumer Price Index) was applied to convert charge data to 1992 dollars, and adjustments made following further analysis using room charges as the indicator; (3) the dollar value per charge for each cost element to determine whether the inflation adjustment alone was likely to have led to differences in total charges for individual patients;(4) hospital accounting information of the relationship between charges and costs in 1992 were used to estimate the dollars that were saved/lost in patients receiving the ABO identical, filtered transfusion regimen.

Currency
US dollars ($).

Sensitivity analysis
Not performed.

Estimated benefits used in the economic analysis
The ABO-identical-filtered leukodepleted group affected by lymphoma showed a reduction in the use of platelet concentrates (71 U vs 143; p = 0.0008) and in the use of red cells (9 U vs 16; P = 0.02). The three groups of patients affected by leukaemia required similar numbers of red cell transfusions. Mean platelets transfused decreased from 146 (ABO-unmatched - unfiltered) to 117 (ABO - identical - unfiltered) to 83 (ABO - identical -filtered) (p = 0.014).

Cost results
For patients receiving autologous bone marrow transplantation for lymphoma striking decreases in length of stay and almost every charge category occurred, including platelet transfusions,when ABO-identical platelets/filters were used. The ABO-identical-filtered leukodepleted recipient group had significantly reduced mean total hospital charges ($67,045 vs. $113,454, p=0.0003), total ancillary service charges ($30,165 vs. $56,051, p=0.0004) and pharmacy charges ($10,027 vs. $17,671, p=0.0008) compared with the recipients of ABO-unmatched-unfiltered transfusions. The mean savings in blood component purchase were $4,127, which exceeded the mean costs of purchasing red cell and platelet filters ($643). For patients undergoing remission therapy for acute leukaemia, the need for most support services also decreased significantly in the ABO-identical-filtered group. Moreover the filter cost per patient was less than the mean platelets transfused costs ($875 vs $3283).
Synthesis of costs and benefits
The ABO-identical platelets filtered leukodepleted strategy is dominant.

Authors' conclusions
Introduction of ABO identical platelets and filtration leukodepletion were implemented with substantial decreases in costs. These findings are (1) currently unexplained by any other known factor (2) of sufficient magnitude to render it unlikely that known bias or confounding could explain the differences seen and (3) have plausible biological mechanisms for which there is substantial scientific and clinical evidence in controlled randomised animal and human experiments.

CRD Commentary
This is a thorough and detailed retrospective cost analysis of the effects of the introduction of ABO-identical-filtered transfusions into one hospital in the US. As the authors note further research into possible reductions in morbidity are required. No sensitivity analyses were performed.

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