A matched-cohort study of health services utilization and financial outcomes for a heart failure disease-management program in elderly patients

Berg G D, Wadhwa S, Johnson A E

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
The use of a disease-management heart failure (HF) programme in elderly patients. This programme employed a structured, evidence-based, telephonic nursing intervention that was designed to provide patient education, counselling and monitoring services. This programme was compared with usual care.

Type of intervention
Treatment and secondary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients, aged 65 years and older, of a Medicare+Choice health plan who were residing in Ohio, Indiana or Kentucky, and who had been hospitalised or visited the emergency department in the last year at which HF was one of the diagnoses. The participants could not be engaged in a local formal HF programme, and had to be enrolled in the plan 12 months before the start date of the study and at least 3 months after the start date in the study. Patients residing (more than 30 days) in a long-term skilled nursing facility, or participating in a hospice programme, were excluded. Also excluded were patients identified as having end-stage renal disease, dialysis, transplants, acquired immune deficiency syndrome, claims costs greater than $100,000, or malignant cancer.

Setting
The study setting was the community. The economic study was carried out in Colorado, USA.

Dates to which data relate
The effectiveness data were gathered between 2000 and 2002. The price year was unclear, but it was likely to have been 2000.

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

Link between effectiveness and cost data
The costing was undertaken retrospectively on the same patient sample as that used in the effectiveness study.

Study sample
No sample size appeared to have been determined in the planning phase of the study. In addition, no retrospective
power calculations were reported. The number of patients initially eligible for the programme was 2,454, of which 837 were recruited for participation in the study. The number then dropped from 837 to 533 due to the exclusion criteria. The main reasons for exclusion were that the patients did not have 12 months of baseline period plan eligibility (174), the patients had less than 3 months of health plan eligibility during the intervention period (116), and the patients had malignant cancer (173), or were in a hospice (26). The average age for the remaining 533 intervention patients was 76.2 years and 33.8% were male.

The control group was drawn from the population eligible for the intervention who could not be reached for telephonic enrolment. It was generated by matching each disease-management participant with a non-participant determined using a propensity score. Non-participants were selected with the closest propensity score to each participant using the method of replacement, whereby it was possible for a comparison group member to be selected more than once. The matched group consisted of 533 non-participants, of which 32.5% were male.

**Study design**

The study was a retrospective, concurrent matched cohort study. The groups were followed up for one year. No loss to follow-up was reported in the analysis.

**Analysis of effectiveness**

All patients included in the study appear to have been accounted for in the analysis. The outcomes used were:

- medical service use, including hospitalisations, emergency department visits, medical doctor visits and skilled nursing facility (SNF) days;
- prescription drug use, including angiotensin-converting enzyme (ACE) inhibitors, beta-blockers, antihypertensive, diuretic, cardiac glycoside, or anti-arrhythmic and anti-anginal use; and
- interventions performed, including haemoglobin A1c, electrocardiography, echocardiography, cardiac catheterisation, myocardial imaging or perfusion, influenza immunisation and pneumococcal immunisation.

Medical service use, prescription drug use and procedures performed were determined from administrative claims. The two groups were shown to be well matched in terms of demographics and co-morbidity variables, showing no significant differences. Also the two groups were closely matched in their baseline use of medical services, drug use and diagnostic testing rates.

**Effectiveness results**

There was a pronounced, significant difference between the groups in the following:

- overall inpatient admissions (23% fewer for the intervention group; p=0.01);
- inpatient bed days (26% fewer for the intervention group; p=0.007);
- inpatient admissions in which HF was identified as the primary diagnosis (44% fewer for the intervention group; p=0.001);
- HF inpatient bed days (34% fewer for the intervention group; p=0.002); and
- SNF days (45% fewer for the intervention group; p=0.032).

There were no significant differences between the two groups for most recommended drug classes.

There were significant differences between the two groups in influenza immunisation rates (29% more for the intervention group; p<0.001) and pneumococcal immunisation rates (59% more for the intervention group; p=0.048).
Clinical conclusions
The study demonstrated that a commercially delivered HF disease-management programme significantly reduced hospitalisations, emergency department visits and SNF days.

Measure of benefits used in the economic analysis
The authors did not derive a measure of health benefit. The analysis was therefore categorised as a cost-consequences analysis.

Direct costs
The resource use and costs were reported separately. The direct costs to the health service (or third-party payer) were included in the analysis. These were for medical service use, prescription drug use interventions performed, and the intervention itself. Medical service use covered hospital bed days, emergency department visits, doctors visits, hospital readmissions and SNF days. Prescription drug use covered ACE inhibitors, beta-blockers, antihypertensive, diuretics, anti-arrhythmic drugs and anti-anginals. The interventions performed included electrocardiography, immunisations, cardiac catheterisation and haemoglobin A1c. The authors did not provide the source from which unit costs were derived. However, it would appear that the costs of medical services and interventions were derived from hospital charges. Discounting was not relevant, as all the costs were incurred during 1 year, and hence was not performed. The study reported the average costs. The price year appears to have been 2000.

Statistical analysis of costs
The resource use and costs were treated stochastically. The Kruskal-Wallis test was used to compare variables between the treatment and control groups. The authors noted three levels of statistical significance (1%, 5% and 10%).

Indirect Costs
The indirect costs were not included in the analysis.

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analyses were conducted.

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

Cost results
The total costs in the intervention group, inclusive of programme fees, were $15,535 ($14,372 if programme fees were not included) versus $17,327 in the control group. However, these differences were not statistically significant.

Synthesis of costs and benefits
The costs and benefits were not combined.

Authors' conclusions
The commercial heart failure (HF) disease-management intervention in the elderly demonstrated significant reductions in medical services, resulting in 10% lower costs of care.
CRD COMMENTARY - Selection of comparators
A justification was given for the comparator used. It represented current practice in the authors' setting. You should decide if this is a widely used health intervention in your own setting.

Validity of estimate of measure of effectiveness
The study was based on a retrospective, concurrent matched cohort study design, which was appropriate for the study question. The authors reported that the health plan providing the service did not wish to evaluate the effect with a randomised controlled trial. The study sample appears to have been representative of the study population. The patient groups were shown to be comparable at analysis, and the control group was extremely well matched on a wide set of variables. The authors reported that, as their study was retrospective in nature, it was potentially subject to selection bias. The authors undertook appropriate statistical analyses to test for any statistically significant differences between the two groups.

Validity of estimate of measure of benefit
The authors did not derive a measure of health benefit. The study was, in effect, a cost-consequences analysis. The reader is therefore referred to the comments in the 'Validity of estimate of measure of effectiveness' field (above).

Validity of estimate of costs
All the categories of cost relevant to the third-party payer perspective appeared to have been included in the analysis, with no relevant costs being omitted. The costs and the quantities were reported separately, which will enhance the generalisability to other settings. However, the authors did not provide any information on the source of the unit costs. It would appear that the hospital costs and costs of any interventions were derived from hospital charges, thus, the results are not necessarily applicable elsewhere. The authors performed appropriate statistical analyses to test for significant differences between the two groups. Discounting was not relevant, as all the costs were incurred during 1 year, and hence was not performed. The price year used in the analysis was unclear, which will limit any inflation exercises.

Other issues
The authors made appropriate comparisons of their findings with those from other studies that also found that a multidisciplinary approach using disease-management nurses had a positive effect, and reduced hospitalisations and the overall cost of medical services for patients with HF. The issue of generalisability to other settings was not addressed. The authors do not appear to have presented their results selectively. In their conclusions, the authors reported that the intervention group had 10% lower costs than the control group. However, in their conclusion, the authors did not point out that this difference was not statistically significant.

The authors reported a number of further limitations to their study. First, although matching on propensity scores tends to balance observed variables, it does not balance unobserved variables such as motivation for deciding to participate in an intervention. As such, important unobserved variables may lead to selection bias. Second, the results obtained were derived strictly from administrative claims data since symptom control, functional status and self-management data were only collected for the intervention group. The authors reported that such information would have allowed for a richer understanding of the clinical effect. Finally, there was no attempt to match geography between the two groups, which might have resulted in different rates of exposure to local markets. However, retrospective analyses showed that the groups were similarly distributed across regions.

Implications of the study
The authors did not make any explicit recommendations but, based on their conclusions, it would appear that they recommended the use of HF disease-management programmes in the elderly.
Source of funding
Funded and conducted by McKesson Corporation.

Bibliographic details

PubMedID
15450041

DOI
10.1111/j.1532-5415.2004.52457.x

Other publications of related interest


Indexing Status
Subject indexing assigned by NLM

MeSH
Aged; Cardiovascular Agents /therapeutic use; Data Collection /methods; Female; Health Services for the Aged /economics /utilization; Heart Failure /drug therapy /economics; Humans; Male; Matched-Pair Analysis; Retrospective Studies; Telephone; United States

AccessionNumber
22004001245

Date bibliographic record published
30/06/2005

Date abstract record published
30/06/2005