Economic evaluation of hospital at home versus hospital care: cost minimisation analysis of data from randomised controlled trial

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
Admission to a hospital at home scheme was compared with admission to an acute hospital. Hospital at home was described as a small nurse-led scheme able to admit a maximum of five patients at any one time.

Type of intervention
Other: The study compared two methods of caring for patients.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised eligible patients referred to the hospital at home scheme with an acute condition. The authors provided a list of specific inclusion criteria. For instance, the patients had to live in the city of Leicester and not require a specialist diagnostic investigation.

Setting
The setting was secondary care. The study was set both in a hospital and in the patients' homes.

Dates to which data relate
The effectiveness data were collected between November 1995 and May 1997. The cost data were collected over the same period, but was extended to three months from admission. A date for the unit costs and prices used was not reported.

Source of effectiveness data
The effectiveness data were derived from a single study. Details of the effectiveness study were published elsewhere (see Other Publications of Related Interest).

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

Study sample
The study comprised 199 consecutive patients referred to hospital at home. This was assessed as being suitable for the time span of the trial. The initial study sample was appropriate since it comprised patients who were suitable for hospital at home.
A total of 400 patients had been anticipated. However, once the trial began the authors realised they should not expect more than 200. They reported that this gave them an 80% power to demonstrate therapeutic equivalence to within 3 points on the Barthel score and 5 points on the sickness impact profile, at a one-sided significance level of 5%. They allowed for 30% missing data.

Of the 199 patients, 102 were randomised to hospital at home and 97 to hospital. Six patients randomised to hospital at home refused the service, while 23 patients randomised to hospital were not admitted due to refusal by the patient, carer or general practitioner (GP). The two patients aged less than 40 were excluded on the grounds that they constituted a distinct group.

**Study design**

The analysis was a randomised controlled trial. The Leicester Bed Bureau staff randomised the patients using consecutively numbered sealed envelopes prepared from a block randomisation with a block size of 10. The study was conducted in three Leicestershire hospitals as well as patients' homes (hospital at home) in the Leicestershire area. It was unclear how long the patients were followed up for in total, but assessments were made at 3 days, 2 weeks and 3 months. The publication reported the loss to follow-up due to death, poor state of health, refusal or missing data at each of the stages. The authors did not report that any blinding was used.

**Analysis of effectiveness**

The basis of the analysis was intention to treat. The authors also explored the implication of conducting the analysis according to the actual treatment received. This brought a pragmatic element to the results. The authors reported that the patients in the two treatment arms had similar baseline characteristics. The median age was 84 years (interquartile range: 77 - 89) in the hospital at home group and 84 (interquartile range: 77 - 89) in the hospital group (one piece of missing data). There were 73 women in the hospital at home group and 67 in the hospital group (one piece of missing data). The number of white people was 93 in the hospital at home group and 91 in the hospital group (11 pieces of missing data). The median score on the Barthel index at initial assessment was 9 (interquartile range: 5 - 12) in the hospital at home group and 9 (interquartile range: 6 - 13) in the hospital group (three pieces of missing data). Within each treatment arm, the authors also compared those who refused their randomised place of care. There were no significant differences in gender, age or baseline Barthel index. No systematic differences between the two treatment groups were identified.

Research interviews were conducted at 3 days, 2 weeks and 3 months. The primary health outcomes were the death rate, number of patients discharged from care at 2 weeks and at 3 months, and the median length of stay. The authors also measured the Barthel index, sickness impact profile, EuroQol, and Philadelphia morale score.

**Effectiveness results**

Twenty-six of the 101 hospital at home patients and 30 of the 96 hospital patients died before the 3-month follow-up.

The number of survivors discharged from care at 2 weeks was 60 out of 88 (68%) from hospital at home and 39 out of 87 (45%) from hospital.

The number of survivors discharged from care at 3 months was 53 out of 73 (73%) from hospital at home and 48 out of 64 (75%) from hospital.

The median initial stay was 8 days in the hospital at home group and 14.5 days in the hospital group, (p=0.026).

The median total days of care over 3 months was 9 days in the hospital at home group and 16 days in the hospital group, (p=0.031).

The median Barthel index score at 3 months was 16 (interquartile range: 13 - 19) in the hospital at home group and 16 (interquartile range: 12 - 20) in the hospital group, (p=1.00).

The median sickness impact profile score at 3 months was 24 (interquartile range: 20 - 31) in the hospital at home.
group and 26 (interquartile range: 20 - 31) in the hospital group, (p=0.73).

The median EuroQol score at 3 months was 0.64 in the hospital at home group and 0.63 in the hospital group, (p=0.94).

The median Philadelphia morale score at 3 months was 37 (range: 30 - 42) in the hospital at home group and 37 (range: 31 - 43) in the hospital group, (p=0.94).

Clinical conclusions
The authors concluded that hospital at home was an "effective alternative" to hospital care, which maintained most patients at home and resulted in fewer days of care in both the initial admission and until the 3-month follow-up.

Measure of benefits used in the economic analysis
There was no summary measure of health benefit used in the economic analysis. The study was therefore categorised as a cost-consequences analysis. In particular, the authors adopted a cost-minimisation approach since they showed clinical equivalence in their clinical study.

Direct costs
The perspective for the cost analysis was not explicitly stated, but the authors appear to have estimated the costs for the duration of the clinical trial. The authors did not report that discounting was carried out. If the costs were estimated for the short run period of the trial (maximum 3 months' follow-up), then discounting would have been unnecessary. The authors estimated five items of resource use for hospital at home patients. These were staff inputs, consumables, equipment, overhead costs, and capital costs associated with the health centre base. The overheads included management administration, car leasing and travel costs, management and finance of the community trust. Nursing hours and information on contact with therapists were extracted from the patients' notes, then adjusted for additional time spent not with the patient using information from a work study completed by nurses on the scheme. These were costed using midpoints on the appropriate salary scales, with adjustments for employer superannuation and national insurance. The costs of the physiotherapists and occupational therapists were estimated from "Unit Costs of Community Care". The authors estimated the costs of a patient's stay in hospital from the length of stay and the costs of the specialty or ward. Both local and national sources were used to estimate the unit costs. The quantities and the costs were reported separately, using actual data. A price year for the analysis was not reported.

Statistical analysis of costs
The authors used a bootstrap estimation (with 1,000 sub-samples) to obtain 95% confidence intervals (CIs) for the average cost. Estimation, in addition to t-tests, was used to explore the mean difference in costs between hospital at home and acute hospital care.

Indirect Costs
The costs to the patients and their family or friends were estimated by collecting descriptive data on who provided care during a patient's stay in hospital, and whether the patients perceived home care as a burden (defined by increased heating, lighting, laundering or other domestic arrangements). The authors did not measure whether any working days were lost due to providing care, and the economic consequences of such hours. This may have been relevant if carers who would otherwise have been economically productive provided the care. The indirect costs were estimated in the same manner as the direct costs.

Currency
UK pounds sterling ( ).

Sensitivity analysis
A sensitivity analysis was conducted to explore different ratios of contact time to non-contact time for nurses. The factors to which the main results were sensitive were reported.

**Estimated benefits used in the economic analysis**

See the 'Effectiveness Results' section.

**Cost results**

The average cost of the initial episode was 2,880.65 (95% CI: 2,316.05 - 3,547.77) for hospital and 2,568.97 (95% CI: 2,089.25 - 2,972.04) for hospital at home. The mean difference was -311.68 (0.80, p=0.427). The bootstrap mean difference was -304.72 (95% CI: -1,112.35 - 447.89).

The average cost per day of the initial episode was 104.95 (95% CI: 91.53 - 118.37) for hospital and 204.65 (95% CI: 181.07 - 228.22) for hospital at home. The mean difference was 99.71 (7.29, p<0.001).

The average cost at 3 months was 3,876.86 (95% CI: 3,224.51 - 4,559.63) for hospital and 3,671.28 (95% CI: 3,140.46 - 4,231.28) for hospital at home. The mean difference was -205.68 (0.46, p=0.647). The bootstrap mean difference was -210.90 (95% CI: -1,025.14 - 635.47).

The total cost of care at the end of the initial episode was 270,781 for the hospital ward and 262,035 for hospital at home.

The total cost of care at 3 months was 368,302 for the hospital ward and 374,471 for hospital at home.

These results were estimated using intention to treat methodology. The authors also reported results that excluded patients who refused their randomised treatment. This created a greater difference between the two care alternatives, with hospital at home being the least costly alternative. The authors reported that their results were sensitive to whether the nurses were working at or under capacity for hospital at home care.

**Synthesis of costs and benefits**

The costs and effects were not combined.

**Authors' conclusions**

The authors concluded from their clinical study that the patient outcomes were similar for the two care alternatives. This enabled them to carry out a cost-minimisation analysis, from which they concluded that hospital at home could be used to provide care at the same or lower cost than admission to a hospital.

**CRD COMMENTARY - Selection of comparators**

Hospital at home was compared with acute hospital admission for patients suffering from a range of conditions that did not require specialist diagnostic investigation. Acute hospital admission seems to have been current practice in the authors' setting. You should consider the relevance of this health technology to your own setting.

**Validity of estimate of measure of effectiveness**

The analysis used a randomised controlled trial with intention to treat methodology, which was appropriate for the study question. The authors also presented results according to the actual treatment received, due to the large number of patients refusing their allocated treatment. This enables the reader to understand the empirical implications of offering hospital at home care. The study sample was representative of the study population and the two study groups were shown to be comparable at analysis.
Validity of estimate of measure of benefit
Despite estimating EuroQols during their clinical study, the authors did not use this information during their economic study. Instead they conducted a cost-minimisation analysis. The authors might, in future, use the information they collected to estimate a cost per quality-adjusted life-year gained, in order to improve the comparability of their results with those from other clinical areas or studies.

Validity of estimate of costs
A perspective for the costing was not explicitly stated. Therefore, it is not possible to comment on whether all the relevant sources of costs were included in the analysis. The authors did not attempt to estimate the economic costs associated with an informal carer, such as a son or daughter. This may have been relevant if a person who would otherwise have been in employment provided the predominant care. The authors wisely considered the implications of whether the hospital at home scheme was operating at capacity. They estimated that the scheme was most likely to be under capacity, and that an enlargement of the scheme once in practice would make hospital at home more attractive relative to hospital admission. Some of the quantities were reported separately from the costs.

Other issues
The authors did not compare their results with other studies. However, they had pointed out that no randomised controlled trials of hospital at home had been published. The issue of generalisability to other settings was not addressed. The authors did not present their results selectively. However, no limitations to the study were presented.

Implications of the study
The authors suggest that hospital at home “may provide a viable alternative to acute hospital when viewed in the long run”. They also propose that hospital at home may have a role in managing demand for hospital admission, and may provide an alternative for those who prefer not to be admitted to a hospital. No suggestions for further research were made.

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Other publications of related interest

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