Evaluatie van het groningse longtransplantatieprogramma: overleving, kwaliteit van leven en kosteneffectiviteit [The evaluation of the lung transplantation program at Groningen: survival rate, quality of life, and cost-effectiveness]


**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**

Lung transplantation.

**Type of intervention**

Treatment.

**Economic study type**

Cost-effectiveness analysis and cost-utility analysis.

**Study population**

Male and female patients with various lung diseases: emphysema, chronic obstructive pulmonary diseases (COPD), cystic fibrosis, pulmonary hypertension, lung fibrosis, and others.

**Setting**

Hospital. The economic study was conducted in Groningen, the Netherlands.

**Dates to which data relate**

Effectiveness data were collected from November 1990 up to March 1995. Data on survival and quality of life were updated to February 1996. Costs and resource data were based on the period until April 1995. The price year was 1992.

**Source of effectiveness data**

Effectiveness data were derived from a single study.

**Link between effectiveness and cost data**

Costing was undertaken prospectively, and on the same patient sample as that used in the effectiveness study.

**Study sample**

All 526 patients who entered the lung transplantation programme at the Academic Hospital Groningen (the only hospital in the Netherlands performing lung transplants at the time of the study) in the period November 1990 to March 1995 participated in the study. 50% of the sample were male and the mean age was 43 years. Because of the expected positive results of transplantation randomisation was not considered on ethical grounds. Therefore, for the calculation of effects without transplantation, the period before transplantation was used. Seventy-six patients underwent lung transplantation. No power calculations were used to determine the sample size.
Study design
This study was a single centre, non-randomised trial with the controls being patients before transplantation and the intervention patients being patients after transplantation.

Analysis of effectiveness
The analysis was based on treatment completers only. The principal health outcomes assessed were life years gained and quality-adjusted life years (QALYs). In the analyses, only patients who completed questionnaires (Nottingham Health Profile, State-trait Anxiety Inventory, Zung depression scale, Karnofsky scale, Index of well-being, EuroQol) before transplantation and 1, 4, 7, 13 and 19 months after transplantation were included. The number of non-responders was not stated. The number of life years gained was calculated by comparing the mean number of expected life years with and without transplantation. The expected number of life years with transplantation was based on observed survival and world-wide data on the survival of patients after lung or heart transplantation. The expected number of life years without transplantation was based on survival data for patients waiting for a lung transplantation. To assess the effect of lung transplantation on survival, survival with or without transplantation was compared from the moment patients were placed on the waiting list. The effect of lung transplantation on survival was assessed by means of a Cox multiple-regression analysis in which the date of transplantation was included as a time-dependent covariable.

Effectiveness results
Lung transplantation led to a significant improvement in survival and quality of life. In comparison with the period before transplantation, the average gains in life years was estimated to be 4.4 and average gain in QALYs was estimated at 5.2.

Clinical conclusions
Lung transplantation leads to improvement in survival and quality of life.

Measure of benefits used in the economic analysis
The benefit measures were life-years gained and QALYs. Data were collected through prospective registration and questionnaires. To assess the number of QALYs gained, the number of life years gained was multiplied by the corresponding utilities (i.e. a calculation of quality of life). To assess the effect of lung transplantation on quality of life, a longitudinal analysis was performed, in which the quality of life of the same group of patients was compared at different times before and after transplantation. Utilities were assessed with the EuroQol instrument. Utilities in the situation without transplantation were also based on EuroQol scores while patients were on the waiting list for transplantation.

Direct costs
Direct costs included costs of transplantation and the costs of conventional care without transplantation. Costs and quantities were not reported separately. Data were recorded in each phase of the lung transplantation programme, about both costs of the programme itself and the costs of conventional treatment. Costs were based on actual data. The costs were predominantly based on 1992 prices. Discounting was applied at a rate of 5% per annum.

Statistical analysis of costs
Not carried out.

Indirect Costs
Total costs were calculated from a societal perspective by including productivity losses and travel expenses in the economic analysis. These data were likely to have been derived from the questionnaire.
Currency
Dutch guilders (Dfl).

Sensitivity analysis
No sensitivity analysis was carried out.

Estimated benefits used in the economic analysis
Lung transplantation led to a significant improvement in survival and quality of life. In comparison with the period before transplantation the average gain in life years and QALYs was estimated at 4.4 and 5.2 respectively. Discounting was applied at a rate of 5% per annum.

Cost results
The average cost per patient in the programme was estimated to be Dfl 670,000 (For currency conversion Dfl 1 = approximately $0.5). Approximately 90% of this total was due to direct medical costs. The incremental cost for transplantation patients was Dfl 536,000 and the savings were Dfl 134,000. 70% of these were due to direct medical costs. Long-term costs were calculated by means of extrapolation.

Synthesis of costs and benefits
Incremental cost per life year gained and cost per QALY were calculated. The average costs per life year and QALY gained were estimated at Dfl 153,000 and Dfl 120,000 (both discounted at 5% per year) respectively.

Authors' conclusions
Lung transplantation leads to an improvement in survival and quality of life. However, it involves considerable additional costs and the cost-effectiveness is unfavourable when compared to other Dutch transplantation programmes (e.g. heart and liver transplants).

CRD COMMENTARY - Selection of comparators
The rationale for the choice of comparator (no transplantation) was clear and was justified by the authors.

Validity of estimate of measure of benefit
Due to the study design (patients were effectively their own controls) and the use of reliable instruments to determine utility scores, the results are likely to have high internal validity. There is some doubt, however, concerning the numbers of and reasons for non-response to the questionnaire.

Validity of estimate of costs
There were some limitations in the reporting of cost data as costs and quantities were not reported separately and no statistical or sensitivity analyses were undertaken, and this may limit the generalisability of the results to other settings.

Other issues
The survival statistics of patients who underwent transplant were favourable compared to international data which will have an impact on the results. Good comparisons were made with other studies in the light of these considerations. Bearing in mind the caveats above the authors' conclusions are likely to be reliable and informative in deciding the optimal strategy for dealing with those suitable for lung transplantation.

Implications of the study
Lung transplantation offers health benefits to the patient domain studied here but comes at an additional cost.

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