Cost-effectiveness analysis of OKT3 induction therapy in cadaveric kidney transplantation

Shield C F, Jacobs R J, Wyant S, Das A

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
The use of OKT3 induction regimen in cadaveric kidney transplant recipients.

Type of intervention
Secondary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
Patients undergoing cadaveric kidney transplant for end stage renal disease (ESRD).

Setting
Hospital. The economic study was conducted in the USA.

Dates to which data relate
The effectiveness and resource use data were obtained from a previously published randomised study in 1993. The costing related to graft failure or patient death during the transplantation stay was carried out based on a separate study published in 1991. The fiscal year was 1992.

Source of effectiveness data
Effectiveness data were derived from a single study.

Link between effectiveness and cost data
Costing was retrospectively undertaken mostly on the same patient sample as that used in the effectiveness study. The costing related to graft failure or patient death during the transplantation stay was carried out based on a separate study of 396 patients.

Study sample
No power calculations were reported. Cadaveric transplant recipients from 5 centres were randomly assigned to receive either OKT3 induction (n=105) or conventional therapy(n=102).

Study design
The study was a randomised trial, carried out in five centres. The duration of the follow-up was five years. The study had no loss to follow-up.
Analysis of effectiveness
The principle (intention to treat or treatment completers only) used in the analysis of effectiveness was not explicitly specified. The main health outcome used in the analysis was the length of graft survival.

Effectiveness results
At 5 years post-transplantation, the number of grafts surviving per 100 patients was 73 with a total of 369 years of graft survival in the OKT3 group and 64 with a total of 332 years of graft survival in the conventional group (P=0.158).

Clinical conclusions
The two treatment groups were pronounced equivalent in terms of clinical characteristics. However, "a trend toward improved graft survival was detected in the OKT3 group (P=0.158)."

Modelling
Cost-effectiveness was modelled through the expected duration of graft survival based on assumptions regarding long-term graft survival and future treatment costs. Graft failure rate was assumed to be 4% annually in both groups.

Measure of benefits used in the economic analysis
The main benefit measure used in the analysis was the length of graft survival evaluated using Kaplan-Meier estimation.

Direct costs
Costs were discounted. Direct health service costs were considered, which included the average charges for organ procurement, routine hospital care, rejection episodes, infections and outpatient follow-up costs, dialysis and physician visits. The cost analysis was performed both from the perspective of a provider of the care and an insurer. The sources of average provider charge data were different national agencies. The date of the price data was 1992. The costs of re-transplantation and re-initiating of dialysis were not included in the cost analysis.

Statistical analysis of costs
Kolmogrov D statistic was used to test the normality of cost variables. Since they were not found to be normally distributed Wilcoxon rank sum test was used.

Indirect Costs
Not considered.

Currency
US dollars ($).

Sensitivity analysis
A set of one-way sensitivity analyses were performed on discount rate, long-term graft failure rate, Medicare reimbursements in place of charges, and some cost variables. A "worst case" sensitivity analysis was also performed.

Estimated benefits used in the economic analysis
At 5 years post-transplantation, the number of grafts surviving per 100 patients was 73 with a total of 369 years of
graft survival in the OKT3 group and 64 with a total of 332 years of graft survival in the conventional group (P=0.158). Total years of graft survival at 22 years post transplantation (estimated time when the last study graft ceases to function) was 741 in the OKT3 group versus 635 in the conventional group. The discount rate applied was 5%.

Cost results
The discount rate was 5%. OKT3 induction uniformly added $8,219 to the cost of transplant hospitalisation. Most of this cost was offset by a reduction in the cost of treating rejection episodes in the OKT3 group (p<0.002). Through 5 years of follow-up, the total costs were $11,244,800 with OKT3 versus $10,852,100 with the conventional regimen. The total costs at the end of graft survival (22 years post-transplantation) were $14,412,100 in the OKT3 group versus $13,528,600 in the conventional group.

Synthesis of costs and benefits
Costs and benefits were combined using an incremental cost-effectiveness ratio. Through 5 years of follow-up, costs per year of graft survival were $30,474 with OKT3 versus $32,687 with the conventional regimen. The incremental cost-effectiveness ratio of OKT3 relative to the conventional regimen at 5-year follow-up was $10,614; at 22 years post-transplantation it was $8,335. The sensitivity analysis established the relative robustness of the results to changes in discount rate and long-term graft failure rate. Changes in other parameters of the model had sizeable effects on the absolute and relative values of the incremental cost-effectiveness ratio.

Authors' conclusions
The authors conclude that OKT3 induction improves the cost-effectiveness of kidney transplantation.

CRD COMMENTARY - Selection of comparators
The reason for the choice of the comparator is clear.

Validity of estimate of measure of effectiveness
Given the use of a randomised design in the effectiveness study the results are likely to be internally valid.

Validity of estimate of costs
Quantities were not systematically reported separately from the costs, although cost items were reported separately. Adequate details of methods of cost estimation were given. The study lacked a prospective study design for cost analysis. As acknowledged by the authors, the definitions of costs and effectiveness in the study were quite narrow.

Other issues
The issue of generalisability to other settings or countries was addressed.

Source of funding
Partially supported by a research grant from Ortho Biotech Inc, Raritan, NJ.

Bibliographic details

PubMedID
8651251

Other publications of related interest