Domiciliary liquid oxygen versus concentrator treatment in chronic hypoxaemia: a cost-utility 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
Long-term oxygen therapy with liquid oxygen treatment, in chronic hypoxaemia.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population was patients with chronic hypoxaemia caused by pulmonary disease, who were eligible for treatment with liquid oxygen, had the ability to use mobile equipment outside the home, and who needed or who desired to spend time outside the home on a weekly basis. Patients who had already received oxygen treatment at home could also be included.

Setting
Community and hospital. The economic study was set in Sweden.

Dates to which data relate
Effectiveness, resource use and cost data were collected in 1993/1994. The price year was 1996.

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

Link between effectiveness and cost data
The costing was conducted on 48 patients of the initial sample from the effectiveness analysis and was carried out retrospectively after the effectiveness results were known.

Study sample
51 patients (29 on L and 22 on CC) from 6 different departments of pulmonary medicine in Sweden were enrolled in the study. No power calculations were reported.

Study design
This was a prospective, randomised, multi-centre trial. Patients were followed up for a six-month period. In group L, 1
patient discontinued treatment for personal reasons. Two patients, one in each group, died during the study period.

**Analysis of effectiveness**
The analysis of the clinical study was based on treatment completers only. The primary health outcome used was quality of life, measured using the EuroQol instrument and the Sickness Impact Profile (SIP). There were no significant differences between groups in terms of age, sex, cause of hypoxaemia, arterial blood gas tensions, oxygen therapy or spirometry values at the start of the trial.

**Effectiveness results**
Effectiveness data were available for 41 patients. Group L attained improvement in 13 out of 15 categories as measured by the SIP instrument, compared with 4 categories for the CC group. Significant differences were found in four categories and in total SIP scores. Group L showed an improvement in these categories, whereas group CC became worse. For patients with chronic obstructive pulmonary disease (COPD) with a PAO2 on air < 7.4 kPa, group L showed an improvement in all but one category, whereas group C became worse. In terms of quality of life (measured by the EuroQol instrument) group L showed some improvement in all categories, whereas group C showed an improvement only in the categories of usual activity and better/worse.

**Clinical conclusions**
Liquid oxygen treatment had a better impact on quality of life than concentrator treatment.

**Modelling**
No modelling was undertaken.

**Measure of benefits used in the economic analysis**
The measure of benefits used was quality of life, measured by the SIP and EuroQol instruments.

**Direct costs**
Direct costs were not discounted given the short time frame of the study (less than 1 year). Quantities and costs were reported separately. Direct costs included the direct monetary costs of different services as well as costs for equipment and oxygen. The following costs were considered: physician visits, nurse visits, physiotherapist visits, almoner visits, transport service, and medical technician. The quantity/cost boundary adopted was that of the health service. The estimation of quantities and costs was based on pharmacy costs, patients’ diaries and telephone contacts with health care professionals. The price year was 1996.

**Statistical analysis of costs**
T tests were used to compare the two groups. A one-sided p-value (<0.05) was considered significant.

**Indirect Costs**
Indirect costs were not included.

**Currency**
US dollars ($).

**Sensitivity analysis**
No sensitivity analysis was reported.
Estimated benefits used in the economic analysis
Effectiveness data were available for 41 patients. In group L, one patient discontinued treatment. Two patients, one in each group, died during the study period. Group L attained improvement in 13 out of 15 categories as measured by the SIP instrument, compared with 4 categories for the CC group. Significant differences were found in four categories and in total SIP scores. Group L showed an improvement in these categories, whereas group CC became worse. For patients with COPD with a PAO2 on air < 7.4 kPa, group L showed an improvement in all but one category, whereas group C became worse. In terms of quality of life (measured by the EuroQol instrument) group L showed some improvement in all categories, whereas group C showed an improvement only in the categories of usual activity and better/worse.

Cost results
Cost data were available for 48 patients (27 L and 21 CC). Total costs per patient per six-month period were $1,310 (+/- 650) for the CC group and $4,950 (+/- 2,340) for the L group.

Synthesis of costs and benefits
Cost and benefit measures were not combined into cost-effectiveness ratios.

Authors' conclusions
Liquid oxygen treatment was more expensive compared to concentrator treatment. However, treatment effects showed that liquid oxygen had a better impact on quality of life.

CRD COMMENTARY - Selection of comparators
A justification was given for the comparator used, namely an alternative regimen for oxygen administration for patients with hypoxaemia. You, as a user of the database, should decide if these health technologies are relevant to your own setting.

Validity of estimate of measure of benefit
The analysis was based on a randomised controlled trial, which was appropriate for the study question. No power calculations were used in the determination of the sample size. The study sample was representative of the study population and patient groups were shown to be comparable at analysis. However, the effectiveness analysis considered only treatment completers. Improvements observed in the SIP were not seen in the EuroQol, which may suggest that the latter is less appropriate for use in this patient group, as acknowledged by the authors. The estimation of benefits was obtained directly from the effectiveness analysis.

Validity of estimate of costs
All relevant cost categories were included. Quantities and costs were reported separately. Actual costs were used in the analysis and the price year was reported. However, no sensitivity analyses were conducted on either costs or quantities. The authors stated that many scale factors were present in the process, making it difficult to separate certain patient specific costs, and to judge whether the size of the hospital affects the cost. Moreover, a six-month trial period may have been too short to attain a true estimate of the use of medical technician services.

Other issues
The authors did make appropriate comparisons of their findings with those from other studies. However, the issue of generalisability to other settings was not addressed. The authors did not present their results selectively. The study enrolled patients with chronic hypoxaemia and this was reflected in the authors' conclusions.

Implications of the study
A transfer from concentrator treatment to liquid oxygen would increase costs of financing bodies "but would also lead to a higher goal fulfilment in the healthcare sector".

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