An evaluation of the use of concentrators for domiciliary oxygen supply for less than 8 h day\(^{-1}\)  
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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  
Using either concentrator supply or cylinder supply for the delivery of domiciliary oxygen therapy in dyspnoeic patients with chronic lung disease, who were using more than one hour per day of oxygen.

Type of intervention  
Treatment.

Economic study type  
Cost-effectiveness analysis.

Study population  
Dyspnoeic patients with chronic lung disease, who were using oxygen between one and 8 hours per day.

Setting  
Community. The economic study was carried out in Cambridge, UK.

Dates to which data relate  
The effectiveness and resource data were collected between March and August 1993. 1993 prices were used.

Source of effectiveness data  
The evidence for the final outcomes was derived from a single study.

Link between effectiveness and cost data  
The costing was undertaken retrospectively on the same patient sample as that used for the effectiveness analysis. Theoretical minimum costs were also calculated.

Study sample  
Power calculations were not used to determine the sample size. A total of 63 patients were eligible to be included in the study. 12.7% (n=8) patients were excluded from the study and 41.3% (n=26) refused to participate in the study. The study sample consisted of 29 patients (18 from Cambridgeshire and 11 from Suffolk) using each health technology for 3 months according to the crossover design (for the first half of the study, the Cambridgeshire patients were assigned to receive a concentrator supply versus cylinder supply for the second half, and conversely for the Suffolk patients).
Study design
The study was a nonrandomised trial with concurrent controls and was carried out in patients' homes in two health regions. The loss to follow up was 4.76% (3 patients), all of whom were from Cambridgeshire.

Analysis of effectiveness
The analysis of the clinical study was based on treatment completers only. The health outcome measures consisted of: physiological indicators (such as forced expiratory volume in 1 s (FEV1), forced vital capacity (FVC), peak expiratory flow rate (PEF), and the resting oxygen saturation breathing air (SaO2); patient satisfaction, obtrusiveness, and ease of use of the oxygen system assessed by a series of visual analogue scale (VAS) questions; and quality of life with regard to fatigue, emotional function and mastery evaluated by the VAS adjusted chronic respiratory disease questionnaire. The health outcome measures were reported for each limb of the study and each region. The groups were shown to be comparable in terms of physiological indicators at the beginning of the study.

Effectiveness results
The study revealed no significant differences between the groups and during the two limbs of the study in terms of physiological indicators. The study revealed that patients using concentrators had significantly (P<0.05) higher scores in terms of VAS and quality of life indicators (patient satisfaction, obtrusiveness, ease of use, fatigue, emotional function and mastery) compared with patients using cylinders, except in terms of “mastery” in the Suffolk group (P=0.12) (the exact values of the results regarding VAS and quality of life indicators were not reported).

Clinical conclusions
The study revealed that the patients with less than 8 hours per day of use of oxygen "found the oxygen concentrator a more useful and acceptable means of oxygen delivery, and the VAS results also suggest that this may be associated with improvements in several dimensions of quality of life".

Measure of benefits used in the economic analysis
No summary benefit measure was identified in the economic analysis.

Direct costs
The assumptions made regarding the resources used were reported separately from the costs. The cost components were not reported separately. The minimum theoretical and actual costs of the cylinder supply per month were reported. The data related to actual cost of cylinders were supplied by the prescription pricing authority. The average cost of oxygen concentrators in the UK provided by a regional contractor was reported. The cost crossover point was identified. Only health services costs were considered. 1993 price data were used.

Indirect Costs
Not calculated.

Currency
UK pounds Sterling ( ).

Sensitivity analysis
A threshold analysis was performed to investigate the effects of change in average patient survival, the duration of concentrator usage, and the flow rate of cylinder oxygen on the cost crossover point.

Estimated benefits used in the economic analysis
Not applicable.

Cost results
The average cost of oxygen concentrators was about 50 per month. The cost of cylinder supply showed an increasing trend in terms of hour per day of oxygen treatment. The range of the cost of cylinder supply was between about 25 per month for approximately half an hour of oxygen treatment per day to about 250 per month for approximately 6 hours of oxygen treatment per day. The cost crossover point was about 1.4 hours per day.

Synthesis of costs and benefits
The authors did not perform a synthesis of costs and benefits since the use of oxygen concentrators was a dominant strategy for the patients who regularly use more than about 1.4 hour per day of oxygen. With regard to the threshold analysis, assuming the values of 6 and 36 months for an average patient survival, the cost crossover point changed to 1.7 and 1.35 hours per day, respectively. Assuming a concentrator usage of 24 hours per day, the cost crossover point became 1.8 hours per day. Assuming a higher flow rate for cylinder oxygen (41 per minute) altered the cost crossover point to around 0.7 hours per day.

Authors' conclusions
The authors concluded that "the study of patients who use oxygen for less than 8 h per day suggest that a concentrator supply would be better accepted by the patients and would be more cost effective than cylinder supply for those patients who regularly use more than 1.4 h per day (or 4 cylinders per month at 21 per minute). These results suggest that the present recommendations for oxygen concentrator prescription should be modified."

CRD COMMENTARY - Selection of comparators
The reason for the choice of the comparator was clear. The comparator was regarded as the standard method of delivery of oxygen for patients using between 1 and 8 hour per day.

Validity of estimate of measure of benefit
Because of the absence of randomisation and the issue of not using any blinding methods for patients, the power of the study might be insufficient to detect differences between the two methods of oxygen delivery.

Validity of estimate of costs
The cost components were not reported separately. Adequate information was not provided with regard to the methods of cost calculations. Since the cost calculation was not performed on the same patient sample as that used in the effectiveness analysis it may not be internally valid.

Other issues
The threshold analysis could have been reported in a more transparent and detailed way. With respect to the lack of randomisation, sensitivity analysis of the effectiveness results, and statistical analysis of the costs, the results need to be treated with some caution. The issue of generalisability to other settings or countries was not addressed.

Source of funding
None stated.

Bibliographic details
Jackson M, Shneerson J. An evaluation of the use of concentrators for domiciliary oxygen supply for less than 8 h day-1. Respiratory Medicine 1998; 92(2): 250-255