Emergency department observation of heart failure: preliminary analysis of safety and cost


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
Emergency department observation was assessed. This involved "the introduction of standardised criteria to provide emergency physicians with an alternative disposition to hospital admission" and enabled patients to be sent to an observation unit (OU). The comparator technology was direct admission as an inpatient.

Type of intervention
Secondary prevention of heart failure (HF)-related events in patients at risk of HF.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised low-to-moderate risk HF patients. Extensive inclusion criteria (adapted for emergency department use from the Framingham criteria) and exclusion criteria were used. The patients were required to satisfy two major, or one major and two minor inclusion criteria. The exclusion criteria included age older than 18 years, hypoxia, severe respiratory distress, and hypotension. A complete list of inclusion and exclusion criteria was provided in the original paper.

Setting
The setting was secondary care (an academic emergency department). The economic study was carried out in Cincinnati, USA.

Dates to which data relate
The effectiveness and resource use data were collected between April 2002 and September 2003. A price year was not reported.

Source of effectiveness data
The effectiveness data were 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, except for 3 patients who were excluded from the cost analysis because of a lack of data.

Study sample
The authors enrolled convenience samples within the dates of the study. They did not report that any power calculations were carried out to obtain the optimum sample size or to estimate the impact of chance on the results. The
Sample contained patients entering an emergency department with signs of HF and so was appropriate for the clinical question. Sixty-four patients were enrolled in the study, of whom 36 (17 females) were admitted directly to the inpatient setting and 28 (12 females) entered the OU. The mean age was 61 years (range: 23 - 101 for patients in the inpatient setting and 56 years (range: 30 - 81) for those in the OU.

**Study design**

The analysis was based on a prospective comparative study with historical control (although the groups were studied sequentially), but the patients' charts were reviewed retrospectively. Patients receiving treatment between April 2002 and April 2003 were allocated to receive inpatient admission, while patients receiving treatment between May 2003 and September 2003 were allocated to be assessed for the OU. The patients in the second group were risk-matched to those in the first group. Recruitment was based at a single centre. The patients were followed for 30 days. One patient from the OU and two from the inpatient setting left the facilities against medical advice, and were lost to follow-up.

**Analysis of effectiveness**

The analysis of the clinical study was conducted on an intention to treat basis. The primary health outcome was adverse clinical events encompassing repeat visits to the emergency department, readmission with a primary complaint of HF, or death, all within the 30-day follow-up period. The groups were compared extensively at analysis in terms of their demographics, medical history and presenting vital signs. Only two variables were found to be statistically significantly different (the percentage of patients with a history of chronic obstructive pulmonary disease and presenting heart rate). The patient groups were otherwise comparable.

**Effectiveness results**

Overall, 10 patients had adverse clinical events (15.6%). Of these, 6 were in the admitted group (16.7%, 95% confidence interval, CI: 7.9 - 31.9) and 4 were in the OU group (14.3%, 95% CI: 5.7 - 31.5). The difference between the groups was not statistically significant, (p=0.538).

There were no deaths in either group.

**Clinical conclusions**

The authors concluded "management of the low-to-moderate risk HF patients is a safe alternative to direct admission to the inpatient setting".

**Measure of benefits used in the economic analysis**

The authors did not estimate a summary measure of health benefit. The study was, in effect, a cost-consequences analysis.

**Direct costs**

The authors carried out a basic costing analysis with the aim of understanding the broad costs involved. The perspective from which the analysis was carried out was not reported. Resource use was measured by a retrospective chart review, with the authors focusing on laboratory, inpatient, emergency department and pharmacy costs. Charges provided by the hospital data centre were used as a surrogate for costs. The authors defined resource burden as length of stay. The length of follow-up was only 30 days and, therefore, discounting was not required. A price year was not reported. In measuring financial and resource use, the 3 patients who withdrew against medical advice were excluded.

**Statistical analysis of costs**

The authors carried out a basic statistical analysis using medians and ranges, and compared continuous data using the Mann-Whitney U-test and p-values.
Indirect Costs
The indirect costs were not estimated.

Currency
US dollars ($).

Sensitivity analysis
The authors did not report that sensitivity analyses were carried out.

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

Cost results
The total length of stay was 46 hours (range: 9 - 173) for all patients, 59 hours (range: 12 - 173) for the admitted group and 26 hours (range: 9 - 109) for the OU group. The difference between the groups was statistically significant, (p<0.001).

The total cost was $5,893 (range: 2,518 - 34,604) for all patients, $7,824 (range: 3,730 - 34,604) for the admitted group and $4,203 (range: 2,518 - 17,485) for the OU group. The difference between the groups was statistically significant, (p=0.001).

Synthesis of costs and benefits
The costs and benefits were not combined as the study was, in effect, a cost-consequences analysis.

Authors' conclusions
The authors concluded "management of the low-to-moderate risk HF (heart failure) patients is a cost-effective alternative to direct admission to the inpatient setting", with cost savings in the observation unit (OU) group estimated to be $3,600 per patient with no associated decrement in well-being.

CRD COMMENTARY - Selection of comparators
The authors compared the admission of patients to an OU and to an emergency department in terms of the clinical effectiveness and cost implications. They argued that a conservative approach to treating patients (admitting straight to hospital) is a "significant inefficiency in an overburdened health care system", and that providing emergency physicians with an alternative such as an OU would allow extended evaluation and treatment that might decrease the relative burden of the disease.

Validity of estimate of measure of effectiveness
The authors designed a prospective comparative study that enabled the patients to be assessed sequentially in the same setting under comparable conditions. Patients in the second group were risk-matched to patients in the first group. This technique was intended to make the two groups as comparable as possible. Further potential systematic differences between the groups might have been achieved with random allocation of the patients between groups; the authors suggested this as an area for further work. It was unclear whether it might have been possible to study the two groups concurrently. It was also unclear whether the study sample was representative of the study population because of the selection method (the inclusion and exclusion criteria were numerous). The patient groups were compared at analysis and found to be broadly similar. Statistically significant differences were found in only two variables, the differences being judged to be clinically insignificant.
Validity of estimate of measure of benefit
The authors did not derive a summary measure of health benefit. The study was, in effect, a cost-consequences analysis. The reader is referred to the comments in the 'Validity of estimate of measure of effectiveness' field (above).

Validity of estimate of costs
A perspective for the costing analysis was not reported. Thus, it is not possible to assess whether all the relevant costs were incorporated. Given the unit costs estimated (laboratory, inpatient, emergency department and pharmacy costs), the analysis seemed to focus on the perspective of the direct health care provider. It was unclear whether these estimates included elements of overhead charges. Length of stay was reported separately from the total costs, although it was not clear how much of the total cost was due to differences in length of stay. In order to help the reader to achieve a better understanding of the key cost drivers, the authors should have broken down the total cost into its constituent parts. The prices were taken from a specific setting. No statistical, sensitivity or other type of analysis of the prices was carried out.

Hospital charges were used to proxy prices for health care. Such charges do not reflect true opportunity costs (due to profit margin) and, in the absence of a cost-to-charge ratio, may limit the generalisability of the results beyond the authors’ clinical setting.

Discounting was not applied, which was appropriate given the short time horizon of the cost analysis. Although the data were collected for more than one year (April 2002 - September 2003), the price year was not reported, which will hinder any reflation exercise.

Other issues
The authors made appropriate comparisons of their own results with those from other studies, stating that their results were consistent with other studies and citing particular evidence that supported this assertion. The generalisability of the study was not addressed. Given the institution-specific unit costs employed, the results should be interpreted with caution when being applied to a different setting. However, given the consistency of the effectiveness results between this and other studies, the clinical outcomes might better transfer between settings. The conclusions accurately reflected the results presented and related well to the clinical question addressing the two hypotheses.

Several limitations were presented. First, the retrospective collection of the data, although the patients were recruited prospectively. Second, the potential for enrolment bias as the treating physician decided upon admission to the OU (although this limitation also makes the study very pragmatic). Finally, the use of charges to approximate costs.

Implications of the study
The authors did not make any recommendations for policy or practice following their study, although they did make suggestions for further work. These included a prospective randomised study to minimise internal biases and studies to investigate OU treatment end points.

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Other publications of related interest

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