Economic costs of expanded criteria donors in renal transplantation

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 kidneys from "expanded criteria" donors (ECDs) in renal transplantation. Five types of ECD were considered: donors aged 5 years or under, those aged at least 55 years, those with a history of hypertension, those with a history of diabetes mellitus, and those with nonheartbeating status.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population was comprised of patients undergoing renal transplantation.

Setting
The study setting was hospital. The economic study was carried out in Cincinnati, USA.

Dates to which data relate
The effectiveness and resource use data were obtained from a cohort of patients discharged in 1995. The price year was 1995.

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

Link between effectiveness and cost data
The costing was undertaken retrospectively on the same patient sample as that used in the effectiveness analysis.

Study sample
Power calculations were not used to determine the sample size. The study sample consisted of 78 cadaveric renal recipients: 38 in the ECD group with a mean age of 45.8 (standard deviation, SD=11) years, and 40 in the non-ECD group with a mean age of 44.6 (SD=12) years.

Study design
This was a retrospective cohort study carried out in a single centre. The duration of the follow-up was 1 year and no loss to follow-up was reported.
Analysis of effectiveness
The health outcome measures at 1 year after transplantation were patient and graft survival, cold ischaemic time (CIT), the percentage of patients needing haemodialysis, length of stay, serum creatinine level, the percentage of patients receiving antilymphocyte induction therapy, the incidence of rejection, and the number of readmissions. There was no significant difference in demographic characteristics such as age, race, gender, percentage of diabetics and percentage of retransplant patients, between the two groups.

Effectiveness results
The effectiveness results were as follows:

Patient survival at 1 year: ECD group 97.5% and non-ECD group 95%, (p = non significant).

Graft survival: ECD group 84% and non-ECD group 85%, (p = non significant).

Mean CIT: ECD group 31.4 (SD=12) hours and non-ECD group 24 (SD=9) hours, (p<0.05).

Patients requiring haemodialysis: ECD group 53% and non-ECD group 30%, (p<0.05).

Length of stay: ECD group 19 (SD=13) days and non-ECD group 12 (SD=7) days, (p<0.05).

Serum creatinine level: ECD group 2.1 (SD=9) mg/dL and non-ECD group 1.6 (SD=4) mg/dL, (p<0.01).

Percentage of patients receiving antilymphocyte induction therapy: ECD group 89% and non-ECD group 80%, (p = non significant).

Incidence of rejection: ECD group 32% and non-ECD group 18%, (p = non significant).

Number of readmissions: ECD group 1.7 (SD=2.2) and non-ECD group 1.4 (SD=1.6), (p = non significant).

Clinical conclusions
Morbidity was more pronounced in the ECD group on account of the significantly higher incidence of delayed graft function, as measured by the need for post-operative dialysis, length of stay and average serum creatinine level found in recipients of ECD organs. If higher serum creatinine levels are found to be markers of lower creatinine clearances in the ECD group, it is possible that long-term graft survival will deteriorate in this group.

Measure of benefits used in the economic analysis
No summary benefit measure was identified in the economic analysis, and only separate clinical outcomes were reported. The study should, therefore, be classified as a cost-consequences analysis.

Direct costs
Costs were not discounted since the period of follow-up was 1 year. Some quantities were reported separately from the costs. Cost items were reported separately, but only in terms of increases due to ECD with respect to non-ECD. Cost analysis covered hospital costs such as pharmacy, room and board, laboratory medicine, intensive care unit, radiology and operating room. A hospital perspective appeared to have been adopted. The collection of all financial data was based on an activity-based cost-accounting system (HBOC Trendstar). The cost analysis only included the hospital costs incurred for the initial transplant admissions. 1995 price data were used.

Statistical analysis of costs
A t-test was used to compare the study groups in terms of cost components and total costs. The correlation between hospital costs, as the dependent variable, and clinical variables was examined in order to identify the variables suitable
for inclusion in a stepwise multivariable linear regression model.

**Indirect Costs**
Indirect costs were not considered.

**Currency**
US dollars ($).

**Sensitivity analysis**
No sensitivity analysis was conducted.

**Estimated benefits used in the economic analysis**
See effectiveness results reported previously.

**Cost results**
The ECD kidneys had a higher average cost of $12,190 (median $10,911) compared with non-ECD controls, (p<0.01). For ECD kidneys transplanted into high-risk patients, the average cost was $15,311 higher than for ECD kidneys transplanted into non-high-risk recipients (p<0.05), and $20,680 more than when non-ECD kidneys were transplanted into non-high-risk patients, (p<0.05).

**Synthesis of costs and benefits**
Cost and benefits were not combined.

**Authors' conclusions**
Kidney transplantation with organs from ECDs is significantly more expensive than with organs from non-ECDs, despite similar graft survival rates. However, if renal transplant programmes should limit the use of organs from ECDs on the basis of short-term financial concerns, it is possible there could be a long-term cost to society.

**CRD COMMENTARY - Selection of comparators**
The reason for the choice of the comparator was clear. You, as a user of this database, should consider if the criteria used in this study to distinguish ECDs from non-ECDs are relevant to your own setting.

**Validity of estimate of measure of benefit**
The internal validity of the effectiveness results can not be fully assured due to the retrospective design adopted for the study. However, the authors undertook appropriate statistical analysis in order to address the issue of confounding, and to assess the difference in terms of clinical outcomes between the two groups.

**Validity of estimate of costs**
All the relevant direct costs from the hospital perspective were included in the analysis, and adequate details of methods of cost estimation were given. Only incremental costs of kidney transplantation with organs from ECDs, with respect to non-ECDs, were reported; it would have been interesting to have known unit costs and total costs for the two kinds of transplantation. The costs are likely to be specific to the setting where the study has been undertaken.

**Other issues**
The issue of generalisability was not addressed by a sensitivity analysis, but the authors did compare their results with other published studies. Some of the findings of this study differed from those of other investigations, for example, a study by Rosenthal et al. which demonstrated a significant difference between ECD and non-ECD transplants in terms of graft survival after 1 year (see Other Publications of Related Interest). The multivariate analysis demonstrated that length of stay is a strong proxy for total hospital costs.

**Implications of the study**
Further study is needed to determine the cost-effectiveness of renal transplantation utilising kidneys from ECDs vis-a-vis haemodialysis.

**Source of funding**
None stated.

**Bibliographic details**

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**Other publications of related interest**

**Indexing Status**
Subject indexing assigned by NLM

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