The effectiveness, acceptability and costs of a hospital-at-home service compared with acute hospital care: a randomized controlled trial

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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
The study examined a hospital-at-home (HAH) service providing nursing and rehabilitative care at home as an alternative to hospital care. The HAH consisted of a nurse-led multidisciplinary team that coordinated care for the patient within the patient's own home. The key features of the service included:

- 7 days per week/10 hours per day nursing availability;
- 24-hour medical on-call by a geriatrician;
- patient-centred planning;
- daily nursing review and adjustment of individual care plan;
- intensive home support with up to 24-hour live-in home carer;
- professional multidisciplinary team support;
- rehabilitation in the patient’s home; and
- a discharge hand-over to ongoing support services.

Type of intervention
Rehabilitation.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised two categories of potential candidates for the HAH. “admission prevention” patients and “early discharge” patients. The “admission prevention” group included people experiencing a health crisis who presented at hospital but who could, with adequate clinical support provided by the HAH programme, be managed at home without being admitted to hospital. Such patients were required to have been in hospital less than 36 hours, in either the Emergency Department or Acute Assessment Ward area, and not have been admitted to an inpatient ward. The “early discharge” group comprised people who had been admitted to hospital for management of their health crisis but who, with the support of the HAH service, could be discharged home earlier than would otherwise have been the case. Patients were excluded if they were booked for major surgery within 36 days of randomisation, or if they did not have suitable living arrangements for the care required.

Setting
The setting was a hospital and the community. The economic study was carried out in New Zealand.
Dates to which data relate
The period during which the effectiveness and resource use data were gathered was not stated. The price year was 1997.

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

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

Study sample
Power calculations were carried out in the preliminary phase of the study. These suggested that a sample of 100 patients per intervention group was required for an 80% or greater power to detect a clinically important intervention effect. The patients were identified by hospital, medical, nursing or allied health professional staff, and referred to programme nurses for assessment. Of the 841 referrals over the study period, 294 were for admission prevention and 547 for early discharge. However, 556 were either not eligible (52.8%) or did not give consent (13.6%), thus 285 (33.6%) were included in the final study sample. There were 143 patients (104 early discharge and 39 admission prevention) in the HAH group and 142 patients (105 early discharge and 37 admission prevention) in the conventional group. The majority of participants were elderly women living alone. The mean age was 80.0 years, with 80.4% aged 75 years or older. Only 3.9% of the patients were 65 years or younger.

Study design
This was a prospective, randomised, open-label clinical trial that was carried out at the Auckland Hospital in New Zealand. Randomisation was carried out by a computer-generated randomisation service that was independent of all parties and accessible by telephone 24 hours per day. The patients were also stratified by perceived risk of resource consumption (normal or high) and by trial type (admission prevention or early discharge). The length of follow-up was 90 days. The outcome was assessed at baseline and at 10, 30 and 90 days after randomisation by face-to-face interviews with trained researchers who were not involved in patient care, but who were not blinded to the intervention group. At the end of the follow-up period, data were available for 129 patients in the HAH group and 124 patients in the conventional group because of withdrawal (13 patients) or death (18 patients).

Analysis of effectiveness
The analysis of the clinical study appears to have been restricted to treatment completers only. The primary outcome measures used were:

changes in personal activities of daily living, assessed with the functional independence measure (FIM);
changes in cognitive function, assessed with the Mini Mental Status Examination (MMSE); and
changes in instrumental activities of daily living (IADLs), measured using a modified OARS assessment.

The secondary outcome measures were:
self-reported recovery (participants were asked if they had made a complete recovery from the problem that had caused them to go into hospital);
health status, as assessed by the SF-36 (acute form) at 90 days after randomisation;
readmission to the hospital;
falls, bladder problems, bowel problems, confusion;
admission to an institution for permanent care; or death.

Acceptability was measured at 90 days using a structured satisfaction survey in which 30 questions were rated using a 5-point Likert scale and two questions required a yes or no answer. The authors stated that the study groups were comparable at baseline in terms of their main clinical and demographic characteristics.

**Effectiveness results**

The effectiveness analysis showed that none of the differences in primary and secondary outcome measures between the two groups reached statistical significance.

In general, the FIM scores improved on average by 13 points from baseline (99.5 to 113.2) over follow-up. The MMSE did not change over time. The IADL scores improved in both intervention groups from baseline over follow-up (7.0 to 9.6).

Recovery was not faster in either intervention group for any health outcome.

At no time did changes in comprehension, memory, bladder control or bowel control show any significant differences between intervention groups.

The proportion of participants reporting a complete recovery improved over time.

The proportion of patients who rated their overall satisfaction as "very good" or "excellent" was 83.0% in the HAH group and 72.5% in the conventional group, (p=0.05). For patients, there was no difference between the intervention groups, either in terms of whether they felt under pressure or in terms of their willingness to recommend either service to others.

The proportion of relatives who rated their overall satisfaction as "very good" or "excellent" was 66.7% in the HAH group and 41.4% in the conventional group, (p=0.004).

The proportion of relatives who did not feel under pressure was 82.6% in the HAH group and 61.8% in the conventional group, (p=0.009).

The proportion of relatives who would recommend the service to others was 98.4% in the HAH group and 89.5% in the conventional group, (p=0.03).

**Clinical conclusions**

The effectiveness analysis showed that the HAH led to a significant improvement in patients’ and relatives’ satisfaction but did not affect other clinical outcomes.

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

The health outcomes were left disaggregated and no summary benefit measure was used in the economic analysis. In effect, a cost-consequences analysis was carried out.

**Direct costs**

The perspective of the cost analysis was not explicitly stated. The direct medical costs were for in-hospital services, HAH and community services. In-hospital services included hospital stay, laboratory services, occupational therapy, physiotherapy, speech therapy, and so on. HAH included nursing, home carers, physiotherapy, occupational therapy, and so on. Community services covered, for example, general practice consultations, private services and community nursing. Pharmaceutical costs were excluded because of difficulty in their estimation. The quantities of resources used were extensively reported, but the unit costs were not. Resource use was estimated using data derived from the sample...
of patients included in the effectiveness analysis. The costs were estimated from hospital departments, market prices and actual fees. Details on the approach used to calculate individual and total costs were reported. Discounting was not relevant as the costs were incurred during a short timeframe. The price year was 1997.

**Statistical analysis of costs**
The t-test was used to test formally for differences in total costs between the groups. Generalised linear models were used to test the difference in per-day costs between the two groups.

**Indirect Costs**
The indirect costs were not included in the economic evaluation.

**Currency**
New Zealand dollars (NZD). In June 1997, the exchange rate for New Zealand dollars to UK pounds sterling (£) was NZD 1 = 0.40.

**Sensitivity analysis**
A sensitivity analysis was performed to assess the impact of different throughput on the cost-difference. This was done to reflect the possibility that the new HAH service could operate at full capacity.

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

**Cost results**
The mean total costs per patient were NZD 6,524 (median 6,031, interquartile range, IQR: 4,421 - 8,366) in the HAH group and NZD 3,525 (median 3,084, IQR: 1,682 - 4,587) in the conventional group. This difference was statistically significant, (p<0.0001).

The mean costs per day of service were NZD 570 (median 527, IQR: 386 - 731) in the HAH group and NZD 538 (median 471, IQR: 257 - 700) in the conventional group.

The sensitivity analysis showed that, when the service was extended to a higher number of patients (i.e. 280 patients), the mean cost per patient in the HAH group decreased to NZD 4,489 although it remained significantly higher than the average cost in the conventional group. However, when the HAH programme was running at full capacity (420 patients), the mean per patient cost of the HAH was NZD 3,696, which was not significantly different from that of the conventional group (NZD 3,525), (p=0.58).

**Synthesis of costs and benefits**
A synthesis of the costs and benefits was not relevant as a cost-consequences analysis was carried out.

**Authors' conclusions**
The hospital-at-home (HAH) service was more acceptable, and as safe and effective, as usual inpatient hospital care for both early discharges and admission preventions. However, the HAH cost approximately NZD 3,000 more than conventional care, an amount that decision-makers may not wish to pay for the marginal gain in acceptability of the service. Nevertheless, the sensitivity analysis suggested that, if the HAH had been operating at full capacity, the new service would have been cost-neutral in comparison with standard care.
CRD COMMENTARY - Selection of comparators
The selection of the comparator was appropriate as it reflected the standard approach in the authors' institution. You should decide whether this is a valid comparator in your own setting.

Validity of estimate of measure of effectiveness
The effectiveness evidence came from a well-conducted clinical trial, which was appropriate for the study question. Thus, the potential impact of selection bias and confounding factors can probably be ruled out. The method of sample selection and details of follow-up were clearly described. The internal validity of the study was further enhanced by the baseline comparability of the study groups and the use of a statistical analysis to determine the most appropriate sample size. However, the trial was open-label, thus assessment bias might have affected the results of the study. Another potential limitation lay in the fact that the analysis was based on treatment completers only, which means that patients lost to follow-up were not taken into consideration in the analysis of effectiveness. Finally, it was unclear whether or not the study sample was representative of the patient population.

Validity of estimate of measure of benefit
No summary benefit measure was used in the analysis because a cost-consequences analysis was conducted. Please refer to the comments in the 'Validity of estimate of measure of effectiveness' field (above).

Validity of estimate of costs
The perspective adopted in the analysis was not explicitly stated. A breakdown of the cost items was provided and a justification for the exclusion of some cost categories was given. The unit costs were not reported, but there was extensive information on resource consumption. Statistical analyses were carried out because of the skewed distribution of the costs. The cost estimates were specific to the study setting and were not varied in the sensitivity analysis. The price year was given, which will facilitate reflation exercises in other time periods. The source of the data was reported, and there was extensive information on the cost calculation. The authors attempted to explain the reasons why the programme was so costly and also noted the existence of several possible ways of reducing costs.

Other issues
The authors did not make extensive comparisons of their findings with those from other studies. They also did not explicitly address the issue of the generalisability of the study results to other settings. This limits the external validity of the analysis. However, the authors highlighted the fact that the intensity of the HAH intervention included in this study was high compared with similar schemes elsewhere. The study referred to patients requiring nursing and rehabilitative care and this was reflected in the authors' conclusions.

Implications of the study
The study results showed that an HAH can be safe and effective in providing rehabilitation care. The authors stressed that further work should be performed to examine how costs might be reduced without reducing the safety and acceptability of these programmes, and to determine an appropriate method for selecting patients for such a scheme.

Source of funding
None stated.

Bibliographic details

PubMedID
Other publications of related interest


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