A multidisciplinary intervention to prevent the readmission of elderly patients with congestive heart failure
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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
A nurse-directed, multidisciplinary intervention in high-risk patients hospitalised with congestive heart failure. The approach consisted of: intensive education about congestive heart failure and its treatment by an experienced cardiovascular research nurse; individualised dietary assessment and instruction given by a registered dietician; consultation with social service personnel to facilitate discharge planning and care; an analysis of medications by a geriatric cardiologist who made specific recommendations to eliminate unnecessary medications and simplify the overall regimen; and intensive follow-up after discharge through the hospital's home care services, supplemented by individualised home visits and telephone contact with the members of the study team.

Type of intervention
Secondary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
High risk patients, 70 years or older, who were hospitalised with congestive heart failure.

Setting
Primary and community care. The economic study was carried out in the USA.

Dates to which data relate
Effectiveness and resource usage data related to the period July 1990 to June 1994. Costs were presented in 1994 prices, and collected in the last year of the study.

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

Link between effectiveness and cost data
The costing was undertaken prospectively on a sample of patients during the final year of the study.

Study sample
All patients 70 years of age or older admitted to medical wards were screened for congestive heart failure. Patients with confirmed heart failure were eligible to participate if they had at least one of the following risk factors for early readmission: prior history of heart failure, 4 or more hospitalisations for any reason in the preceding 5 years, or
congestive heart failure precipitated by either an acute myocardial infarction or uncontrolled hypertension. 391 patients were excluded from the study because they had no risk factors for early readmission and a further 633 patients were excluded for various other reasons (e.g. they lived outside the catchment area). There were 140 patients in the control group and 142 patients in the treatment group.

Study design
The study was a single centre prospective randomised trial. The patients underwent blinded randomisation with the use of a computer-generated list of random numbers immediately after consenting to participate. All patients were followed for 90 days after discharge.

Analysis of effectiveness
The analysis of the clinical study was based on intention to treat. The primary health outcome was survival for 90 days without readmission. The treatment and control groups were well balanced with regard to most baseline characteristics. However, the patients in the treatment group were somewhat older and better educated, had higher heart rates on baseline electrocardiogram and were more likely to have undergone previous coronary-artery revascularization. These variables did not have a significant effect on the rate of readmission.

Effectiveness results
Survival for 90 days without readmission occurred in 75 patients in the control group (53.6%) as compared with 91 patients in the treatment group (64.1%) but this difference was not significant. When the analysis was restricted to survivors of the initial hospitalisation a significant difference in survival for 90 days without readmission was noted: 54.3% in the control group versus 66.9% in the treatment group (p=0.04).

Clinical conclusions
A nurse-directed, multidisciplinary treatment strategy can significantly reduce hospital readmissions for elderly people with heart failure.

Measure of benefits used in the economic analysis
Survival for 90 days without readmission was used as the primary benefit. A secondary benefit was patients’ quality of life scores (using the Chronic Heart Failure Questionnaire). Quality of life was assessed at baseline and at three months in 126 patients.

Direct costs
Detailed data on all medical costs and costs for caregivers were collected prospectively for 57 patients during the final year of the study. Logs were also maintained by the study personnel to determine the cost of treatment. An hourly rate of $20 was chosen as the cost of nursing time as well as for time spent by the dietician, social worker and home care team. Costs for hospital admissions were based on allowed reimbursements provided according to standard codes for each DRG. To calculate the overall cost of medical care during the 90-day follow-up period, the mean cost of readmission for all patients in each group was added to the average cost for non-hospital medical services and caregivers and, in the treatment group, for the intervention.

Statistical analysis of costs
Costs were treated stochastically; p-values were reported for the difference between the costs in the intervention and control groups.

Indirect Costs
Detailed data on costs for caregivers were collected prospectively for 57 patients during the final year of the study. An
hourly rate of $6 was chosen as the cost of time spent by unpaid caregivers.

**Currency**
US dollars ($)

**Sensitivity analysis**
In order to find which elements were most important in reducing readmission rates and improving the quality of life, additional analyses were performed to assess compliance with medication, to evaluate the review of medications and to determine the effects of the intervention on the patients' understanding of heart failure.

**Estimated benefits used in the economic analysis**
Survival for 90 days without readmission occurred in 75 patients in the control group (53.6%) as compared with 91 patients in the treatment group (64.1%) but this difference was not significant. When the analysis was restricted to survivors of the initial hospitalisation a significant difference in survival for 90 days without readmission was noted: 54.3% in the control group versus 66.9% in the treatment group (p=0.04).

All patients were also followed for one year: readmission rates during the nine months after the discontinuation of the intervention were similar in the two groups but readmissions for heart failure were less frequent in the treatment group (p=0.08). Although the quality of life improved in both groups, there was significantly more improvement in the treatment group (22.1 +/- 20.8 versus 11.3 +/- 16.4, p=0.001). Quality of life improved consistently on each of the four subscales among the patients receiving the treatment (range 52%-195%).

The sub-analyses of the different components of the intervention suggested that all the components were beneficial.

**Cost results**
The average cost of the study intervention was $216 per patient. 66% of this amount was spent on nursing time, representing an average of 7.2 hours per patient. Other costs for medical care, excluding those for readmissions, were similar between the two study groups. However, caregivers spent 33 more minutes per patient per day attending to those in the treatment group than to those in the control group, for an estimated incremental cost of $336 per patient. The cost of hospital readmissions in the control group was higher by an average of $1,058 per patient ($3,236 versus $2,178), p=0.03. The overall cost of care was higher in the control group by $460 or an average of $153 per patient per month.

**Synthesis of costs and benefits**
The multidisciplinary intervention was the dominant strategy.

**Authors' conclusions**
A nurse-directed, multidisciplinary treatment strategy can significantly reduce hospital readmissions and improve the quality of life for elderly patients with heart failure. Widespread use of this intervention in caring for the growing number of elderly patients hospitalised with heart failure could substantially reduce costs for healthcare.

**CRD Commentary**
As the authors noted the generalisability of this study is questionable. Of the 1,306 patients with congestive heart failure only 282 (21.6%) were randomised. The duration of the follow-up (90 days) was relatively short but the authors did report on 1 year follow-up which suggested that the long-term cost savings with the intervention may be even greater than those reported. The cost analysis was only performed on a subset of the study sample (57 out of 282 patients), and a sensitivity analysis would have been useful on the DRG reimbursement figures used. This was, however, a good study with randomisation, clear objectives and statistical testing.
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