Effects of caregiver specialty on cost and clinical outcomes following hospitalization for heart failure


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
Patient care provided by either generalists or cardiologists, as a clinical specialty, to patients with heart failure and shock (diagnosis-related group, DRG, 127) was examined.

Type of intervention
Patient care management.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients hospitalised under DRG 127 (patients suffering from heart failure and shock).

Setting
The setting was tertiary care. The economic study was carried out at the Oschsner Foundation Hospital, New Orleans (LA), USA.

Dates to which data relate
The effectiveness and resource use data were gathered from September 1994 to August 1995. The price year was 1995.

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

Link between effectiveness and cost data
The costing was carried out retrospectively on the same sample of patients as that used in the effectiveness study.

Study sample
Power calculations to determine the sample size were not reported. A sample of 614 hospital admissions for DRG 127 was retrospectively identified at the Quality Assurance Department of the study hospital from September 1994 to August 1995. The primary caregiver was a generalist for 217 admissions (group 1) and a cardiologist for 397 admissions (group 2). In group 1, the generalist was either an internist with or without sub-specialty training in a field other than cardiology (197 patients; 32%), or a family physician (20 patients; 3%). In group 2, the cardiologist was either a general cardiologist (302 patients; 49%) or a cardiologist with training in advanced heart failure (95 patients; 16%). The mean age was 71 (+/- 16) years for the generalist patients and 68 (+/- 14) years for the cardiologist patients.
The proportions of men were 44% (generalist group) and 61% (cardiologist group), respectively.

**Study design**
This was a retrospective cohort study that was carried out in a single centre, the Oschsner Foundation Hospital. Data were obtained from a retrospective chart review. The patients were assigned to the study groups on the basis of their primary caregiver. The patients were followed until they were discharged from the hospital. No loss to follow-up was reported for the whole group, but data were available for sub-groups of patients depending on the outcome of interest.

**Analysis of effectiveness**
The analysis of the clinical study was restricted to those patients whose follow-up data were available after the chart review. The primary health outcomes were length of stay (LOS) and in-hospital mortality.

The two groups were statistically different at baseline in terms of their age, gender distribution and several clinical characteristics (e.g. systemic hypertension and coronary artery disease). The patients in the generalist group were older and had a higher rate of systemic hypertension. The cardiologist group contained more men and coronary artery disease was more frequent.

There was no statistically significant difference between the groups in the severity score, either in the primary analysis (488 patients) or in the sub-group analysis where the sub-set of patients who required intensive care (n=64) was considered separately from those who did not (n=550). The severity score was based on four severity indicators. More specifically, initial systolic blood pressure (\(<= 90\) mmHg), respiratory rate (>30 breaths/minute), serum sodium level (\(<= 135\) mmol/L), and ST-T wave changes on initial electrocardiogram neither known to be old nor attributable to digoxin.

Potential confounding factors were assessed in a multivariate analysis. For example, age, gender, ejection fraction, history of hypertension, known or suspected coronary artery disease, history of atrial fibrillation, chronic obstructive pulmonary disease, and the need for intensive care. Also, blood pressure, heart rate, respiratory rate, electrocardiographic changes, and pertinent initial laboratory values (serum sodium, blood urea nitrogen, and creatinine) at the time of admission.

**Effectiveness results**
The mean LOS was 4.0 (+/- 3.7) days in the generalist group and 3.9 (+/- 2.9) days in the cardiologist group. The difference between the groups did not reach statistical significance.

The statistical analysis revealed that four independent variables were significantly correlated with LOS. These were the need for intensive care during hospitalisation, systolic blood pressure, caregiver specialty, and age. However, despite the LOS being longer in the sub-group of patients who required intensive care, the difference did not reach statistical significance.

The average in-hospital mortality was 2.3% in both groups.

The multivariate analysis revealed that in-hospital mortality was associated with the need for intensive care during hospitalisation (odds ratio, OR=17; 97% confidence interval, CI: 5 - 60) and a systolic blood pressure of less than 100 mmHg (OR 15, 95% CI: 4 - 54).

**Clinical conclusions**
The effectiveness analysis showed that the specialty of the primary caregiver had no impact on the crude mortality rate or on the LOS. However, the sub-group analysis revealed which prognostic factors were associated with higher LOS or mortality.

**Measure of benefits used in the economic analysis**
NHS Economic Evaluation Database (NHS EED)
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No summary benefit measure was used because the effectiveness analysis showed the clinical equivalence of the two types of specialty care provided to patients with heart failure and shock. Therefore, in effect, a cost-minimisation analysis was performed.

Direct costs
The costs were not discounted since they were incurred during a short time for each patient. The health services in the evaluation of the costs were not reported. Only the total hospitalisation costs, as derived from the patients' bills, were considered. The authors stated that these costs reflected the total charges incurred by the health care providing agent. Indeed, the perspective of the analysis was that of the service provider. A cost-to-charge ratio was used to calculate the true costs of the services. The quantities of resources used were derived from the chart review, which was performed to identify the clinical outcomes. All the costs were converted into 1995 values, but the method used was not reported.

Statistical analysis of costs
The costs were presented as mean values with standard deviations. The statistical significance of the difference between the groups was assessed using standard tests. A multiregression analysis was conducted to estimate the impact of prognostic factors on the estimated costs.

Indirect Costs
The indirect costs were not considered.

Currency
US dollars ($).

Sensitivity analysis
Sensitivity analyses were not carried out.

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

Cost results
The estimated total costs per patient were $2,998 (+/- 3,155) in the generalist group and $3,013 (+/- 2,655) in the cardiologist group. The difference was not statistically significant.

The multivariate analysis showed that three variables were statistically associated with hospital costs. These were the need for intensive care, age and caregiver specialty.

When adjusted for age and the need for intensive care, the costs were significantly lower for patients treated by cardiologists than for those treated by generalists. However, when adjusted only for age, there was no significant difference between the two groups.

Synthesis of costs and benefits
The costs and benefits were not combined as a cost-minimisation analysis was performed.

Authors' conclusions
There was no difference in the clinical outcomes and costs of care provided by either generalists or specialists in the treatment of patients with heart failure and shock. Some potential cost-savings were observed in the sub-set of patients
requiring intensive care, as well as in those who did not require it, when the care was provided by cardiologists.

**CRD COMMENTARY - Selection of comparators**
The two types of care provided by either cardiologists or generalists were selected to represent the actual care received by patients with a diagnosis of heart failure at discharge. You should decide whether they represent valid forms of care delivered in your own setting.

**Validity of estimate of measure of effectiveness**
The basis of the analysis of effectiveness was a cohort study. The retrospective design of this study had several limitations in terms of answering the study question, as factors affecting the clinical outcomes were not under the observation of the study assessors. The use of a prospective and randomised study would have provided more reliable results. However, it has to be noted that the authors performed statistical analyses to account for the potential impact of confounding factors. The results of the multiregression analyses were satisfactorily reported. Statistical methods were also required because the study groups were not comparable at baseline.

**Validity of estimate of measure of benefit**
No summary benefit measure was used in the analysis since a cost-minimisation analysis was conducted.

**Validity of estimate of costs**
The authors stated explicitly the perspective adopted in the study. Although a detailed breakdown of the cost items was not provided, the billing system used to derive the costs comprised all care services provided to the patients considered in the study. Therefore, it appears that all the relevant categories of costs have been included in the economic evaluation. However, the resources used and the unit costs were not presented separately, which limits the possibility of replicating the study. The source of the cost data was reported. The price year was stated, thus simplifying reflation exercises in other settings. Statistical tests to consider the impact of potential confounding factors on the estimated costs were also performed. The authors stated that the economic evaluation focused only on the in-hospital costs and that the estimation of the overall impact of the care provided to the study patients (i.e. costs incurred following hospital discharge) was beyond the scope of the analysis.

**Other issues**
The authors made some comparisons of their findings with those from other studies and found similar results. However, a discussion was presented to justify the differences found with one published study. The authors attributed the different results to the discrepancy in disease severity. In terms of generalisability, the authors noted that their findings were valid only for similar centres but should not be generalised to different settings. Similarly, the conclusions of the analysis apply only to patients with DRG 127. Some limitations to the validity of the analysis were reported.

**Implications of the study**
The authors stated that their findings challenged the belief that specialist care is more expensive than generalist care. However, caution is required when interpreting the study results due to the limitations of the analysis, especially on the effectiveness side of the study.

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None stated.

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