Effectiveness of team-managed home-based primary care: a randomized multicenter 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
A Veteran Affairs (VA) Team-Managed Home-Based Primary Care (TM/HBPC) programme was examined. The programme involved a multidisciplinary team comprising patients who had two or more activities of daily living impairments or a terminal illness, congestive heart failure or chronic obstructive pulmonary disease. There were six main interventions or objectives:

to target care to high-risk patients;
to designate a primary care manager within the team;
to provide 24-hour contact for the patients;
to obtain prior approval of scheduled hospital readmissions;
to transfer stable readmitted patients to step-down beds; and
to involve a HBPC team in readmission discharge planning.

Type of intervention
Other: home-based health care.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised hospitalised patients with two or more activities of daily living impairments or a terminal illness, congestive heart failure or chronic obstructive pulmonary disease. The patients were required to live within a 25- to 35-mile catchment area served by their hospital's HBPC programme. Patients not hospitalised, but referred from outpatient clinics or nursing homes, were considered eligible if they had been hospitalised within the past three months. Patients with a primary diagnosis of psychiatric illness, alcoholism, substance abuse, or spinal cord injury were not included in the study.

Setting
The setting was the community. The economic study was conducted in 16 VA medical centres in the USA.

Dates to which data relate
The effectiveness and resource use data were gathered from October 1994 to October 1996. The price year was 1996.

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

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

**Study sample**
Power calculations to determine the sample size were not reported in the current paper (correspondence with the authors, however, indicates that they were performed; the sample size of 1,966 was high enough to detect a cost difference of 14% at a significance level of 0.05). The method of sample selection was reported. Of an initial sample of 2,202 eligible patients, 1,966 patients (and 1,883 caregivers) were enrolled in the study. There were 981 patients in the TM/HBPC group (intervention) and 985 patients in the customary post discharge care (control) group. In the TM/HBPC group, the mean age was 70.4 (+/- 10.3) years and 96.5% were men. In the control group, the mean age was 70.4 (+/- 10.3) years and 96.2% were men. However, the final evaluable sample comprised 331 patients in the intervention group and 336 patients in the control group. This was because 39 patients in the intervention group and 32 patients in the control group died before discharge, 17 patients in both groups were discharged, 340 (intervention) and 336 (control) patients died after discharge, 180 (intervention) and 163 (control) patients were unable to respond, 45 (intervention) and 69 (control) patients refused post-test, and 29 (intervention) and 32 (control) patients were lost to follow-up.

**Study design**
This was a randomised controlled trial that was carried out in several VA centres. The patients were stratified before randomisation by site, diagnosis and age. Randomisation was performed on telephoning the statistical coordinating centre. The patients were followed for 12 months and the outcome assessment was performed at baseline, 1, 6, and 12 months. The loss to follow-up was 29 patients (3%) in the intervention group and 32 patients (3.2%) in the control group.

**Analysis of effectiveness**
The basis of the clinical analysis was intention to treat. The primary health outcomes used in the effectiveness analysis were:

- patient functional status, assessed using the Barthel Index;
- patient and caregivers HR-QoL (using the Medical Outcomes Study, Short-Form, 36-item, MOS SF-36) subscales, which were then aggregated in the Mental Component Scale and Physical Component Scale;
- patient and caregiver satisfaction, using the selected Ware Satisfaction with Care scales;
- caregiver burden, estimated using the Montgomery scale;
- the presence of cognitive impairment, using the Mental Status Questionnaire; and
- the risk of readmissions, using the Smith Comorbidity Index.

The implementation of the HBPC programme was estimated through compliance rates, which were assessed using annual surveys of study sites, telephone calls, and so on. The study groups were shown to be comparable at baseline in terms of their demographics and health conditions.

**Effectiveness results**
The mean compliance with the programme was 93.8% for the targeting of care to high-risk patients, 93.8% for the designation of a primary care manager within the team, 68.8% for the provision of 24-hour contact for the patients, 68.8% for obtaining prior approval of scheduled hospital readmissions, 75% for the transfer of stable readmitted...
patients to step-down beds, and 56.2% for HBPC team involvement in readmission discharge planning.

Most of the outcomes estimated in the effectiveness analysis were similar in the two study groups.

The outcomes that were statistically significantly different between the intervention and control groups were emotional role function (coefficient: 12.7), social function (coefficient: 0.6), bodily pain (coefficient: 2.4), mental health (coefficient: 3.0), vitality (coefficient: 1.8), and general health (coefficient: 0.9) in terminal patients. In non-terminal patients, these were bodily pain (coefficient: -2.0) in the HR-QoL scale and five of the six dimensions of satisfaction with care, that is, access (coefficient: 5.3), technical quality (coefficient: 6.3), communication (coefficient: 8.5), interpersonal (coefficient: 6.3) and outcomes (coefficient: 7.1).

With the exception of bodily pain in the HR-QoL scale, all the remaining significantly different outcomes favoured the intervention group.

Caregiver satisfaction and burden scores generally favoured the intervention group.

The mean hospitalisation for all patients after one year was 14.7 (+/- 27.6) days in the intervention group and 13.3 (+/- 22.8) days in the control group. (p=0.95).

**Clinical conclusions**
The effectiveness analysis showed that patient functional status did not differ in the two study groups. However, the quality of life scores were better for patients in the TM/HBPC programme than for those managed with customary VA and private sector care.

**Measure of benefits used in the economic analysis**
The health outcomes were left disaggregated and no summary benefit measure was used in the analysis. A cost-consequences analysis was therefore conducted.

**Direct costs**
Discounting was not applied as the costs were incurred during one year. The unit costs and the quantities of resources were not reported separately. The health services included in the economic evaluation were both VA and non-VA health care costs. The VA costs included inpatient, nursing home, outpatient, TM/HBPC care, and other resources such as emergency department, pharmacy, durable medical equipment, contract nursing home, and adult day of health care. The non-VA costs included inpatient and outpatient care, home-based care, hospice, and other resources such as emergency department, case management, emergency response, adult day health care, residential care, and homemaker/chore. The cost/resource boundary adopted in the study was not reported.

Data relating to resource use, VA hospital, nursing home, outpatient, and TM/HBPC use were derived from national data files. Durable medical equipment and pharmacy use was derived from local hospital computer systems. Non-VA resource use, such as private sector use and cost data, was derived from Health Care Financing Administration data for Medicare-reimbursement and from patient self-reports confirmed with providers. The unit costs were derived from the VA Cost Distribution Reports referring to the fiscal year 1996 and from private hospital charges and other Medicare costs. A cost-to-charge ratio was used to derive the true costs. All non-VA costs were adjusted to 1996 costs using the appropriate medical care producer cost inflation index. The quantities of resources were estimated from October 1994 to October 1996. The price year was 1996.

**Statistical analysis of costs**
The costs were analysed on an intention to treat basis (patients were grouped by randomisation) and as-treated analysis (patients were grouped by the treatment they actually received). Standard statistical analyses were conducted to investigate the statistical significance of the results.
Indirect Costs
The indirect costs were not included in the analysis.

Currency
US dollars ($).

Sensitivity analysis
Sensitivity analyses were conducted to assess the robustness of the cost analysis to variation in the unit costs of care. Facility-specific costs were used.

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

Cost results
After one year, the total VA costs were $25,614 (+/- 27,339) in the intervention group and $21,687 (+/- 25,709) in the control group, (p<0.001).

The total non-VA costs were $5,787 (+/- 17,172) in the intervention group and $6,321 (+/- 13,210) in the control group, (p<0.001).

The total VA and non-VA costs were $31,401 (+/- 32,624) in the intervention group and $28,008 (+/- 30,613) in the control group, (p=0.005).

The sensitivity analyses showed that the use of facility-specific costs did not affect the estimated costs.

Synthesis of costs and benefits
Irrelevant as a cost-consequences analysis was conducted.

Authors’ conclusions
The Team-Managed Home-Based Primary Care (TM/HBPC) programme improved several health-related quality of life (HR-QoL) measures in patients and their caregivers and reduced hospital readmissions. The initial costs of the programme were higher in comparison with the more traditional model of patient management, but after one year there was no statistically significant difference in the cost.

CRD COMMENTARY - Selection of comparators
The rationale for the choice of the comparator was clear. Customary VA and private sector care was selected as it represented the standard care provided to the patients included in the analysis. You should decide whether it represents a widely used approach in your own setting.

Validity of estimate of measure of effectiveness
The analysis of effectiveness used a randomised controlled trial, which was appropriate for the study question. The study sample was representative of the study population. The study groups were shown to be comparable at baseline. The clinical study was analysed on an intention to treat basis. Statistical analyses were conducted to stratify the patients and to assess outcomes adjusted for baseline characteristics. These issues tend to enhance the internal validity of the analysis. Power calculations were not performed.
Validity of estimate of measure of benefit
No summary benefit measure was used in the economic analysis. The analysis was therefore categorised as a cost-consequences study.

Validity of estimate of costs
The perspective adopted in the study was not explicitly reported. Thus, it was unclear whether all the relevant categories of costs had been included in the analysis. There was a detailed breakdown of the costs, but the unit costs were not reported separately from the quantities of resources. Statistical analyses of the costs were conducted. The price year was reported, thus enabling reflation exercises in other settings. The cost estimates were specific to the study setting, but sensitivity analyses were performed to assess the impact of different unit costs. The source of the cost data was appropriately reported. Discounting was irrelevant.

Other issues
The authors did not compare their results with those from other studies, as their analysis was considered to be the first randomised trial assessing home-based care for impaired patients. A sample of patients requiring home care was enrolled in the study and this was reflected in the conclusions of the analysis. The authors noted that some caution would be required when generalising the study findings to the private sector.

Implications of the study
The authors highlighted the importance of caregiver burden when assessing programme outcomes. Future research should further investigate the benefits of new models of home-based care.

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