



Title	Cost Effectiveness of Cell Salvage and Alternative Methods of Minimizing Perioperative Allogeneic Blood Transfusion: A Systematic Review and Economic Model
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Aim

To compare patient outcomes, resource use, and cost to the NHS associated with cell salvage and alternative methods of minimizing perioperative allogeneic blood transfusion, and to assess the impact of changes in the use of cell salvage on the NHS and the National Blood Service.

Conclusions and results

Preoperative autologous donation (PAD) reduced the risk of allogeneic blood transfusion by 64% (RR=0.36; 95% CI: 0.25, 0.51) for active vs control studies. PAD plus erythropoietin (EPO) reduced exposure to allogeneic blood transfusion by a relative 44% (95% CI 26%–57%) in orthopedic surgery and 64% (95% CI 12%–85%) in cardiac surgery. Fibrin sealants reduced the relative risk of exposure to allogeneic transfusion by a relative 54% (95% CI 32%–68%). EPO alone reduced exposure to allogeneic blood transfusion by a relative 51% (95% CI 36%–62%) in orthopedic surgery and did not significantly reduce exposure to allogeneic blood in cardiac surgery (RR 0.40, 95% CI 0.13, 1.22). Cell salvage reduced the relative risk of exposure to allogeneic blood by a relative 41% (95% CI 27%–52%). Tranexamic acid reduced the relative risk of exposure to allogeneic blood by 34% (95% CI 19%–46%). Acute normovolemic hemodilution (ANH) reduced the relative risk of exposure to allogeneic blood by 31% (95% CI 16%–44%). Aprotinin reduced the relative risk of exposure to allogeneic transfusion by 30% (95% CI 24%–36%). Epsilon aminocaproic acid resulted in a statistically nonsignificant reduction in exposure to allogeneic blood (RR 0.48, 95% CI 0.19, 1.19). The use of a restrictive transfusion threshold reduced exposure to allogeneic and/or autologous blood transfusion by a relative 42% (95% CI 29%–53%) compared to control. Poor methodological quality, significant heterogeneity, and inadequate reporting of long-term clinical outcomes were evident and should be considered when assessing the evidence of effectiveness. Cell salvage was likely to be cost effective compared to all of the alternative transfusion strategies except ANH. The expected cost of cell

salvage in the primary analysis was GBP 4930 per person. The incremental saving associated with cell salvage ranged from GBP 28 to GBP 336 per person. ANH and fibrin sealants had lower expected costs than cell salvage. Cell salvage was associated with improved outcomes compared to all the alternative transfusion strategies except PAD. This translated to a small gain in QALYs. The probability that cell salvage is cost effective compared to all the alternative strategies except ANH was more than 50%. ANH was likely to be more cost effective than cell salvage. Washed intraoperative cell salvage was more cost effective than unwashed postoperative cell salvage for cardiac surgery. Unwashed postoperative cell salvage appeared to be more cost effective than washed intraoperative cell salvage for orthopedic surgery.

Recommendations

All of the transfusion strategies to minimize the use of perioperative allogeneic blood transfusion significantly reduced exposure to allogeneic blood. Cell salvage appeared to be cost effective in elective surgery compared to all other transfusion strategies except ANH. However, data for the model were generally poor quality, and results of the economic analysis should be treated with caution.

Methods

See Executive Summary link above.

Further research/reviews required

Adequately powered, high-quality RCTs directly comparing the included blood transfusion strategies that report long-term clinical outcomes are needed to assess the clinical value of avoiding allogeneic blood transfusion and receiving autologous blood transfusion. Observational and tracking studies are required to assess the likelihood of adverse events associated with allogeneic and autologous blood transfusion and their impact on mortality, health status, and health-related quality of life.