Randomised controlled trial of supported discharge in patients with exacerbations of chronic obstructive pulmonary disease

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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
An Acute Respiratory Assessment Service (ARAS), for the management of patients with exacerbations of chronic obstructive pulmonary disease (COPD) at home after supported discharge, was examined. The ARAS was available on weekdays from 9.00 a.m. to 5.00 p.m. After discharge, patients were given a treatment package (antibiotics, corticosteroids, nebulised bronchodilators and, if required, an oxygen concentrator on loan) and were visited at home by an ARAS nurse the day after discharge, and thereafter at intervals of 2 to 3 days. Medical advice was available daily from the on-call respiratory team. Any change in prescription could be obtained by consultation with the patient's general practitioner (GP).

Type of intervention
Secondary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients with exacerbations of COPD. Patients with any of the following indicators of the severity of the exacerbation (impaired level of consciousness, acute confusion, new acute changes on radiograph, or arterial pH less than 7.35) were not eligible for entry into the trial, as the BTG deemed them necessary for immediate hospital admission. The authors stated that a number of other patients were admitted due to concomitant medical conditions or social reasons. Patients admitted at weekends were excluded.

Setting
The setting was a hospital. The economic study was carried out at the Royal Infirmary of Edinburgh, UK.

Dates to which data relate
The effectiveness and resource use data were gathered between November 1996 and May 1998. 1997 to 98 prices were used for the costs.

Source of effectiveness data
The effectiveness evidence came from a single study.

Link between effectiveness and cost data
The costing was performed prospectively on the same sample of patients as that used in the effectiveness study.
Study sample
Power calculations were performed a posteriori. These suggested that the study had a power of 80% to detect a difference of 20% in readmission rates at 5% significance level. A total of 1,006 patients were admitted to the emergency department of the study hospital from November 1996 to May 1998. Of these, 798 were not eligible due to the obligatory nature of admission (353), weekend referrals (288), co-existing medical conditions (140), or poor social circumstances (17). Twenty-four of the 208 remaining patients refused to participate (reasons not reported). Thus, the final sample enrolled in the analysis included 184 patients. There were 122 patients in the home support group and 62 in the hospital group. The mean age in the home support group was 68.5 years (range: 39 - 84) and 48.4% of the patients were women. The mean age in the hospital group was 69.9 years (range: 51 - 86) and 61.3% of the patients were women.

Study design
This was an open randomised controlled trial, which was carried out in a single centre. Randomisation was performed using a set of computer-generated sequences of random numbers in a 2:1 ratio (home support group versus hospital group). The patients were followed for 8 weeks. A final assessment was conducted on 79 patients in the home support group and 28 patients in the hospital group.

Analysis of effectiveness
The basis of the analysis of the clinical study (intention to treat or treatment completers only) was not stated. The primary health outcomes used in the effectiveness study were:

- the number of respiratory and non-respiratory readmissions before and after discharge;
- the median days under hospital or ARAS care, and the mean follow-up visits by ARAS nurses and GP visits between referral and discharge;
- GP visits and increased carer visits between discharge and final assessment;
- changes in respiratory parameters, such as respiratory rate, peak expiratory flow, forced expiratory volume in one second (FEV1), and oxygen saturation, both between initial and discharge assessments and between discharge and final assessments;
- patient satisfaction, as measured using the Chronic Respiratory Questionnaire; and
- GP satisfaction, measured through a short postal questionnaire.

The study groups were shown to have been comparable at baseline in terms of their age, gender, smoking status, home circumstances and clinical conditions. The authors reported that patients excluded because of weekend admission were more likely to have been housebound or with peripheral oedema than those included in the final sample.

Effectiveness results
Before discharge, the number of respiratory readmissions was 9 in the home support group and 0 in the hospital group. The number of non-respiratory readmissions was 3 (home support) and 0 (hospital), respectively, and one patient in the hospital group died.

After discharge the number of respiratory readmissions was 23 in the home support group and 19 in the hospital group. The number of non-respiratory readmissions was 4 (home support) and 2 (hospital), respectively, and 4 (home support) and 6 (hospital) patients died.

Between referral and discharge, the median days of care were 7 in the home support group and 5 in the hospital group, (p<0.01);

in the home support group, the mean follow-up visits by ARAS nurses were 3.8 and there were 0.85 GP visits per 100
Between discharge and final assessment, the GP visits per 100 patient-days were 0.70 in the home support group and 1.07 in the hospital group, and the rate of increased career visits was 21% (home support) and 36% (hospital), respectively.

Between initial and discharge assessment, the changes in respiratory parameters in the home support group were -2.1 beats/minute for respiratory rate, 40.3 L for peak expiratory flow, 0.16 L for FEV1 and 2.8% for oxygen saturation. The corresponding changes in the hospital group were -2.4 beats/minute (respiratory rate), 21.9 L (peak expiratory flow), 0.06 L (FEV1) and 1.4% (oxygen saturation).

Between discharge and final assessment, the changes in respiratory parameters in the home support group were 0.2 beats/minute for respiratory rate, -12.6 L/minute for peak expiratory flow, -0.06 L for FEV1 and -0.75% for oxygen saturation. The corresponding changes in the hospital group were -0.6 beats/minute (respiratory rate), 10.3 L/minute (peak expiratory flow), 0.14 L (FEV1) and 2.4% (oxygen saturation).

The changes in respiratory parameters changed significantly from baseline to assessment and were comparable across the study groups.

Sixty-nine per cent of the patients in the home support group replied to the questionnaires on satisfaction. Of these, 95% said they were completely satisfied with the service.

About 50% of the GPs replied to the questionnaire and all were satisfied with the new service, which did not increase the demand for their services.

Clinical conclusions
The effectiveness analysis showed that the ARAS was as safe and effective as standard care in improving respiratory functions in patients with exacerbations of COPD. There was a trend towards fewer hospital readmissions after discharge in the intervention group (25%) than in the comparison group (34%), but this difference did not reach statistical significance.

Measure of benefits used in the economic analysis
The health outcomes were left disaggregated and no summary benefit measure was used. A cost-consequences analysis was therefore conducted.

Direct costs
Discounting was not applied since the costs per patients were incurred over a short time period. The unit costs were not reported separately from quantities of resources used. The health services included in the economic evaluation were ARAS (staffing, non-staffing, and drug costs depending on the length of service), inpatient costs, and GP service. Figures for these resources were not reported in the paper, only the total mean health service cost was reported. The cost/resource boundary adopted in the study appears to have been that of the NHS. The costs were estimated from the average costs per bed-day in the respiratory units and Personal and Social Services Research Unit. A specific evaluation of the costs was carried out for ARAS items. Resource consumption was estimated alongside the effectiveness trial, between November 1996 and May 1998, and 1997 to 98 prices were used for the costs.

Statistical analysis of costs
The costs were treated deterministically.

Indirect Costs
The indirect costs were not included in the economic evaluation.
Currency
UK pounds sterling (£).

Sensitivity analysis
No sensitivity analyses were conducted.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
The mean health service cost per patient was 877 in the home support group and 1,753 in the hospital group.

The mean cost of GP care between discharge and final assessment was slightly higher in hospital patients than in ARAS patients.

Synthesis of costs and benefits
Not relevant because a cost-consequences analysis was conducted.

Authors' conclusions
The Acute Respiratory Assessment Service (ARAS) represented an effective and efficient alternative to conventional care for the management of patients with exacerbations of chronic obstructive pulmonary disease (COPD). The hospital costs were far lower and both the patients and general practitioner (GPs) were satisfied.

CRD COMMENTARY - Selection of comparators
The rationale for the choice of the comparator was clear. Hospital care was selected because it represented the standard approach for the management of patients with exacerbations of COPD. You should decide whether it represents a valid comparator in your own setting.

Validity of estimate of measure of effectiveness
The analysis of effectiveness used a randomised controlled trial, which was appropriate for the study question. The methods of randomisation and patient selection were reported. The study groups were comparable at baseline. The comparison between patients included and those excluded (because of weekend admissions) was commented on. The study sample was unselected and was representative of the study population. The length of follow-up was reported, as well as the tools used to evaluate the outcome and power calculations. These issues enhance the internal validity of the analysis. However, the basis for the analysis of the clinical study (intention to treat or treatment completers only) was not reported.

Validity of estimate of measure of benefit
No summary benefit measure was used in the economic analysis. The analysis was therefore categorised as a cost-consequences study.

Validity of estimate of costs
The perspective adopted in the study was not explicitly stated, but is likely to have been that of the NHS. As such, it appears that all the relevant categories of costs were included in the analysis. The source of the cost data and the price year were reported. However, the unit costs and the quantities of resources used were not given, and both the costs and quantities were treated deterministically. The cost estimates were somewhat specific to the study setting because no
sensitivity analyses were reported. The economic evaluation represented a minor part of the overall analysis and limited details were provided. The authors stated that the estimated costs of the two interventions were not strictly comparable. This was mainly due to the existence of fixed costs.

Other issues
The authors compared their finding with those from a published study. However, they did not address the issue of the generalisability of the study results to other settings. No sensitivity analyses were conducted, thus the external validity of the analysis is fairly low. The study enrolled unselected patients with exacerbations of COPD and this was reflected in the conclusions of the study.

Implications of the study
The study suggests that a service for supported discharge may be feasible in patients hospitalised due to exacerbations of COPD. However, the economic implications of such a service should be further analysed.

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None stated.

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Other publications of related interest

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