Randomised controlled trial comparing hospital at home care with inpatient hospital care. I: three month follow up of health outcomes

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Abstract

Objectives: To compare hospital at home care with inpatient hospital care in terms of patient outcomes.
Design: Randomised controlled trial with three month follow up.
Setting: District general hospital and catchment area of neighbouring community trust.
Subjects: Patients recovering from hip replacement (n = 86), knee replacement (n = 86), and hysterectomy (n = 238); elderly medical patients (n = 96); and patients with chronic obstructive airways disease (n = 32).
Interventions: Hospital at home care or inpatient hospital care.
Main outcome measures: Dartmouth COOP chart to measure patients' general health status; SF-36 to measure possible limitations in physical functioning of patients with hysterectomy; disease specific measures—chronic respiratory disease questionnaire, Barthel index for elderly medical patients, Oxford hip score, and Bristol knee score; hospital readmission and mortality data; carer strain index to measure burden on carers; patients' and carers' preferred form of care.
Results: At follow up, there were no major differences in outcome between hospital at home care and hospital care for any of the patient groups except that those recovering from hip replacement reported a significantly greater improvement in quality of life with hospital at home care (difference in change from baseline value 0.50, 95% confidence interval 0.13 to 0.88). Hospital at home did not seem suitable for patients recovering from a knee replacement, as 14 (30%) of patients allocated to hospital at home remained in hospital. Patients in all groups preferred hospital at home care except those with chronic obstructive airways disease. No differences were detected for carer burden. Carers of patients recovering from knee replacement preferred hospital at home care, while carers of patients recovering from a hysterectomy preferred hospital care.
Conclusions: Few differences in outcome were detected. Thus, the cost of hospital at home compared with hospital care becomes a primary concern.

Introduction

There is an increasing demand for acute hospital beds, partly because of rising numbers of emergency medical admissions.[1] Increased provision of services in the community is one proposed method for reducing the pressure on acute hospitals. Hospital at home schemes provide care that is usually available only in hospital in a patient's home—such as observation, administration of drugs, support, nursing care, and rehabilitation. The aim is to reduce costs to the health service by reducing length of stay in hospital or by avoiding admission altogether. A national survey of purchasing authorities has shown that most areas of the United Kingdom are providing some form of hospital at home scheme.[2] There is, however, considerable uncertainty about the costs and effectiveness of hospital at home care compared with hospital care.[3 4]

A proposal for a new hospital at home scheme in Northamptonshire offered an opportunity to perform a rigorous evaluation of the service as it was introduced. The service provider (Rockingham Forest NHS Trust), the hospital trust (Kettering General Hospital NHS Trust), the purchasing authority (Northampton Health Authority), and local general practitioners agreed to collaborate in a randomised controlled trial. The aim of the trial was to evaluate the health outcomes and costs of the hospital at home scheme compared with inpatient hospital care, and patients could be admitted to the scheme only if they agreed to be randomised. We report here the effects of hospital at home care on health outcomes.

Patients and methods

Patients were recruited from the catchment area of Kettering General Hospital NHS Trust (about 699 km^2), and 102 general practitioners from 26 practices participated in the trial. Ethical approval for the study was obtained from the local research ethics committee. After discussions with clinicians and service providers, and a review of the published reports of other hospital at home schemes,[3] five groups of patients were considered suitable for the trial. These were patients recovering from a hip replacement, a knee replacement, or a hysterectomy; patients with chronic obstructive airways disease; and elderly patients with a mix of medical conditions. Patients were eligible for recruitment if

- Their hospital consultant and general practitioner agreed that they were suitable to be discharged early from hospital to hospital at home care or that they

could be admitted to hospital at home as an alternative to hospital care
- Their home was suitable for hospital at home care (minimum requirements were hot and cold running water, indoor sanitary facilities, and room for the patient's bed to be moved downstairs if necessary)
- Their carer (if one was identified) consented to participate in the trial.

Patients were excluded from the trial if
- They were under 60 years old, except for women having a hysterectomy
- They were having a hysterectomy for ovarian or uterine malignancy.

Intervention

The Rockingham Forest NHS Trust provided hospital at home care as a direct alternative to inpatient care for patients who were clinically stable and did not require immediate access to diagnostic or specialist medical care. The services provided included nursing, physiotherapy, occupational therapy, pathology, and speech therapy. Patients were provided with a mobile phone if required. The type of care was more than is normally available in the community through NHS care. It consisted of observation, administration of drugs (including intravenous drugs), nursing care, and rehabilitation of patients in their home. Nursing care was available 24 hours a day in patients' home if necessary. General practitioners held clinical responsibility and were reimbursed for visits they made to patients admitted to the scheme. The decision to discharge patients from the hospital at home scheme was made by a senior nurse.

Randomisation

Before randomisation, a research nurse obtained informed consent from eligible patients and their carers. The randomisation schedule, which was not stratified, was generated by computer. Allocations to hospital or hospital at home were sealed in opaque envelopes. The allocations were revealed through a telephone randomisation service, independent of the service providers (see figure).

Data collection

After patients were randomised, a research nurse collected demographic information and administered the modified mini-mental state examination.[5] Patients were asked to complete the Dartmouth COOP chart,[6] a questionnaire on general health status that is brief, easy to complete, and is sensitive to subjectively important change.[7] Patients who had a hysterectomy were also asked to complete the SF-36 to capture possible limitations in physical functioning.[8] Disease specific measures included the chronic respiratory disease questionnaire[9] and the Barthel index[10] for elderly medical patients. Patients were asked to complete these questionnaires at one and three months' follow up. Patients having a hip or knee replacement completed the Oxford hip score[11] or Bristol knee score[12] at one and three months. Data on hospital readmissions and mortality were collected.

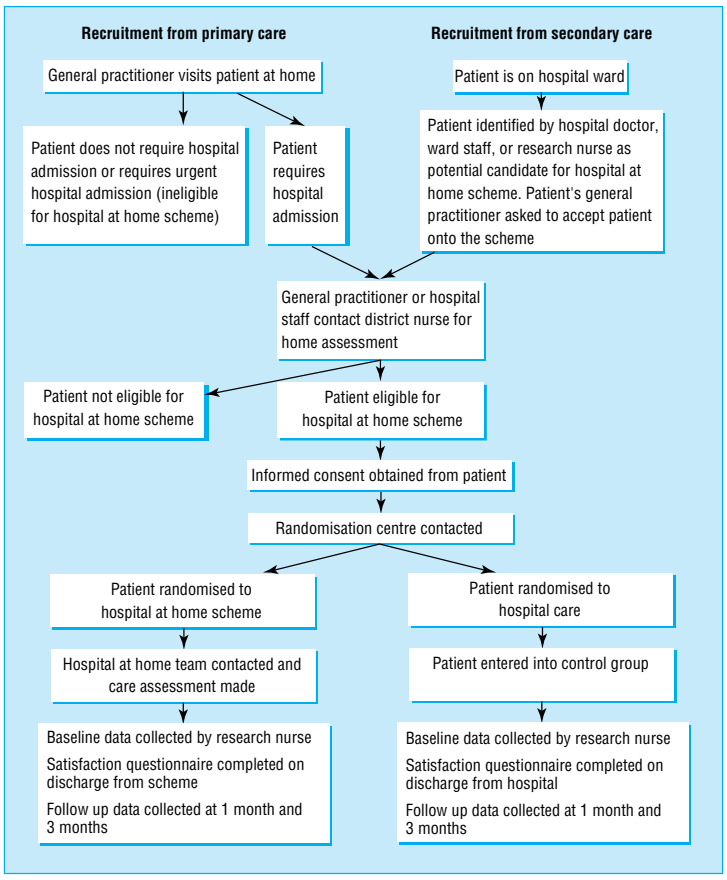
Carers demographic information was collected at baseline. Carers were also asked to complete the carer strain index,[13] a measure of carer burden, at baseline and at one and three months' follow up. Patients and carers were asked their preferred place of care, hospital at home or hospital, when they were discharged from care.

Data on cost and resource use are reported in our accompanying paper.[14]

Sample size

When possible sample size calculations were based on a change in health status for each clinical condition. When this information was not available (for hip and knee replacements) the calculation of sample size was based on a change in cost thought to be important by the purchasing authority. Pre-trial estimates of treatment costs were obtained from the acute trusts in the former Oxford Regional Health Authority. Levels of β and α varied for each clinical condition according to the expected change for each of the five primary measures of outcome and by the number of patients predicted for each group.

Sample sizes for hip and knee replacements had a power of 80%, with an α of 0.01, to detect a 20% change in healthcare cost. The sample size for patients having a hysterectomy had a power of 80%, with an α of 0.05, to detect a change of 10 points on the physical functioning domain of the SF-36, based on a standard deviation of 18.7. Sample size for patients with chronic obstructive airways disease had a power of 80%, with an α of 0.05, to detect a change of 4 points on the emotional functioning domain of the chronic respiratory disease questionnaire, based on a standard deviation of 3. Sample size for elderly patients with a medical condition had a power of 90%, with an α of



Procedure for recruitment and randomisation of patients and data collection in trial of hospital at home scheme

Table 1 Demographic details of 538 patients allocated to hospital at home care or inpatient hospital care according to diagnosis (values are numbers (percentages) unless stated otherwise)

	Hip replacement		Knee replacement		Hysterectomy		Elderly medical		Chronic obstructive airways disease	
	HaH (n=37)	Hospital (n=49)	HaH (n=47)	Hospital (n=39)	HaH (n=114)	Hospital (n=124)	HaH (n=50)	Hospital (n=46)	HaH (n=15)	Hospital (n=17)
Sex:										
Male	15 (41)	18 (37)	24 (51)	14 (36)	—	—	17 (34)	23 (50)	5 (33)	3 (18)
Female	22 (59)	31 (63)	23 (49)	25 (64)	114 (100)	124 (100)	33 (66)	23 (50)	10 (67)	14 (82)
Mean (SD) age (years)	71 (7.7)	70 (8.7)	68 (7.9)	72 (6.8)	45 (9.4)	44 (8.9)	77 (11.6)	76 (9.6)	71 (7.2)	73 (10.1)
Social class:										
Non-manual	12 (32)	16 (33)	6 (13)	15 (38)	29 (25)	52 (42)	11 (22)	12 (26)	2 (13)	2 (12)
Manual	19 (51)	26 (53)	32 (68)	19 (49)	69 (61)	64 (52)	29 (58)	25 (54)	8 (53)	12 (70)
Not working	5 (14)	6 (12)	8 (17)	5 (13)	5 (4)	3 (2)	8 (16)	6 (13)	5 (33)	3 (18)
Missing	1 (3)	1 (2)	1 (2)	—	11 (10)	5 (4)	2 (4)	3 (7)	—	—

HaH=hospital at home care.

0.01, to detect a difference of 3 points on the Barthel index, based on a standard deviation of 3.1.

Statistical analysis

After randomisation, the patients were analysed according to their clinical group—hip replacement, knee replacement, hysterectomy, chronic obstructive airways disease, or elderly medical. Analysis was done on an intention to treat basis. The outcome measures from patients' self assessment generated multiple comparisons of data. To reduce the risk of reporting misleading significant results, we report only P values that are ≤0.01 unless the sample size was based on an α of 0.05. Unpaired two tailed t tests were used to test for differences between normally distributed continuous variables. For continuous variables that showed a non-normal distribution, differences were tested with the two tailed Mann-Whitney U test. The χ^2 test was used to test for differences in proportions.

Results

Between October 1994 and November 1996 we recruited 538 patients. For each clinical condition, the groups of patients allocated to the two types of care were broadly similar in distribution of sex, age, and social class (table 1). Sample size requirements were met for each of the five clinical conditions. We report differences between the two arms of the trial in terms of the change of score from baseline to the final follow up time at three months.

Table 2 Outcome measures reported by patients recovering from hip replacement who were allocated to hospital at home care (n=37) or inpatient hospital care (n=49)

	Mean (SD) value at baseline		Mean change from baseline value at 3 month follow up		
	HaH	Hospital	HaH	Hospital	Difference (95% CI)
Dartmouth COOP charts*:	(n=36)	(n=48)	(n=36)	(n=45)	
Physical fitness	4.58 (0.91)	4.73 (0.49)	0.42	0.51	–0.09 (–0.48 to 0.29)
Feelings	2.44 (1.08)	2.60 (1.16)	1.03	0.78	0.25 (–0.29 to 0.79)
Daily activities	3.17 (1.13)	3.40 (0.98)	1.00	0.93	0.07 (–0.39 to 0.53)
Social activities	2.92 (1.27)	3.10 (1.19)	1.43	1.02	0.41 (–0.15 to 0.97)
Pain	4.33 (0.76)	4.46 (0.68)	1.54	1.69	–0.15 (–0.78 to 0.49)
Change in health	2.44 (0.94)	2.44 (0.92)	0.74	0.13	0.61 (0.02 to 1.20)
Overall health	2.78 (0.76)	2.85 (1.01)	0.06	–0.04	0.10 (–0.35 to 0.55)
Social support	1.56 (0.84)	1.90 (1.34)	0.26	0.40	–0.14 (–0.57 to 0.28)
Quality of life	2.94 (0.83)	2.73 (0.74)	0.97	0.47	0.50 (0.13 to 0.88)
Oxford hip score†	(n=34) 25.56 (6.15)	(n=46) 27.34 (8.03)	(n=31) 4.77	(n=43) 3.13	1.64 (–1.23 to 4.50)

HaH=hospital at home care. *Scale 1-5 (low score=good quality of life). No data for some patients. †Scale 12-60 (high score=high level of impairment). Baseline score measured at 1 month. No data for some patients.

Hip replacements

Five (14%) of the patients allocated to hospital at home remained in hospital because of postoperative complications. Table 2 shows outcomes after three months. Patients in the hospital at home group reported a significantly greater improvement in quality of life in the self reported Dartmouth COOP charts compared with those in the hospital group. There were no other significant differences in outcome. Two (5%) of the patients in the hospital at home group were readmitted to hospital compared with one (2%) patient in the hospital group (difference 3%, 95% confidence interval −5% to 12%). One patient in the hospital group died. More of the patients receiving hospital at home care reported that they had received their preferred form of care (difference 36%, 17% to 55%). No differences were detected between carers in the two groups for carer burden or preferred place of care (table 3).

Knee replacements

Fourteen (30%) of the patients receiving hospital at home care remained in hospital, primarily because of postoperative complications. Table 4 shows outcomes at three months. No significant differences between the two groups were detected for any of the measures. Four (9%) patients in the hospital at home group were readmitted to hospital compared with one (3%) patient in the hospital group (difference 6%, −3% to 15%). There were no deaths. More patients in the hospital at home group reported that they had received their preferred form of care (difference 34%, 14% to 54%). No significant differences in carer burden were detected, but a greater proportion of carers in the hospital at home group expressed satisfaction with their place of care compared with those in the hospital group (difference 25%, 1% to 49%) (table 3).

Hysterectomy

Sixteen (14%) of the patients allocated to hospital at home remained in hospital, primarily because of postoperative complications. Table 5 shows outcomes at three months. No significant differences between the two groups were detected for any of the measures. Seven (6%) patients in the hospital at home group were readmitted to hospital during follow up compared with

Table 3 Comparison of carer strain index measures* at baseline and 3 month follow up

	Baseline value		Change from baseline value at 3 months		
Patient category	**HaH**	**Hospital**	**HaH**	**Hospital**	**Difference (95% CI)**
Hip replacement	(n=26) Median 1.00 (interquartile range 0.0-2.0)	(n=36) Median 1.00 (interquartile range 0.0-3.0)	(n=23) Median 0.00	(n=29) Median 1.00	Mann-Whitney U test P=0.34
Knee replacement	(n=33) Mean 1.27 (SD 2.39)	(n=25) Mean 1.64 (SD 1.98)	(n=28) Mean 0.25	(n=19) Mean –0.58	0.83 (–0.79 to 2.45)
Hysterectomy	(n=97) Mean 0.96 (SD 1.87)	(n=107) Mean 1.02 (SD 1.69)	(n=79) Mean 0.15	(n=79) Mean 0.28	–0.13 (–0.77 to 0.52)
Elderly medical	(n=32) Mean 3.53 (SD 2.76)	(n=28) Mean 3.89 (SD 2.79)	(n=23) Mean 0.96	(n=23) Mean –0.22	1.17 (–0.47 to 2.82)
Chronic obstructive airways disease	(n=10) Mean 5.00 (SD 3.59)	(n=10) Mean 6.50 (SD 3.50)	(n=6) Mean –0.33	(n=4) Mean 2.75	–3.08 (–8.19 to 2.02)

HaH=hospital at home. *Scale 0-13 (high score=high level of strain).

13 (10%) in the hospital group (difference – 4%, – 11% to 3%). Of these seven hospital at home patients, four were readmitted during the course of their hospital at home care. There were no deaths. A greater proportion of patients in the hospital at home group reported that they had received their preferred type of care (difference 19%, 8% to 30%). In contrast, a lower proportion of carers in the hospital at home group described hospital at home as their preferred form of care (difference – 27%, – 40% to – 14%) (table 3).

Elderly medical patients

Table 6 shows outcomes at three months. No significant differences were detected between the two groups of patients for any of the measures. During follow up, 13 (26%) of the patients in the hospital at home group were either admitted to hospital (if recruited in the community) or readmitted compared with five (11%) in the hospital group (difference 15%, 0% to 30%). Of these 13 hospital at home patients, seven were readmitted during their hospital at home care. Nine (18%) patients in the hospital at home group and four (9%) in the hospital group died (difference 9%, – 4% to 23%). More patients in the hospital at home group reported that they had received their preferred form of care (difference 41%, 20% to 62%). No significant differences were detected between the two groups of carers (table 3).

Chronic obstructive airways disease

Table 7 shows outcomes at three months. No statistically significant differences between the two groups were detected for patient outcomes or preferred place of care. During follow up, eight (53%) of the patients in the hospital at home group were either admitted to hospital (if recruited in the community) or readmitted compared with six (35%) in the hospital group (difference 18%, – 16% to 52%). Of these eight hospital at home patients, one was admitted during hospital at home care. Three (20%) of the patients in the hospital at home group died compared with three (18%) in the hospital group (difference 2%, – 25% to 30%). No significant differences were detected between the two groups of carers (table 3).

Discussion

There is growing interest in applying the methods of the randomised controlled trial to issues in delivering health services. We conducted such a trial to compare the effect of hospital at home care with inpatient hospital care. One of the most important issues in designing the trial was to define the service provided and the population to be studied. We hypothesised that both outcomes and costs would differ according to diagnosis and age and that valid conclusions could be drawn only by comparing similar patients. On the other hand, the service providers were under pressure to accept a wide range of patients to demonstrate the usefulness of the scheme. We therefore recruited patients with a range of clinical conditions to the service but determined a priori that they would be analysed according to their main diagnosis. Under a common

Table 4 Outcome measures reported by patients recovering from knee replacement who were allocated to hospital at home care (n=47) or inpatient hospital care (n=39)

	Mean (SD) value at baseline		Mean change from baseline value at 3 month follow up		
	HaH	**Hospital**	**HaH**	**Hospital**	**Difference (95% CI)**
Dartmouth COOP charts*:	(n=46)	(n=39)	(n=45)	(n=35)	
Physical fitness	4.58 (0.79)	4.58 (0.79)	0.19	0.29	–0.10 (–0.49 to 0.29)
Feelings	2.62 (1.13)	2.67 (1.26)	0.51	0.37	0.14 (–0.50 to 0.78)
Daily activities	3.33 (0.97)	3.41 (0.85)	0.68	0.91	–0.23 (–0.71 to 0.26)
Social activities	3.20 (1.36)	3.08 (1.29)	0.98	0.91	0.07 (–0.61 to 0.74)
Pain	4.41 (0.75)	4.39 (0.75)	1.02	1.06	–0.04 (–0.62 to 0.53)
Change in health	2.63 (0.95)	2.69 (0.95)	0.48	0.62	–0.14 (–0.73 to 0.45)
Overall health	3.04 (0.84)	3.21 (0.86)	–0.11	0.15	–0.26 (–0.65 to 0.12)
Social support	1.89 (1.30)	1.87 (1.10)	0.18	–0.03	0.21 (–0.33 to 0.74)
Quality of life	2.93 (0.68)	2.85 (0.49)	0.42	0.40	0.02 (–0.37 to 0.41)
Bristol knee score†	(n=38) 32.68 (6.9)	(n=33) 33.03 (6.5)	(n=38) –3.00	(n=31) –4.06	1.06 (–1.58 to 3.70)

HaH=hospital at home care. *Scale 1-5 (low score=good quality of life). No data for some patients. †Scale 0-50 (low score=poor level of functioning). Baseline score measured at 1 month. No data for some patients.

Table 5 Outcome measures reported by patients recovering from hysterectomy who were allocated to hospital at home care (n=114) or inpatient hospital care (n=124)

	Mean (SD) value at baseline		Mean change from baseline value at 3 month follow up		
	HaH	**Hospital**	**HaH**	**Hospital**	**Difference (95% CI)**
Dartmouth COOP charts*:	(n=108)	(n=123)	(n=94)	(n=103)	
Physical fitness	2.78 (1.14)	2.80 (1.19)	0.04	0.04	0.00 (–0.43 to 0.44)
Feelings	2.61 (1.16)	2.89 (1.11)	0.70	0.84	–0.14 (–0.48 to 0.19)
Daily activities	2.21 (0.95)	2.28 (1.03)	0.52	0.45	0.07 (–0.25 to 0.38)
Social activities	2.03 (1.01)	2.16 (1.15)	0.56	0.52	0.04 (–0.30 to 0.38)
Pain	3.22 (1.33)	3.27 (1.32)	1.22	1.20	0.02 (–0.42 to 0.48)
Change in health	2.99 (0.72)	3.06 (0.62)	1.45	1.36	0.09 (–0.22 to 0.40)
Overall health	3.16 (0.92)	3.23 (0.98)	1.09	0.82	0.27 (–0.06 to 0.58)
Social support	2.07 (1.30)	2.13 (1.08)	0.48	0.42	0.06 (–0.27 to 0.37)
Quality of life	2.53 (0.80)	2.67 (0.82)	0.65	0.67	–0.02 (–0.30 to 0.27)
SF-36 physical functioning scale†	(n=100) 80.25 (19.97)	(n=113) 79.11 (21.73)	(n=82) –4.82	(n=91) –3.02	–1.80 (–8.28 to 4.69)

HaH=hospital at home care. *Scale 1-5 (low score=good quality of life). No data for some patients. †Scale 1-1000 (low score=low level of functioning). Baseline score measured at 1 month. No data for some patients.

Table 6 Outcome measures reported by elderly medical patients who were allocated to hospital at home care (n=50) or inpatient hospital care (n=46)

	Mean (SD) value at baseline		Mean change from baseline value at 3 month follow up		
	HaH	Hospital	HaH	Hospital	Difference (95% CI)
Dartmouth COOP charts*:	(n=47)	(n=42)	(n=38)	(n=37)	
Physical fitness	4.70 (0.55)	4.34 (1.11)	0.06	0.00	0.06 (–0.32 to 0.43)
Feelings	2.53 (1.27)	2.26 (1.13)	0.26	0.00	0.26 (–0.43 to 0.95)
Daily activities	3.62 (1.39)	3.38 (1.21)	0.39	0.38	0.01 (–0.64 to 0.67)
Social activities	2.74 (1.47)	2.67 (1.39)	–0.10	0.32	–0.42 (–1.15 to 0.29)
Pain	3.24 (1.64)	2.98 (1.66)	0.39	0.35	0.04 (–0.78 to 0.86)
Change in health	3.19 (1.33)	3.43 (1.25)	0.92	1.19	–0.27 (–1.06 to 0.53)
Overall health	3.74 (0.79)	3.64 (0.85)	–0.03	0.16	–0.19 (–0.63 to 0.26)
Social support	1.62 (1.03)	1.43 (0.74)	0.13	–0.05	0.18 (–0.30 to 0.67)
Quality of life	2.81 (0.99)	2.88 (0.83)	0.16	0.35	–0.19 (–0.70 to 0.32)
Barthel index†	(n=47) 14.74 (4.82)	(n=42) 15.69 (2.58)	(n=38) –1.71	(n=37) 1.27	0.44 (–2.09 to 1.21)

HaH=hospital at home care. *Scale 1-5 (low score=good quality of life). No data for some patients. †Scale 0-20 (low score=high level of dependence). No data for some patients.

Table 7 Outcome measures reported by patients with chronic obstructive airways disease who were allocated to hospital at home care (n=15) or inpatient hospital care (n=17)

	Mean (SD) value at baseline		Mean change from baseline value at 3 month follow up		
	HaH	Hospital	HaH	Hospital	Difference (95% CI)
Dartmouth COOP charts*:	(n=13)	(n=17)	(n=10)	(n=11)	
Physical fitness	4.92 (0.29)	4.56 (0.63)	0.40	0.18	0.22 (–0.81 to 1.25)
Feelings	2.54 (1.13)	2.53 (1.55)	–0.45	0.18	–0.63 (–2.13 to 0.86)
Daily activities	4.08 (1.26)	4.00 (1.00)	0.00	1.09	–1.09 (–2.27 to 0.08)
Social activities	3.00 (1.29)	3.24 (1.25)	–0.82	0.18	–1.00 (–2.48 to 0.48)
Pain	3.00 (1.63)	2.31 (1.58)	0.73	0.67	0.06 (–1.24 to 1.36)
Change in health	3.62 (1.33)	3.35 (1.54)	0.36	0.73	–0.37 (–2.02 to 1.29)
Overall health	4.23 (0.93)	3.76 (0.83)	–0.18	0.09	–0.27 (–1.03 to 0.48)
Social support	2.08 (1.26)	1.88 (1.05)	0.00	0.18	–0.18 (–1.33 to 0.97)
Quality of life	3.54 (1.05)	2.82 (0.88)	0.18	0.54	–0.36 (–1.22 to 0.49)
Chronic respiratory disease questionnaire†:	(n=12)	(n=13)	(n=10)	(n=9)	
Dyspnoea (scale 5-35)	16.25 (4.00)	12.85 (5.32)	0.94	–3.85	4.79 (–2.07 to 11.65)
Fatigue (scale 4-28)	9.75 (4.43)	9.31 (4.37)	–0.40	–4.78	4.38 (–0.31 to 9.07)
Emotion (scale 7-49)	24.75 (8.73)	25.69 (8.32)	–0.80	–8.66	7.86 (–2.16 to 17.89)
Mastery (scale 4-28)	15.25 (5.48)	15.69 (5.99)	0.00	–1.44	1.44 (–5.93 to 8.82)

HaH=hospital at home care. *Scale 1-5 (low score=good quality of life). No data for some patients. †Low score=low level of functioning). No data for some patients.

administrative structure we effectively conducted clinical trials in five distinct groups of patients, of which three were patients discharged early after surgical procedures and two were patients with medical conditions.

Our results suggest that, for most of the clinical conditions we studied, there are no major differences in patient assessed health outcomes between hospital at home and hospital care. This is consistent with the results of other randomised controlled trials.[15–19] Our trial did not have the power to detect differences in morbidity or mortality, and the number of patients recruited with chronic obstructive airways disease was small. However, our results suggest that patients recovering from a knee replacement are not suitable for hospital at home care: nearly a third of these patients experienced complications associated with their knee replacement that prevented early discharge. More elderly medical patients allocated to hospital at home care had to receive secondary care during the three month follow up than did those allocated to hospital.

Although there were few differences in outcome, most patients preferred hospital at home care. It is not clear how these preferences were formed, and further work is needed to explore this issue. It is possible that patients with a strong preference for hospital care may have declined to enter the study. Patients will always express a range of preferences for different forms of care, which providers of services should take into account. It is, however, interesting that greater levels of patient satisfaction did not lead to improved health outcomes, as found in other studies.[20] The preferences of carers were less strong than those of patients. Although the carers of patients recovering from a hysterectomy preferred hospital care, there was little difference for the other clinical conditions, suggesting that, with adequate support, care in the community does not necessarily mean an unacceptable burden for carers.

It is not unusual for purchasers to be faced with decisions that must be made in the absence of data on effectiveness. When a new initiative is part of a national trend it is hard to resist providing support, even though evidence for its effectiveness may be lacking. One solution is to develop the research role of purchasers. When presented with an option to support a new initiative, purchasers are in a strong position to insist that an evaluation be conducted to provide data. Not only will the evaluation answer questions about quality and effectiveness, but it will also provide a mechanism to curtail the funding of new services that are of no proved efficacy. Our study shows that, with careful planning and commitment, NHS purchasers and providers can collaborate to support rigorous evaluations of new services as they are introduced.

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Contributors: SS defined the research question, collaborated in designing the trial, coordinated the trial, analysed the data, and was the principal writer of the paper. DH contributed to the running of the trial, maintained the databases, and helped with

Key messages

- Hospital at home schemes are a popular alternative to standard hospital care, but there is uncertainty about their cost effectiveness
- In our randomised controlled trial we compared hospital at home care with inpatient hospital care for patients recovering from hip replacement, knee replacement, and hysterectomy; elderly medical patients; and those with chronic obstructive airways disease
- There were no major differences in patients' reported health outcomes between the two treatments, but, because of complications commonly needing hospitalisation, patients recovering from knee replacement did not seem suitable for hospital at home care
- All patient groups except those with chronic obstructive airways disease preferred hospital at home care
- Carers of patients recovering from a hysterectomy preferred hospital care, while those of patients recovering from a knee replacement preferred hospital at home care

writing the paper. CJ advised on the selection, analysis, and interpretation of outcome measures used and cowrote the initial draft of the article. AG discussed core ideas and participated in analysing and interpreting the data and writing the paper. MV collaborated in designing the trial, solving problems that occurred during the trial, and writing the paper. PM assisted with the study design, implementing the trial, and writing the results. SS is guarantor for the paper.

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Randomised controlled trial comparing hospital at home care with inpatient hospital care. II: cost minimisation analysis

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Abstract

Objectives: To examine the cost of providing hospital at home in place of some forms of inpatient hospital care.

Design: Cost minimisation study within a randomised controlled trial.

Setting: District general hospital and catchment area of neighbouring community trust.

Subjects: Patients recovering from hip replacement (n = 86), knee replacement (n = 86), and hysterectomy (n = 238); elderly medical patients (n = 96); and patients with chronic obstructive airways disease (n = 32).

Interventions: Hospital at home or inpatient hospital care.

Main outcome measures: Cost of hospital at home scheme to health service, to general practitioners, and to patients and their families compared with hospital care.

Results: No difference was detected in total healthcare costs between hospital at home and hospital care for patients recovering from a hip or knee replacement, or elderly medical patients. Hospital at home significantly increased healthcare costs for patients recovering from a hysterectomy (ratio of geometrical means 1.15, 95% confidence interval 1.04 to 1.29, P = 0.009) and for those with chronic obstructive airways disease (Mann-Whitney U test, P = 0.01). Hospital at home significantly increased general practitioners' costs for elderly medical patients (Mann-Whitney U test, P < 0.01) and for those with chronic obstructive airways disease (P = 0.02). Patient and carer expenditure made up a small proportion of total costs.

Conclusion: Hospital at home care did not reduce total healthcare costs for the conditions studied in this trial, and costs were significantly increased for patients recovering from a hysterectomy and those with chronic obstructive airways disease. There was some evidence that costs were shifted to primary care for elderly medical patients and those with chronic obstructive airways disease.

Introduction

There is little evidence to justify the widespread adoption of hospital at home on the basis of cost. A review of the subject identified only one randomised controlled trial that compared the cost of hospital at home with inpatient hospital care.[1] This trial, based in the United States, recruited patients with a terminal illness and found no difference in overall healthcare costs.[2] There is conflicting evidence from non-randomised studies.[3 4]

We report the results of a prospective economic evaluation, in the context of a randomised controlled trial, of the cost of providing hospital at home as a substitute for some forms of inpatient hospital care. The

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Uses of health service resources that were recorded for cost minimisation analysis

Hospital care
- Number of inpatient days
- Number of inpatient days due to a hospital readmission related to the trial diagnosis
- Medication

Hospital at home care
- Number of hospital at home days
- Number of hospital at home visits (including duration of visit and grading of staff)
- Medication

Hospital transport
- Number of journeys made by ambulance or a health service car

General practitioner visits
- Number of visits to doctor's surgery
- Number of home visits

three questions addressed by the economic evaluation were
- Does substituting hospital at home care for hospital care result in a lower cost to the health service?
- Does hospital at home care, compared to hospital care, increase the cost to general practitioners?
- Does hospital at home care increase the cost borne by the patients and their families compared with hospital care?

Methods

We describe patient recruitment and randomisation in our accompanying paper.[5] This economic evaluation took the form of a cost minimisation analysis, as the health outcomes of the two arms of the trial did not differ. Our primary interest was the cost to the health service, but we also examined the costs incurred by patients and families, as they could influence the acceptability of a hospital at home scheme.

We recruited five groups of patients: patients recovering from a hip replacement, a knee replacement, or a hysterectomy; patients with chronic obstructive airways disease; and elderly patients with a mix of medical conditions. All patients were aged 60 years or over, except those recovering from a hysterectomy, who were aged 20-70 years.

Data collection

The box lists the uses of health service resources on which data were collected. We obtained cost data for hospital care and hospital at home care from the respective trusts' finance departments for the financial year 1994-5, apportioned on the basis of activity for 1993-4. Details of the unit costs are available from the authors.

Hospital costs

The cost of hospital care included staffing costs, all non-staff running costs, and capital costs. Patient dependency scores were developed by hospital nursing and medical staff to reflect the marginal costs incurred during a patient's episode of hospital care (and hence the marginal savings of early discharge).[3,6] These scores were used to weight the costs for each day that a patient was in hospital. The costs of physiotherapy and occupational therapy were calculated according to the amount of time spent with a typical patient for each clinical group, and included a cost for non-contact time. Equipment costs (based on ward records), the cost of items not directly related to levels of patient care, and capital charges for land and buildings (based on valuation and including interest and depreciation) were divided by the number of ward bed days for the year 1994-5 to arrive at a charge per bed day. The cost of prescribed drugs was obtained from the hospital pharmacy department.

The time profile for costing hospital care differed for each clinical group. The costs for surgical patients excluded the costs of the operation, as these costs do not alter with different rehabilitative care. For patients having a hip or knee replacement, costs were calculated from the fourth postoperative day. For patients having a hysterectomy, costs were calculated from the first postoperative day. Cost data for medical patients were collected for the duration of their hospital stay.

Hospital at home costs

The cost of hospital at home care included all staffing and non-staff running costs. The costs of nurses, physiotherapists, and occupational therapists were based on the amount of time spent with patients, and included a cost for non-contact time. The following non-staff costs were included: central administration, travel, training, telephones and pagers, equipment, and office space. Medical supplies and equipment costs were depreciated over a 10 year period with a discount rate of 6%.[7] These costs were apportioned on an equal basis to each patient receiving hospital at home care, assuming costs were payable in advance at the start of the year. Administration and travel costs were apportioned according to the volume of patients. The cost of prescribed drugs was obtained from the hospital's pharmacy department.

General practitioner costs

Research nurses visited each practice to record the number of general practitioners' home visits and number of patients' visits to the surgery. The community trust providing the hospital at home care reimbursed general practitioners visiting hospital at home patients at a rate of £100 per patient and £25 for each visit. General practitioner costs for the hospital care group were calculated with unit costs developed by the Personal Social Services Research Unit, Kent.[8]

Carer costs

Carers were asked to record all expenditures related to the trial diagnosis (including equipment and adaptations, consumables, and travel) in a diary for one month, and any loss of earnings and days off work due to caring for their patient. Carers were also asked to record the number of hours a day they spent caring for the patient.

Statistical analysis

We describe the sample size calculations in our accompanying paper.[5] Analysis was done on an intention to treat basis. When appropriate, data with non-normal distribution was log transformed before further para-

metric analysis was done. The Mann-Whitney U test was used for continuous variables that did not approximate a normal distribution after log transformation.

Sensitivity analyses were conducted for areas that could possibly restrict the generalisability of the trial results. These were the trial rate of reimbursing general practitioners, patients' duration of hospital at home care observed in the trial, and the use of average costs per inpatient day instead of dependency adjusted hospital costs.

Results

Results are presented by clinical condition for both arms of the trial. Inpatient hospital care and hospital at home care accounted for most of the healthcare costs. Tables 1, 2, and 3 show health service resources and costs for each patient group.

Early discharge of patients after elective surgery

Patients allocated to hospital at home care after a hip or knee replacement or a hysterectomy spent significantly fewer days in hospital (tables 1 and 2). However, they received significantly more days of health care with the addition of hospital at home. For patients recovering from a hip or knee replacement, the total costs to the health service were not significantly different between the two groups. For patients recovering from a hysterectomy, total health service costs were significantly higher for those allocated to hospital at home care. Of the total numbers of patients undergoing these procedures during the study period, we recruited about 20% of all those having hip replacements, 25% of those having knee replacements, and 35% of those undergoing hysterectomy.

Elderly medical patients and patients with chronic obstructive airways disease

No significant difference was detected between the two groups of elderly medical patients in the number of days spent in hospital, but, with the addition of hospital at home care, the total days of health care for the hospital at home group was significantly higher (table 3). Patients with chronic obstructive airways disease in the hospital at home group spent significantly fewer days in hospital, but this reduction was offset by the time spent in hospital at home care so there was no significant difference between the two groups for the total days of health care (table 3). For elderly medical patients, total costs to the health service were not significantly different between the two groups. Patients with chronic obstructive airways disease allocated to hospital at home care incurred significantly greater healthcare costs than did those receiving only hospital care. About 1% of all patients admitted for medical conditions during the study period were recruited to either the elderly medical or chronic obstructive

Table 1 Health service resources and costs consumed at 3 months after hospital admission by patients allocated to hospital at home care or inpatient hospital care: orthopaedic patients recovering from hip or knee replacement

	Hospital at home	Hospital	Difference (95% CI)
Hip replacement:	(n=36*)	(n=49)	
Mean (SD) days in hospital care	8.11 (5.52)	11.87 (4.52)	−3.75 (−5.92 to −1.58)
Mean (SD) days in hospital at home care	6.58 (4.26)	—	—
Mean (SD) total days of care	14.69 (5.13)	11.87 (4.57)	2.84 (0.75 to 4.93)
Median (interquartile range) days of readmission	0 (0.00-0.00)	0 (0.00-0.00)	P=0.39†
Mean (SD) hospital costs including readmission (£)	515.42 (473.20)	776.30 (364.53)	−260.87 (−441.56 to −80.19) P<0.01
Mean (SD) hospital at home costs (£)	351.24 (240.58)	—	—
Median (interquartile range) GP costs: home and surgery visits (£)	42.84 (0.00-64.61)	15.49 (0.00-45.19)	P=0.06†
Mean (SD) total health service costs (£)	911.39 (563.76)	815.70 (347.99)	Ratio of geometric mean 1.05 (0.87 to 1.27) P=0.59
Knee replacement:	(n=46‡)	(n=39)	
Mean (SD) days in hospital care	10.28 (4.60)	13.31 (4.57)	−3.02 (−5.01 to −1.04)
Mean (SD) days in hospital at home care	5.72 (4.98)	—	—
Mean (SD) total days of care	16.00 (5.44)	13.31 (4.57)	2.69 (0.50 to 4.88)
Median (interquartile range) days of readmission	0 (0.00-0.00)	0 (0.00-0.00)	P=0.23†
Mean (SD) hospital costs including readmission (£)	1092.24 (615.27)	1348.35 (625.94)	−256.11 (−524.61 to 12.38) P=0.06
Mean (SD) hospital at home costs (£)	348.16 (275.25)	—	—
Median (interquartile range) GP costs: home and surgery visits (£)	15.49 (0.00-57.15)	15.49 (0.00-30.98)	P=0.22†
Mean (SD) total health service costs (£)	1461.62 (666.61)	1375.36 (637.76)	Ratio of geometric mean 1.05 (0.88 to 1.26) P=0.55

GP=general practitioner. *No data available for 1 patient. †Mann-Whitney U test. ‡No data available for 1 patient.

Table 2 Health service resources and costs consumed at 3 months after hospital admission by patients allocated to hospital at home care or inpatient hospital care: patients recovering from hysterectomy

	Hospital at home (n=111*)	Hospital (n=123†)	Difference (95% CI)
Mean (SD) days in hospital care	4.34 (1.86)	5.79 (2.98)	−1.44 (−2.09 to −0.79)
Mean (SD) days in hospital at home care	3.11 (2.64)	—	—
Mean (SD) total days of care	7.45 (2.59)	5.79 (2.98)	1.66 (0.94 to 2.39)
Median (interquartile range) days of readmission	0 (0.00-0.00)	0 (0.00-0.00)	P=0.21‡
Mean (SD) hospital costs including readmission (£)	487.43 (350.20)	647.77 (496.27)	Ratio of geometric mean 0.76 (0.67 to 0.87) P<0.01
Mean (SD) hospital at home costs (£)	250.18 (273.54)	—	—
Median (interquartile range) GP costs: home and surgery visits (£)	30.98 (15.49-61.96)	30.98 (15.49-61.96)	P=0.70‡
Mean (SD) total health service costs (£)	771.78 (408.72)	679.39 (439.83)	Ratio of geometric mean 1.15 (1.04 to 1.29) P<0.01

GP=general practitioner. *No data available for 3 patients. †No data available for 1 patient. ‡Mann-Whitney U test.

Table 3 Health service resources and costs consumed at 3 months after hospital admission by patients allocated to hospital at home care or inpatient hospital care: elderly medical patients and patients with chronic obstructive airways disease

	Hospital at home	Hospital	Difference (95% CI)
Elderly medical:	(n=50)	(n=44*)	
Mean (SD) days in hospital care	12.84 (14.69)	13.20 (14.19)	–0.36 (–6.30 to 5.57)
Mean (SD) days in hospital at home care	9.04 (7.79)	—	—
Mean (SD) total days of care	21.88 (18.30)	13.20 (14.19)	8.67 (1 90 to 15.45)
Median (interquartile range) days of readmission	0 (0.00-1.00)	0 (0.00-0.00)	P=0.08†
Median (interquartile range) hospital costs including readmission (£)	913.76 (243.31-2045.68)	1366.16 (629.08-2033.50)	P=0.21†
Mean (SD) hospital at home costs (£)	793.45 (811.36)	—	—
Median (interquartile range) GP costs: home and surgery visits (£)	67.84 (45.19-172.83)	45.19 (15.49-82.95)	P<0.01†
Median (interquartile range) total health service costs (£)	1705.32 (913.83-3121.55)	1388.76 (645.06-2094.88)	P=0.09†
Chronic obstructive airways disease:	(n=15)	(n=17)	
Mean (SD) days in hospital care	6.93 (3.39)	12.12 (7.49)	–5.18 (–9.48 to –0.89)
Mean (SD) days in hospital at home care	5.33 (3.94)	—	—
Mean (SD) total days of care	12.27 (3.69)	12.12 (7.49)	0.15 (–4.21 to 4.51)
Median (interquartile range) days of readmission	5.00 (0.00-10.0)	0.00 (0.00-3.00)	P=0.08†
Median (interquartile range) hospital costs including readmission (£)	1389.53 (821.65-1993.97)	1198.53 (712.00-1508.24)	P=0.56†
Mean (SD) hospital at home costs (£)	710.61 (526.50)	—	—
Median (interquartile range) GP costs: home and surgery visits (£)	115.38 (25.00-214.30)	15.49 (0.00-91.02)	P=0.02†
Median (interquartile range) total health service costs (£)	2379.67 (1458.09-2759.05)	1247.64 (772.50-1619.19)	P=0.01†

GP=general practitioner. *No data available for 2 patients. †Mann-Whitney U test.

airways disease groups. Nineteen of these patients were recruited by general practitioners, of whom nine were allocated to hospital care. However, only two of these patients received acute hospital care.

General practitioner costs

For patients discharged early after elective surgery, no significant differences in general practitioner costs were detected between the two groups. However, for elderly medical patients and those with chronic obstructive airways disease, the costs of general practitioner services were significantly higher for the patients allocated to hospital at home care compared with those in the hospital groups.

Costs to patients and carers

Patients' and carers' expenses made up a small proportion of total costs. There were no significant differences between the two groups for any of the categories of patients, and inclusion of these costs did not alter the results. The median cost for all patient groups was £0. The greatest expense was incurred by patients with chronic obstructive airways disease: median cost for the hospital at home group was £0 (interquartile range £0-£19.8) and for the hospital group was £0 (£0-£0). There were no significant differences between the two groups of carers in the time spent caring for the patient, although this was a substantial element in both groups. Few carers reported loss of earnings from caring for the patient, as most of the carers were retired. Further details of these costs will be published elsewhere.

Sensitivity analysis

Table 4 shows the results of the sensitivity analyses. Reducing length of stay in hospital at home care changed the difference in total healthcare costs for patients recovering from a hysterectomy and for those with chronic obstructive airways disease. A one day reduction eliminated the difference in cost for patients recovering from a hysterectomy, while a two day reduction altered the results so that hospital at home care

Table 4 Sensitivity analysis: comparing costs of hospital care, dependency adjusted costs and average costs, with costs of hospital at home care after reducing lengths of stay by one or two days

	Hip replacement HaH (n=36) *v* hospital (n=49)	Knee replacement HaH (n=46) *v* hospital (n=39)	Hysterectomy HaH (n=111) *v* hospital (n=123)	Elderly medical HaH (n=50) *v* hospital (n=44)	Chronic obstructive airways disease HaH (n=15) *v* hospital (n=17)
Trial results: difference in total healthcare costs using dependency adjusted hospital costs					
Difference in cost (£)	Mean 95.68	Mean 86.26	Mean 92.40	Median 316.56	Median 1132.03
Ratio of geometric mean (95% CI)	1.05 (0.87 to 1.27)	1.05 (0.88 to 1.26)	1.15 (1.04 to 1.29)	—	—
P value	0.59	0.55	0.009	0.09	0.01
Sensitivity analysis: difference in total healthcare costs using average hospital costs					
Difference in cost (£)	Mean –36.80	Mean 35.23	Mean 60.85	Median 518.35	Median 741.36
Ratio of geometric mean (95% CI)	0.89 (0.73 to 1.09)	1.004 (0.82 to 1.22)	1.06 (0.98 to 1.23)	—	—
P value	0.27	0.96	0.10	0.05	0.02
Sensitivity analysis: length of stay in hospital at home care reduced by 1 day					
Difference in cost (£)	Mean 58.32	Mean –8.01	Mean –21.75	Median 227.25	Median 840.26
Ratio of geometric mean (95% CI)	1.02 (0.84 to 1.23)	1.002 (0.84 to 1.19)	0.99 (0.90 to 1.11)	—	—
P value	0.87	0.99	0.99	0.17	0.04
Sensitivity analysis: length of stay in hospital at home care reduced by 2 days					
Difference in cost (£)	Mean 10.61	Mean –49.10	Mean –80.48	Median 103.37	Median 757.23
Ratio of geometric mean (95% CI)	0.95 (0.78 to 1.15)	0.96 (0.81 to 1.15)	0.88 (0.78 to 0.99)	—	—
P value	0.59	0.68	0.03	0.38	0.06

HaH=hospital at home.

became significantly less costly than hospital care for these patients. Costs remained significantly more expensive for patients with chronic obstructive airways disease when duration of hospital at home care was reduced by one day, but a reduction of two days resulted in a non-significant difference between the two groups.

Using average hospital costs instead of dependency adjusted costs reduced the difference in cost between hospital at home care and hospital care for all groups of patients except for the elderly medical patients. Using standard general practitioner costs[8] for both arms of the trial altered the results only for patients recovering from a hip replacement, and general practitioner costs for these patients became significantly more expensive (Mann-Whitney U test $P = 0.03$).

Discussion

Many believe that hospital at home schemes will contain healthcare costs by reducing the demand for acute hospital beds. Our findings indicate that this is not the case. Instead, hospital at home care increased health service costs for some groups of patients, while for others there were no net differences in costs. This is perhaps not surprising, as patients who were discharged early to hospital at home care went home when their hospital care was least expensive. Once in hospital at home care some patients, particularly elderly patients with a medical condition, required 24 hour care. Furthermore, hospital at home increased the overall duration of an episode of health care. This pattern has been observed elsewhere.[4] It may be possible to decrease the amount of time patients spend in hospital at home, and thus reduce cost. However, this could have an adverse effect on patient outcomes. For elderly medical patients and those with chronic obstructive airways disease, hospital at home care increased general practitioner costs, providing evidence that some costs were shifted within the health service.

Perhaps surprisingly for a service that is intended to reduce the pressure on acute hospital beds, the proportion of patients eligible for hospital at home care was low. Other evaluations have also described a relatively low volume of eligible patients.[2 4 9–12] This contrasts with the numbers described by some service providers (Harrison V, Intermediate Care Conference, Anglia and Oxford NHS Executive, Milton Keynes, October, 1997). An increased volume of patients would not, however, alter the costs substantially as only a small proportion of hospital at home costs are fixed. It is possible that patients who would otherwise agree to use hospital at home are deterred by an evaluation. An alternative explanation may be that hospital at home provides extra care in the community but not necessarily care that would otherwise be carried out in a hospital setting.

Just as inappropriate admissions are a problem for acute hospitals, there is no reason to believe they do not pose a problem for services such as hospital at home. We found that some patients allocated to hospital care were never admitted to hospital and stayed at home with no extra services. This has been found elsewhere (A Wilson, personal communication) and suggests that hospital at home schemes could potentially provide care to patients who would otherwise not be receiving healthcare services. Alternatively, hospital at home may be viewed as supplementing existing services, which may be an acceptable policy option for some groups of patients, particularly elderly medical patients who prefer this form of care.

The extent to which hospital at home care can substitute for hospital care in the United Kingdom is limited. This can partly be explained by the speed at which hospital at home schemes have been set up. Purchasers and providers have responded quickly to initiatives, usually supported by "ring fenced" monies, designed to ease the pressure on hospital beds. Schemes have usually been grafted onto primary care services, with minor alterations to the mix of skills already available. They may become out of date with changes in hospital practice. This is a particular problem for schemes admitting patients who are discharged early from hospital. As hospital lengths of stay decrease, the number of days that can be transferred into the community is correspondingly reduced.

Conclusions

The results of this trial suggest that simply shifting services from one location to another is unlikely to reduce health service costs. Patients discharged early after elective surgery go home at a time when they use least resources. When an inpatient stay involves relatively high nursing costs, as with elderly medical patients, early discharge to hospital at home is unlikely to be significantly cheaper than hospital based care as most of these nursing costs still have to be incurred. Hospital at home care may be cost effective for patients who are relatively independent but who require technical support, such as those receiving intravenous antimicrobial therapy. However, there is little evidence to support or refute this.[13] Service developments, as much as clinical interventions, need to be evidence based. Arguments for diverting resources away from hospital beds should be viewed in the light of the available evidence.

Key messages

- Hospital at home schemes are a popular alternative to standard hospital care, but there is uncertainty about their cost effectiveness
- In our randomised controlled trial we compared the cost of hospital at home care with that of inpatient hospital care for patients recovering from hip replacement, knee replacement, and hysterectomy; elderly medical patients; and those with chronic obstructive airways disease
- There were no major differences in health service costs between the two arms of the trial for patients recovering from hip or knee replacement and elderly medical patients
- Hospital at home care increased healthcare costs for patients recovering from hysterectomy and for those with chronic obstructive airways disease
- Hospital at home care resulted in some costs shifting to general practitioners for elderly medical patients and those with chronic obstructive airways disease

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Contributors: SS defined the research question, collaborated in designing the trial, coordinated the trial, analysed the data, and was the principal writer of the paper. DH contributed to the running of the trial, maintained the databases, and helped with writing the paper. AG discussed core ideas and participated in analysing and interpreting the data and writing the paper. MV collaborated in designing the trial, solving problems that occurred during the trial, and writing the paper. PM assisted with the study design, implementing the trial, and writing the results. SS is guarantor for the paper.

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Randomised controlled trial comparing effectiveness and acceptability of an early discharge, hospital at home scheme with acute hospital care

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Abstract

Objective: To compare effectiveness and acceptability of early discharge to a hospital at home scheme with that of routine discharge from acute hospital.
Design: Pragmatic randomised controlled trial.
Setting: Acute hospital wards and community in north of Bristol, with a catchment population of about 224 000 people.
Subjects: 241 hospitalised but medically stable elderly patients who fulfilled criteria for early discharge to hospital at home scheme and who consented to participate.
Interventions: Patients' received hospital at home care or routine hospital care.
Main outcome measures: Patients' quality of life, satisfaction, and physical functioning assessed at 4 weeks and 3 months after randomisation to treatment; length of stay in hospital and in hospital at home scheme after randomisation; mortality at 3 months.
Results: There were no significant differences in patient mortality, quality of life, and physical functioning between the two arms of the trial at 4 weeks or 3 months. Only one of 11 measures of patient satisfaction was significantly different: hospital at home patients perceived higher levels of involvement in decisions. Length of stay for those receiving routine hospital care was 62% (95% confidence interval 51% to 75%) of length of stay in hospital at home scheme.
Conclusions: The early discharge hospital at home scheme was similar to routine hospital discharge in terms of effectiveness and acceptability. Increased length of stay associated with the scheme must be interpreted with caution because of different organisational characteristics of the services.

Introduction

Alternatives to inpatient hospital care have become a focus of interest among health service strategists working towards a primary care led NHS.[1] They seem to offer potential for reducing both the number of admissions and the length of hospital stay.[2] The search for alternative settings for care has arisen because of several factors, including pressure on hospital beds and the increasing age of the population, with the concomitant increase in morbidity and the high costs of maintaining patients in acute hospitals.[1 3] At the same time, home healthcare technology is becoming more sophisticated, and standards of the home environment have improved. These changes facilitate home management of certain groups of patients.[1 4]

"Hospital at home" is a generic term, referring to a package of home based nursing and rehabilitation services.[1 4] Schemes can be divided into two main groups: those that prevent admission into an acute hospital and those facilitating the early discharge of patients from an acute hospital.[5–8] In both cases the purpose of hospital at home is to provide a substitute

for hospital care, although in practice some evaluations have found that hospital at home is an additional rather than a substitute service.[9 10]

Previous evaluations of early discharge, hospital at home schemes for orthopaedic patients in Britain have indicated that such schemes may reduce total length of hospital stay,[5 8 11] although a recent evaluation found the opposite.[9] One British evaluation of an early discharge service with a varied case mix also concluded that it was a cost effective alternative to hospital care.[6] Estimates of the inpatient orthopaedic bed days saved by early discharge schemes vary considerably, from 5 days[8] up to 9.6 days.[5] The potential for saving inpatient bed days will vary depending on a patient's condition and the baseline efficiency in bed use of a particular hospital.

There are substantial methodological problems with previous evaluations, and to date no randomised trials have evaluated the effectiveness and acceptability of early discharge, hospital at home schemes. This paper reports the results of effectiveness and acceptability from a pragmatic randomised controlled trial of such a scheme operating in Bristol. This service caters for two main types of patients, emergency admissions from a variety of specialties and elective patients undergoing hip or knee replacement.

Subjects and methods

Patient selection

Patients suitable for early discharge to hospital at home care were identified by ward staff from general medical, care of the elderly, orthopaedic, and general surgical specialties. The box shows patient selection criteria, remit of the team, and staffing of the hospital at home scheme. All patients were assessed for suitability by the hospital at home coordinator (MAD), who then obtained informed consent for entry into the trial from the patients and, when appropriate, carers. Consent from next of kin was provided for patients who were unable to provide such consent themselves (these patients were not asked to complete any measures themselves). The local ethics committee gave approval for this study.

Treatment schedules

Patients suitable for the hospital at home scheme were randomised to hospital at home or acute hospital care in a ratio of 2:1 in order to maintain sufficient patients for the scheme. Randomisation (in blocks of six) was stratified by type of admission (elective or emergency) and done by means of sealed envelopes produced independently of the research and clinical staff.

Patients within the hospital arm of the trial received usual hospital care. Patients in the hospital at home scheme received rehabilitative care at home (see box) until they were either discharged from the team or readmitted to hospital.

Patient assessment

Emergency patients who were deemed appropriate for the hospital at home scheme completed a baseline interview in hospital and were then randomised. For pragmatic reasons, the small number of elective patients was randomised before surgery at a stage when a home assessment by the hospital at home team would, in practice, be made. This was to assist discharge planning for both treatment arms and to ensure that patients did not experience unnecessary uncertainty about their care after surgery. The baseline interview was conducted to mimic the interview timing of emergency patients (about 5 days postoperatively), and randomisation was considered to become effective at this point. It was not possible to blind the researcher during the baseline interview of elective patients.

Follow up assessments were conducted 4 weeks and 3 months after randomisation (this was taken as the date of the baseline interview for all patients). A combination of self completed and interviewer administered instruments was used.

Baseline interview

Sociodemographic information, including age, sex, living circumstances, social class, longstanding health,[12] and information about the patient's hospital stay was collected.

Cognitive ability was assessed by mean of the Folstein mini-mental state examination.[13]

Functional ability was assessed with the Barthel activities of daily living index[14] scored using investigation criteria derived from Collin et al.[15]

Quality of life was assessed with two generic quality of life measures, the EuroQol EQ-5D[16] and the COOP-WONCA charts.[17] While the former had a one day time frame, the baseline COOP-WONCA charts were the subject of a nested trial of the standard 2 week and a 48 hour time frame.[18]

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Hospital at home scheme: patient suitability, remit, and staffing

Patient suitability (assessed by hospital at home coordinator)

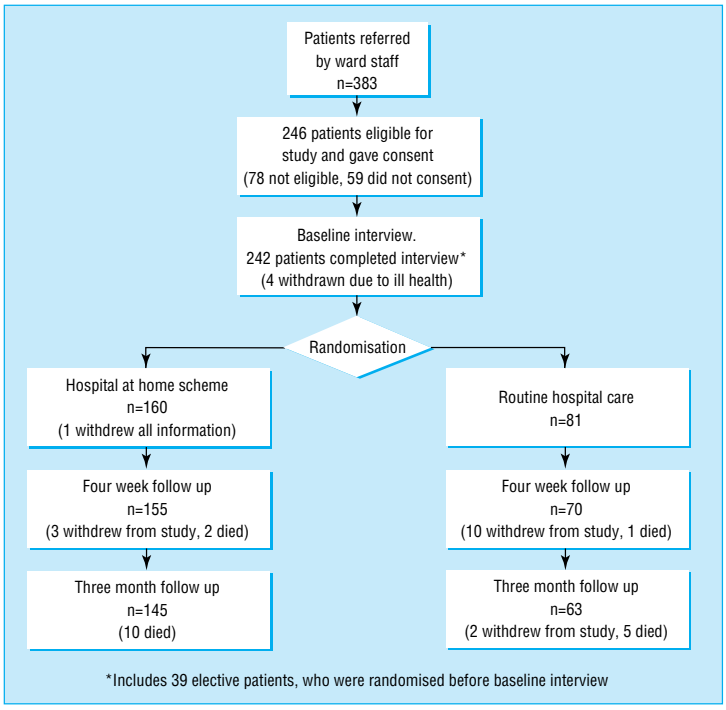
- Adult patient (all but 16 were aged over 65 years) on an acute hospital ward and resident within catchment area of Frenchay NHS Trust
- Positive rehabilitative outcome expected
- Appropriate home circumstances (that is, adequate heating, safety in relation to patient's disability) and, if necessary, adequate support from carers available
- Patient would require further hospital care if team were not available
- Patient should not be awaiting a nursing home place or input of social care alone
- Patient expected to remain in hospital for between 1 and 28 days
- Patient's general practitioner accepts clinical responsibility

Remit of scheme

- Maximum case load of 12 patients (orthopaedic) at any one time, or less if higher dependency patients (such as stroke) managed
- Care routinely provided between 8 30 am and 11 pm; exceptionally, care provided outside these times
- Service provided is for health care, with minimal essential domestic tasks performed
- Discharge from hospital at home when patient could be managed by routinely available community services

Staffing of scheme

- 1 whole time equivalent G grade district nurse coordinator
- 1 whole time equivalent E grade registered nurse
- 0.8 whole time equivalent senior 1 physiotherapist
- 0.5 whole time equivalent senior 1 occupational therapist
- 3 part time B grade support workers (20-27 hours each per week)
- 1 occupational therapy technician as required (6-12 hours per month)



Passage of patients through trial of hospital at home scheme

Four week and three month follow ups

Patient mortality was ascertained from general practitioner and hospital records.

Post-randomisation length of stay was defined as the period for which a patient was supervised by a service, either hospital or hospital at home, from the (effective) date of randomisation. For hospital patients, the length of stay was therefore from randomisation date until discharge from hospital. For hospital at home patients, length of stay was from randomisation date until discharge from hospital plus total stay in hospital at home plus any readmission occurring while the hospital at home care was being provided.

In addition, we assessed the patients' functional ability (Barthel index), quality of life (EQ-5D and COOP-WONCA with standard time frame), and satisfaction with the primary and secondary care services received.

Sample size considerations

With a two sided 5% significance level, a total sample size of 250 (with 2:1 randomisation ratio) would yield about 85% power to detect a standardised difference of 0.4 standard deviations on outcome measures. In terms of length of stay, based on routine data from patients with conditions similar to those expected to be cared for by the hospital at home scheme, the study would be able to detect a difference in the mean length of stay of between 2.8 and 5.2 days.

Data handling and statistical methods

We performed data analysis with the SAS statistical package and carried out all comparisons of outcomes on an intention to treat basis. Skewed distributions meant that we analysed length of stay and the COOP-WONCA pain chart using Mann-Whitney U tests. Log transformed data were used for the length of stay confidence intervals. We analysed satisfaction questions using the Mann-Whitney U test for ordinal data and χ^2 or exact methods for categorical data. A two sided 5% significance level was used throughout.

We analysed the Barthel index, remaining COOP-WONCA charts, and EQ-5D (score and thermometer) using multivariate repeated measures analysis of variance methods for the baseline, 4 week, and 3 month measurements. The results of the nested trial of time frame for the COOP-WONCA charts[18] indicated that the baseline assessments for all charts except pain could be used in this way. Confidence intervals for differences through time were obtained from separate (univariate) analyses of covariance for the two follow up assessments adjusted for baseline.

Results

Recruitment and patient progression through study

The hospital at home scheme for acute admissions began operating in April 1994, but recruitment of patients into the trial did not begin until July 1994 to allow the team to develop its practices. Elective surgical patients were referred to the team from April 1995, but recruitment of such patients did not begin until June 1995. Recruitment was complete by October 1995.

A total of 383 patients were referred by ward staff to the hospital at home scheme during the recruitment period (see figure). Of these, 78 were not appropriate for hospital at home care and 59 did not consent to take part. The 246 suitable and consenting patients were subsequently randomised (203 emergency and 43 elective admissions). Four patients undergoing elective procedures never became appropriate for the scheme because of ill health after surgery, and one emergency patient randomised to the hospital at home scheme requested that all study information be withdrawn. Of the remaining 241 patients, 160 were randomised to the hospital at home scheme (two of whom subsequently developed complications and remained in hospital and four of whom were readmitted to hospital from hospital at home) and 81 to routine hospital discharge. Eleven of these patients had consent provided by next of kin as they were unable to provide consent themselves.

By the 4 week interview, information was available for 225 (93%) of the patients, and, by 3 months, information was available for 208 patients (86%).

Characteristics of patients at baseline

Most of the patients (68%) had been admitted for orthopaedic procedures. The largest diagnostic category was fractured neck of femur (31%), with the rest being other fractures (21%), elective hip replacement (11%), cerebrovascular accidents (10%), elective knee replacement (5%), and miscellaneous reasons (22%) such as chest infection or falls without fractures.

Table 1 summarises the trial patients' sociodemographic characteristics and their health status at the time of recruitment (including cognitive and functional ability). Most of the patients were elderly and female, and about half were living alone before their hospitalisation. The two groups were broadly similar for sociodemographic variables. There were differences between the two arms of the trial in terms of the EuroQol EQ-5D score, however, with hospital at home patients reporting lower levels of overall health than the hospital patients. To correct for these observed

differences, all subsequent analyses of EQ-5D were adjusted for the relevant baseline assessment. Similar adjustments were made for the COOP-WONCA charts. Potentially, the most important aspect that differed markedly between the groups was that a main carer was identified by a higher proportion of hospital at home patients (58%) than by hospital patients (49%). Since the carers were identified before randomisation, this discrepancy occurred by chance.

Those patients who refused consent to participate in the trial were of broadly similar age distribution to those who did participate (table 1), with a median age of 78 years (interquartile range 68-83 years). A higher proportion of those who refused consent were female (80%) compared with those who participated.

Outcome measures

Mortality—By the 3 month follow up, 18 patients (7%) had died, and these deaths were distributed proportionately across the two arms of the trial (12 hospital at home patients, 6 hospital patients; 95% confidence interval for difference in mortality −7% to 7%).

Length of stay after randomisation was significantly longer in the hospital at home scheme (table 2). Based on the geometric means, the length of stay after randomisation in the hospital group was 62% of that in the hospital at home group (51% to 75%; P < 0.0001).

Functional ability—Table 3 shows the changes in total Barthel scores between the baseline and each of the follow up assessments, the positive differences indicating improvement. Repeated measures analysis of variance showed no significant difference between the two arms of the trial in terms of changes in functional ability over time (P = 0.19). After adjustment for baseline values, the differences in Barthel score between the groups (hospital minus hospital at home) was −0.33 (−1.20 to 0.54) at 4 weeks and 0.17 (−0.76 to 1.10) at 3 months.

Quality of life—Table 4 shows changes in the EQ-5D and thermometer scores at 4 weeks and 3 months, with positive differences being in favour of the hospital at home group. Again there were no significant differences between the two groups. Similar results were observed for the COOP-WONCA charts (table 5), although the difference for the daily activities chart approached significance at the 5% level. For the pain chart, the analysis of which formed part of a nested trial reported elsewhere,[18] analysis of absolute values at follow up showed no significant differences at either 4 weeks (P = 0.55) or 3 months (P = 0.99).

Patient satisfaction—As most patient responses to the five point Likert scales of patient satisfaction were in the top two categories (for example, "good" and "excellent"), we compared the proportions in the highest category in the two treatment arms (table 6, with positive differences in favour of hospital at home). We found significant differences between the groups for only one of the 11 questions at 4 weeks ("discussions with staff"), which was in favour of the hospital at home patients. The confidence intervals were often quite wide. A similar pattern was observed in the patient satisfaction questionnaires at 3 months (data not shown).

Table 1 Sociodemographic characteristics and health status of 241 patients at baseline by treatment allocated

	Rehabilitative care	
	Hospital (n=81)	Hospital at home (n=160)
Sociodemographic characteristics		
Median (interquartile range) age (years)	79 (74-84)	79 (72-84)
No (%) women	58 (72)	109 (68)
No (%) married	29 (36)	60 (38)
No (%) retired (n=239)	63/80 (79)	112/159 (70)
No (%) living alone	45 (56)	82 (51)
No (%) identifying a main carer	40 (49)	93 (58)
No (%) in manual social classes (n=239)	36/80 (45)	54/159 (34)
Health status at randomisation		
Median (interquartile range) Folstein score (n=229)	26 (23-28)	26 (23-28)
Median (interquartile range) Barthel score	16 (14-17)	16 (14-17)
No (%) with longstanding limiting disability	34 (42)	59 (37)
Median (interquartile range) EQ-5D:		
Score (n=220)	0.52 (0.26-0.69)	0.43 (0.26-0.64)
Thermometer (n=196)	65 (50-75)	68 (50-80)
Median (interquartile range) COOP-WONCA chart:		
Physical fitness	5 (4-5)	5 (4-5)
Feelings	2 (1-3)	2 (1-3)
Daily activities	4 (3-5)	4 (2-5)
Social activities	3 (1-4)	2 (1-4)
Change in health	2 (1-3)	2 (1-3)
Overall health	3 (3-4)	3 (3-4)
Pain	3 (2-4)	4 (2-4)

Table 2 Length of stay in rehabilitative care after randomisation among 237 patients by treatment allocated

	Rehabilitative care	
Length of stay (days)	Hospital (n=79)	Hospital at home (n=158)
Mean	12.2	16.8*
Median	9.0	14.0
Geometric mean	8.6	14.0

*Mean length of stay for hospital at home patients comprises a mean of 2.8 days in hospital after randomisation plus a mean of 12.8 days in hospital at home plus a mean of 0.9 days in hospital due to readmission from hospital at home scheme (based on 152 patients for whom it was possible to subdivide data).

Table 3 Changes in functional ability (Barthel index score) among 241 patients from baseline to follow up, at 4 weeks and 3 months, by rehabilitative care allocated

	Hospital care		Hospital at home care	
Time period	No of patients	Mean (SD) change in total Barthel score*	No of patients	Mean (SD) change in total Barthel score*
Baseline to 4 weeks	69	1.0 (2.82)	152	1.5 (2.93)
Baseline to 3 months	60	1.7 (2.68)	141	1.9 (3.22)

*Possible range of score 0-20.

Table 4 Differences between mean EQ-5D and thermometer scores of patients allocated hospital at home care and those of patients allocated hospital care after adjustment for baseline assessments*

	Difference (95% CI)†	P value‡
EQ-5D score§:		
At 4 weeks' follow up	0.00 (−0.09 to 0.10)	0.20
At 3 months' follow up	−0.04 (−0.13 to 0.06)	
Thermometer¶:		
At 4 weeks' follow up	−1.9 (−7.9 to 4.1)	0.47
At 3 months' follow up	−4.6 (−11.0 to 2.0)	

*From (separate) univariate analyses of covariance for the two follow up assessments.
†Scores for hospital at home care minus those for hospital care.
‡From (a single) multivariate repeated measures analysis of variance.
§Possible range 5-15.
¶Possible range 0-100.

Table 5 Differences between mean COOP-WONCA chart scores of patients allocated hospital at home care and those of patients allocated hospital care, after adjustment for baseline assessments*

COOP-WONCA scores‡	Difference (95% CI)†		P value§
	At 4 weeks' follow up	At 3 months' follow up	
Physical fitness	–0.02 (–0.20 to 0.17)	–0.05 (–0.28 to 0.19)	0.83
Feelings	0.25 (–0.09 to 0.59)	–0.09 (–0.50 to 0.32)	0.54
Daily activities	0.51 (0.13 to 0.89)	–0.04 (–0.47 to 0.38)	0.054
Social activities	0.10 (–0.35 to 0.54)	0.07 (–0.38 to 0.52)	0.90
Change in health	0.08 (–0.24 to 0.41)	–0.01 (–0.34 to 0.31)	0.58
Overall health	0.14 (–0.12 to 0.40)	0.10 (–0.21 to 0.42)	0.86

*From (separate) univariate analyses of covariance for the two follow up assessments.
†Scores for hospital at home care minus those for hospital care.
‡Possible range 1-5.
§From (a single) multivariate repeated measures analyses of variance.

Discussion

This study compared the effectiveness and acceptability of early discharge to a hospital at home scheme with that of routine hospital care. There were few significant differences between routine hospital care and the hospital at home scheme across a wide range of outcomes. Specifically, there were no differences in terms of mortality, functional ability, quality of life, and most measures of satisfaction at the 4 week and 3 month follow ups.

The main significant difference between the two forms of care was the length of stay after randomisation. The geometric mean of the length of stay in the hospital group was 62% of that in the hospital at home group (95% confidence interval 51% to 75%; $P < 0.0001$). Caution is needed in interpreting this result with regard to its implications for cost. The length of stay after randomisation represented the time during which a patient was supervised by a service. In hospital this is indicative of bed occupancy and hence is strongly related to cost. However, hospital at home care can be of variable intensity, tailing off towards the end of an episode of care, and, therefore, length of stay may be less strongly related to cost. The observed differences in length of stay are of obvious importance in terms of resource allocation within acute care, and a full economic evaluation of these data is reported elsewhere.[19]

At the 4 week follow up, the patients receiving hospital at home care reported significantly higher levels of perceived involvement in decisions pertaining to their care than did the hospital patients. By the 3 month follow up, however, there were no differences in levels of patient satisfaction. As this was the only significant result in the context of multiple statistical tests, it should be viewed with caution. The remaining measures of patient satisfaction were similar in the two treatment arms. The widths of confidence intervals for the data on patient satisfaction were quite broad, however, which suggests that the sample size (based on expected length of stay) may not be sufficiently large to identify important differences in acceptability between the two groups.

Limitations of study

For the small subgroup of patients (43 in total) undergoing elective procedures, randomisation to treatment occurred before the baseline interview. Thus, it was not possible to fully blind patients or interviewer to the treatment during the baseline interview. Further, for all patients it was not possible to blind the interviewer during the follow up interviews.

The hospital at home team under evaluation admitted patients with a wide range of diagnoses. However, the sample size of individual groups (including elective admissions) was too small to detect clinically important differential effects.

There was a limited choice of outcome measures for rehabilitation in an elderly population. We selected the Barthel index because of its wide use in rehabilitative clinical practice, but it has the disadvantage that it is relatively insensitive to change, particularly at the top end of the scale.

For every two patients discharged early to the hospital at home scheme, one patient remained in hospital for routine discharge. Thus, there may have been periods when the scheme was underused. This is likely to have most impact on the economic analysis, but it could also explain, in part, the increased length of stay in the hospital at home group. During the trial, the workload of the hospital at home team might not have been as intense as it would have been without the concurrent evaluation, and therefore the impetus to discharge patients from the scheme might have been less.

Conclusions

In terms of effectiveness and acceptability, our study does not indicate that one scheme is substantially preferable to the other. However, the decision to implement an early discharge, hospital at home scheme for emergency and elective patients should not be made

Table 6 Patients' satisfaction with care received expressed at 4 week follow up (values are percentages unless stated otherwise)

	Rehabilitative care			
	Hospital (n=70)	Hospital at home (n=155)	Difference (95% CI)	P value
Quality of service (excellent)	44.6	50.7	6.1 (–8.6 to 20.8)	0.49*
Received needed services (all of the time)	60.0	63.0	3.0 (–11.5 to 17.4)	0.81*
Content with care (all of the time)	56.9	69.6	12.7 (–1.6 to 27.0)	0.12*
Received all help needed (yes)	75.4	83.8	8.4 (–3.7 to 20.6)	0.15†
Discussions with staff (excellent)	27.7	47.4	19.7 (5.9 to 33.5)	0.024*
Involved in decision making (as much as wanted)	71.7	79.4	7.7 (–5.7 to 21.1)	0.41‡
Information about illness (as much as wanted)	80.0	76.7	–3.3 (–15.7 to 9.2)	0.75‡
Information on treatment (as much as wanted)	80.7	77.5	–3.2 (–11.2 to 17.8)	0.77‡
Privacy (as much as wanted)	88.1	84.7	–3.4 (–13.7 to 6.9)	0.88‡
Informal practical support (as much as wanted)	93.2	87.0	–6.2 (–14.8 to 2.4)	0.73‡
Informal emotional support (as much as wanted)	96.6	93.9	–2.7 (–8.9 to 3.5)	0.92‡

*Mann-Whitney U test. †χ^2 test. ‡Fisher's exact test.

purely on effectiveness grounds; costs are clearly also important, and we report on these in the associated paper.[19] More research into the most appropriate case mix and size of hospital at home schemes is required.

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Contributors: SHR participated in the study design, collected data, conducted the data analysis, helped with data interpretation, and wrote the paper. JC initiated the study, participated in the study design, conducted the data analysis, and helped with data interpretation and writing the paper. DJG initiated the study, participated in the study design, and helped with data analysis and interpretation and writing the paper. TJP designed the statistical component of the study, supervised and helped with data analysis, and helped with data interpretation and writing the paper. JP helped with the study design, data interpretation, and writing the paper. MAD helped with the study design, recruitment of patients, data interpretation, and writing the paper.

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Conflict of interest: MAD was, and still is, employed as a member of the hospital at home scheme.

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Key messages

- Pressure on hospital beds, the increasing age of the population, and high costs associated with acute hospital care have fuelled the search for alternatives to inpatient hospital care
- There were no significant differences between early discharge to hospital at home scheme and routine hospital care in terms of patient quality of life, physical functioning, and most measures of patient satisfaction
- Length of stay for hospital patients was significantly shorter than that of hospital at home patients, but, owing to qualitative differences between the two interventions, this does not necessarily mean differences in effectiveness
- Early discharge to hospital at home provides an acceptable alternative to routine hospital care in terms of effectiveness and patient acceptability

Patients who make my practice

Known by name

I had not met her before, but I have known her name for 25 years: Patricia Patterson. She had hypoparathyroidism since thyroidectomy when she was 21 years old and over the years, on treatment with vitamin D, had had episodes of hypocalcaemia and hypercalcaemia. This latest episode of hypercalcaemia was related to an uncommon conjunction of events, stopping hormone replacement therapy and continuing with vitamin D treatment at the dose prescribed for some years. We met at the mineral metabolism clinic. She gave a classic history of hypercalcaemia, nausea, occasional vomiting, severe constipation. She had had endoscopy in another hospital, which showed mild oesophagitis and a small hiatus hernia. Measuring the plasma calcium gave the answer.

I am a clinical biochemist with an interest in calcium metabolism. Recurring names over the years jog our memories as we report, and their presentation in discussion groups and clinicopathological conferences brings more clinical effectiveness. We still continue to recognise our patients, for such they are. Each blood sample and request is a request for a consultation. Our medical scientific officers, because samples are analysed and numbered but not named in the interest of safety, cost effectiveness, and speed, see only numbers associated with specimens and not names. Those who came into the health service because of a wish to perform tasks for patients are now excellent analytical chemists but have lost a certain rapport with patients. It is not possible to associate the high calcium with a patient, so it matters just a little less. Many of the older ones see the job as having changed greatly and losing its attractiveness for them. In the interests of cost effectiveness, we now have to argue cogently for the need for consultant laboratory staff near the patient—in the hospitals we serve. Are we the last generalists covering a wide range of patients but with a knowledge and enthusiasm to follow the interesting patient or finding?

To return to the patient, she told me that her family has thyroid problems, a sister has also had a thyroidectomy—her surname is McMenemy. "Oh," I said, "not Grace McMenemy, didn't know you two were sisters." Haven't met her either, but know her blood. (The names have been changed with the patients' permission.)

Frances J Dryburgh, *consultant biochemist, Glasgow*

Hospital at home or acute hospital care? A cost minimisation analysis

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Abstract

Objective: To compare, from the viewpoints of the NHS and social services and of patients, the costs associated with early discharge to a hospital at home scheme and those associated with continued care in an acute hospital.
Design: Cost minimisation analysis.
Setting: Acute hospital wards and the community in the north of Bristol (population about 224 000).
Subjects: 241 hospitalised but medically stable elderly patients who fulfilled the criteria for early discharge to a hospital at home scheme and who consented to participate.
Main outcome measures: Costs to the NHS, social services, and patients over the 3 months after randomisation.
Results: The mean cost for hospital at home patients over the 3 months was £2516, whereas that for hospital patients was £3292. Under all the assumptions used in the sensitivity analysis, the cost of hospital at home care was less than that of hospital care. Only when hospital costs were assumed to be less than 50% of those used in the initial analysis was the difference equivocal.
Conclusions: The hospital at home scheme is less costly than care in the acute hospital. These results may be generalisable to schemes of similar size and scope, operating in a similar context of rising acute admissions.

Introduction

Hospital at home is a generic term referring to home based nursing and rehabilitation services aiming to prevent admission or to facilitate early discharge from care in an acute hospital. Hospital at home schemes are often thought to be a cost effective alternative to acute hospital care,[1–3] but few published evaluations exist. Some studies have shown that early discharge schemes are viable in terms of cost, [4–6] but a recent study has shown increased costs.[7] To date, however, no economic evaluations have been published in which cost data have been collected alongside a randomised controlled trial evaluating the effectiveness of hospital at home. Studies have generally concentrated on costs of secondary health care, ignoring costs incurred by the patient, social services, and even primary care. Furthermore, studies have not, generally, followed patients for an equivalent time from the baseline assessment (instead, following patients until discharge) and have not considered whether differences in costs arise after discharge.

We compared standard continued acute hospital care with early discharge to hospital at home, for elderly patients currently in the acute hospital but requiring only nursing or rehabilitative care, or both. The comparison is particularly apt in the current context of rising emergency admissions to hospital, as a perceived aim of hospital at home is to ensure that hospital resources are focused on patients who cannot easily be managed in the community.

The study was carried out in parallel with a pragmatic randomised controlled trial comparing the effectiveness and acceptability of the two alternatives, which concluded that the two forms of care had similar outcomes in terms of mortality, functional outcome, quality of life, and satisfaction with care.[8]

Methods

The economic evaluation compared continued care in an acute hospital with early discharge to hospital at home for patients who had been admitted to the specialties of general medicine, care of the elderly, general surgery, and orthopaedics and who had potential for a good rehabilitative outcome. Patients randomised to the hospital arm received routine hospital care with discharge at the usual time. To ensure that the team operated as close to its capacity as possible, for every patient randomised to hospital care, two patients were randomised to hospital at home. Patients randomised to hospital at home received early discharge with home based rehabilitative care between 8 30 am and 11 pm provided by a team of two nurses (one G grade, one E grade), a physiotherapist (senior 1, 0.8 whole time equivalent), an occupational therapist (senior 1, 0.5 whole time equivalent), and three support workers (B grade auxilliary, flexible hours). Discharge from both hospital and hospital at home occurred when the patient could be managed by routine community services.

The economic evaluation was conducted from two main viewpoints: a combined NHS and social services viewpoint, and a patient viewpoint. The NHS and social services viewpoint is presented separately, except in the analysis of aids and adaptations (which are combined because patients could not reliably distinguish the providing service).

The appropriate form of economic evaluation was determined by the results of the associated trial.[9] Although provision was made in the study for conducting alternative forms of evaluation, the appropriate form is a cost minimisation analysis, given the extremely similar results in terms of effectiveness and acceptability.[8]

The analysis was conducted in the context of rising emergency admissions in a hospital nearing capacity. Average costs were used to value hospital care, as these approximate the costs that would be associated with the provision of new hospital services in the long term. In this context, using short run variable costs to approximate marginal savings in hospital use of resources (which could potentially be recouped to pay for hospital at home) is not appropriate. Using long run costs may also be more meaningful for informing national policy.[10]

Collection of resource use data

Data on use of resources were obtained for each patient for the three months following randomisation (table 1).

The acute hospital trust provided information on use of hospital resources on a per patient basis, relating to length of stay, specialty, ward, and use of particular services (for example, some paramedical services, diagnostic tests, use of operating theatre). For the elective surgery centre such information was not available, and resource use was based on length of stay.

Data routinely collected through the integrated community system for particular community services (including the hospital at home team) included number of visits, grade of visitor, and length of visit.

Patients completed questionnaires at 4 weeks and 3 months. Data are missing for patients for whom consent was provided by a carer, withdrawals, and deaths. General practitioners of all patients (excluding those withdrawing from the study) were sent a questionnaire covering the number of home and surgery visits for each patient.

Hospital at home records were used to determine the mileage costs incurred by members of the hospital at home team.

Valuation of resource use data

Sources of valuations for individual items of resource use are shown in table 2.

Costs available on a per patient basis from the acute hospital included use of some paramedical services and use of the operating theatre as well as information about "specialty overheads" (including medical staff, administration, cleaning, catering, maintenance, staff, and capital charges) and "ward/nursing" (including nursing staff dedicated to the ward, ward clerks, consumables attributable to the ward). For the elective surgery centre, valuation was on the basis of postoperative length of stay.

Unit costs of health and social care for 1996[11] were used to value the majority of community services. Where possible, valuation was conducted using information on the time taken during the visit, and a cost per hour of client contact was used; otherwise, valuation was based on the average cost per visit. Capital and revenue overheads are included.

Costs for the hospital at home team, per hour of client contact, were directly calculated using information about salary (including employer's contribution to national insurance and superannuation) for each grade of staff and about revenue overheads and capital overheads (based on data obtained from Netten and Dennett[11]). Data from one month were used to allocate the cost of non-contact time across patient contacts. The month chosen was one year after the scheme started.

Market prices (including value added tax) were used to value all items purchased either by the NHS and social services or by patients (where not available from standard sources,[11] local information was obtained from community stores or the hospital at home occupational therapist). The initial analysis used a relatively extreme lifespan assumption—that items were used for one year and then discarded. An assumption at the other extreme was used for the sensitivity analysis (see below).

The NHS mileage rate at the time of the study was used to value all travel for the hospital at home team.

Table 1 Sources of data on use of resources that was used in analysis

Resource item	Routine ICS data	Patient questionnaire	GP questionnaire	Included in hospital costs	Hospital at home records	Assumed
NHS and social services staff time						
Hospital at home	•					
District nurses	•					
Physiotherapists	•					
Chiropodists	•					
Health visitors	•					
Occupational therapists		•				
General practitioner			•			
Hospital doctors				•		
Hospital nursing				•		
Home aid		•				
Home help		•				
Social worker		•				
Other NHS and social services resources						
Hospital capital				•		
Loan equipment		•				
Hospital overheads				•		
Other staff overheads						•
Team travel					•	
Other travel						•
Meals on wheels		•				
Day care		•				
Patients' resources						
Equipment		•				
Social services		•				
Nursing care		•				

ICS=integrated community system; GP=general practitioner.

Table 2 Sources of valuations used in analysis

Resource item	Included in hospital costs	Direct estimate	Netten and Dennett[11]	Market prices	NHS mileage	Patient report
NHS and social services staff time						
Hospital at home		•*				
District nurses			•†			
Physiotherapists			•†			
Chiropodists			•‡			
Health visitors			•†			
Occupational therapists			•†			
General practitioner			•‡			
Hospital doctors	•					
Hospital nursing	•					
Home aid		•§				
Home help			•‡			
Social worker			•‡			
Other NHS or social services resources						
Hospital capital	•					
Loan equipment				•		
Hospital overheads	•					
Other staff overheads			•			
Team travel					•	
Other travel					•	
Meals on wheels			•			
Day care			•			
Patients' resources						
Equipment						•
Social services						•
Nursing care						•

*Costs were directly calculated as described in the main text. †Estimated on basis of cost per hour of client contact. ‡Estimated on basis of cost per visit. §Costs were assumed to be idential to the costs of hospital at home B grade auxilliaries, given the similar nature of the work undertaken.

Patients were asked to provide information about the cost of any purchases, services, or contributions to social services.

Sensitivity analysis

Hospital resources released for care of other patients may be less than the long run average cost when patients are nearing the end of their hospital stay and therefore require less intensive nursing support. Sensitivity analyses assumed that resources released would be either 75% or 50% of the average cost.

For the sensitivity analysis, aids and adaptations were assumed to have a 10 year product life, discounted at 6% per year.

It was not possible to obtain information about travel costs for community or social services staff (apart from hospital at home staff), and this cost was ignored. The sensitivity analysis included assumed travel costs.[11]

Table 3 Time spent by members of hospital at home team on client contact and other activities, and cost per hour of client contact (£ at 1995-6 values) used in the main analysis and in the sensitivity analysis

Team member	Client contact in 1 month (minutes)	Non-client activity in 1 month (minutes)	Cost per hour of client contact (£)	
			Trial	Sensitivity analysis*
B grade auxilliaries	7360	7380	16.77	11.18
E grade district nurse	2880	4320	30.95	20.63
G grade district nurse	1750	7250	78.11	52.08
Physiotherapist (senior 1)	1750	3530	48.10	32.07
Occupational therapist (senior 1)	1210	3530	59.50	39.67

*Assumes greater activity of the hospital at home team in a non-trial situation.

Table 4 Resource use per patient for 3 months after randomisation

Resource item	Hospital		Hospital at home	
	No of patients*	Mean (SD) use	No of patients*	Mean (SD) use
Acute hospital				
Hospital length of stay (days)	68	13.5 (11.75)	130	3.1 (3.24)
Hospital occupational therapy (sessions)	68	2.6 (5.72)	131	0.5 (1.42)
Readmission (days)	68	4.8 (12.17)	131	5.6 (13.84)
Elective surgery centre				
Hospital length of stay (days)	11	4.2 (3.12)	24	1.8 (1.70)
Readmission (days)	13	5.2 (10.33)	24	0.5 (1.70)
Hospital at home team†:				
B grade auxilliaries (minutes)	78	0 (0)	158	666 (858.6)
E grade district nurse (minutes)	78	4 (15.4)	158	209 (250.7)
G grade district nurse (minutes)	78	35 (31.9)	158	94 (90.4)
Physiotherapy (minutes)	78	6 (14.9)	158	132 (126.1)
Occupational therapy (minutes)	78	0.3 (2.8)	158	97 (174.5)
Total No of visits	78	1.1 (0.66)	158	25.0 (20.50)
Other NHS or social services				
Outpatient (visits)	58/66	1.0 (NA)	131/136	1.1 (NA)
GP (visits)	61	2.2 (2.03)	133	2.8 (2.78)
Practice nurse (visits)	54	0.9 (2.30)	110	1.6 (3.95)
Community services (minutes)‡	78	175 (344.5)	158	174 (277.1)
Day care (visits)	49/65	0.4 (NA)	111/131	0.8 (NA)
Social services (minutes)§	59-65	826 (NA)	131-141	310 (NA)
Meals on wheels (visits)	59-64	14.6 (NA)	132-140	8.7 (NA)
Patients' costs				
Care and nursing services (visits)¶	58-68	5.3 (NA)	132-141	4.4 (NA)

NA=In these cases it is not possible to give a standard deviation because of the necessity of summing mean values across different sample sizes. This generally resulted from a necessity to sum data either over different categories of resource use or across the two follow up periods (randomisation to four weeks, four weeks to three months).
*Randomisation ratio of two hospital at home patients to one hospital patient was used.
†Resources associated with care in the hospital at home scheme appear under the hospital arm of the trial. These are an artefact of the trial, as they are associated with recruitment of patients to the trial. However, resources were also used in recruitment of patients to the trial in the hospital at home arm, so excluding these costs in one arm of the trial and including them in the other would be inappropriate.
‡Includes district nurses, health visitors, physiotherapists, chiropodists. Occupational therapy data were collected separately and had a smaller sample size. Occupational therapy costs are included in the cost figures for community services in table 5 (£4.47 for hospital patients, £0.09 for hospital at home patients).
§Includes home help, home aid, and social worker.
¶Includes domestic help, private meals on wheels, private nursing, private laundry service, gardening.

Initial estimates of cost per hour of client contact for members of the hospital at home team assumed that the team was fully utilised. However, despite the 2:1 randomisation ratio, the trial itself almost certainly resulted in low recruitment to the scheme. For the sensitivity analysis, revised values were calculated, assuming all patients recruited to the trial would have received hospital at home care (with average treatment time assumed to be identical to that for existing patients) without additional resources being required. This implies that, in treating an extra 50% of patients in the existing scheme, the time available for administration and other activities would be reduced, thus reducing cost per hour of client contact. It was assumed that there would be no impact on the quality of care provided through the scheme.

Statistical analysis

The sample size was not determined for the economic evaluation specifically,[8] and the aim was to collect data for all patients included in the study. A variety of data sources was used to acquire information about resource use, and relatively few patients had a complete set of such data. Hence, mean costs for each item of resource use were calculated and then aggregated to estimate the total cost per patient. Statistical testing was therefore not possible at the level of total resource use per patient. The mean is presented for descriptive purposes; although the resource use data are highly positively skewed, provision of information about median resource use and costs (which were often zero) is unhelpful for service planners who require estimates of total costs associated with each scheme. For such skewed data, however, care must be exercised in interpreting standard deviations in particular.

Results

All 241 patients participating in the associated randomised controlled trial were included in this economic evaluation.[8] Table 3 shows the time spent on different activities by the hospital at home team during one month, the associated cost per hour of client contact, and costs used in the sensitivity analysis.

The main measures of use of physical resources associated with both forms of care are presented in table 4. Table 5 shows the results of combining resource use with information on valuation, in terms of mean cost per patient, and also the total costs associated with particular viewpoints. Hospital at home costs were lower than costs of continued hospital care from both the NHS and social services viewpoint and the patient's viewpoint.

Table 6 shows the results of the sensitivity analysis. Neither altering the valuation of aids and adaptations nor including travel costs for community and social service staff made large differences to the results. The impact of assuming a greater utilisation of the hospital at home team (and hence a lower cost per hour of client contact) was inevitably concentrated in the hospital at home arm: relative to the initial results, the impact of this change was to make hospital at home seem even less costly. The greatest impact on results occurred when changes to hospital costs were assumed. When hospital costs were taken as 75% of the original costs,

Table 5 Mean cost (£ at 1995-6 values) per patient for each aspect of resource use in 3 months after randomisation

Resource item	Hospital	Hospital at home
Hospital or hospital at home costs		
Acute hospital:		
Hospital length of stay	2142.78	626.40
Hospital occupational therapy	12.32	2.54
Other hospital services	20.59	4.21
Readmission	808.54	1004.64
Elective orthopaedic surgery:		
Hospital length of stay	631.45	264.25
Readmission	789.85	75.50
Overall initial inpatient cost—all patients	1960.67	535.11
Overall readmission cost—all patients	805.54	860.77
Hospital at home team*:		
B grade auxilliaries	0	186.13
E grade district nurse	2.05	107.78
G grade district nurse	45.60	122.81
Physiotherapy	4.47	105.92
Occupational therapy	0.32	95.81
Travel costs	2.70	62.73
Other NHS or social services costs		
Outpatient	55.28	62.46
GP care	89.54	118.74
Practice nurse	5.44	9.82
Community services	93.81	94.20
Day care	11.27	23.66
Social services	123.45	44.13
Meals on wheels	42.16	25.01
Aids and adaptations	93.91	90.18
Subtotal	3336.21	2545.26
Patients' contributions to social services	–44.22	–29.55
Total cost to NHS or social services	3291.99	2515.71
Patients' costs		
Care and nursing services	16.62	19.49
Contributions to social services†	44.22	29.55
Aids and adaptations	16.19	10.55
Total cost to patients	77.03	59.59

*Resources associated with care in the hospital at home scheme appear under the hospital arm of the trial. These are an artefact of the trial, as they are associated with recruitment of patients to the trial. Resources were also used in recruitment of patients in the hospital at home arm; however, the precise amount of resources used for trial recruitment in this arm is unknown and could vary between zero (if there was no extra cost associated with trial recruitment) and £55.14 (if the cost associated with recruitment to the scheme was entirely attributable to the cost of recruitment to the trial). Since the costs of recruitment in the hospital at home arm are unknown and therefore impossible to exclude, these costs have not been excluded from the hospital arm.
†Includes home help and meals on wheels.

hospital at home continues to be less costly, but if hospital costs were taken as 50% of original costs, the two options incurred similar total costs.

Discussion

This economic evaluation comparing early discharge to hospital at home with continued care in an acute hospital followed by routine discharge has, under all assumptions used, found that the cost of hospital at home care is less than that of hospital care over the 3 months from randomisation. Only when hospital costs were assumed to be less than 50% of the costs originally used was the comparison more equivocal.

Costs of the schemes and impacts on budgets

The initial analysis calculated the mean cost per hospital patient as £3292 and that for hospital at home patients as £2516. This implies a reduction in cost of around £750 per patient with early discharge. For every £10 000 spent, routine hospital care could be provided for only three patients, whereas early discharge to care in the hospital at home scheme could be provided for four patients.

The conclusion that hospital at home care seems to be less costly than hospital care is strengthened by the underutilisation of the team during this evaluation owing to the randomisation of patients. This occurred in part because of difficulty in recruiting patients to the trial and in part because one in three consenting patients actually received hospital care. The hospital at home team also spent time publicising the scheme and the associated trial. The hospital at home recruitment rate increased after the trial (from 16 to 35 per month), which would be expected to reduce the cost per hour of client contact. At some point, however, the scheme would become fully utilised and any subsequent increase in caseload could compromise the quality of care.

Hospital at home schemes involve changing the location of the patient's care from the secondary to the primary sector. The impact on the budgets of these sectors could be important: costs for general practitioners increased slightly with hospital at home, but costs for community healthcare services were almost identical for both types of care. The impact on the budget of the secondary care providers will depend on whether new funding is available for hospital at home care.

Costs to patients were much lower than costs to the NHS and social services. For elderly patients, most of whom will be receiving state pensions, these costs may still be important, but they were similar in the two arms of the trial. A slightly higher mean cost for hospital care was due primarily to increased contributions to care by social services.

Limitations of the study

Inevitably this study has limitations. Different data sources were used to estimate quantities of particular items of resource use. For each source, data were available for different numbers of patients (and different patients). To maximise data available for each item of resource use, each item was analysed separately, with

Table 6 Results of sensitivity analysis. Values are new values (change from initial analysis)

	Impact on individual cost item		Impact on NHS and social services costs		
Assumption	Hospital	Hospital at home	Hospital	Hospital at home	Least costly alternative
Initial inpatient costs at 75% of baseline	1477.59 (–483.08)	433.45 (–101.66)	2808.78	2414.01	Hospital at home
Initial inpatient costs at 50% of baseline	994.50 (–966.17)	290.87 (–244.24)	2325.69	2271.43	Hospital at home—but becoming more equivocal
Reduced cost per hour of client contact for hospital at home team	37.66 (–17.48)	475.03 (–206.15)	3274.38	2309.52	Hospital at home
Inclusion of community and social services travel costs	28.86 (28.86)	17.86 (17.86)	3320.72	2533.53	Hospital at home
Assumed ten year life for aids and adaptations	12.76 (–81.15)	12.25 (–77.93)	3210.71	2437.74	Hospital at home

Key messages

- Some economic evaluations have found that hospital at home care is more costly than acute hospital care in the United Kingdom, and others have found that it is less costly
- Cost minimisation analysis found a mean cost to the NHS and social services of £2516 per hospital at home patient and £3292 per hospital patient
- For every £10 000 spent, routine hospital care could be provided for three patients, while early discharge to care in the hospital at home scheme could be provided for four patients
- Sensitivity analysis (making differing assumptions for the cost of both services within reasonable boundaries) does not change the result that hospital at home is less costly than hospital care; only when hospital costs are assumed to be less than 50% of the original estimate does the difference become equivocal
- Costs to patients were similar in the two arms of the trial

aggregation of the mean cost per patient for individual items to estimate total mean cost per patient only at the end of the analysis. This rules out confidence intervals for overall estimates of resource use and statistical analysis of these overall estimates. Basing costs on patients for whom complete data sets were available would have reduced the sample size. As the study was randomised, there is no reason to believe that problems with data availability were more important in one arm of the trial.

Because of the varied nature of patients enrolled into the trial, a time and motion study could not be used to estimate the extent of resource use in the hospital. The sensitivity analysis was used to assess the impact of using average costs, which may not reflect the opportunity costs of hospital care.

Start-up costs and cost of informal care

The hospital at home scheme examined in this trial had been operating for three months before the trial began. The steepest part of the team's learning curve was therefore avoided, but costs associated with hospital at home would be expected to reduce further over time. Particularly in the first year of the study, the hospital at home coordinator spent considerable time publicising the scheme and recruiting patients. The cost per patient associated with the early days of a scheme is likely to be much higher than that associated with an established scheme.

Though 55% of patients studied identified an individual providing informal care, we did not assess costs associated with this informal care. Such assessment is complex[12] and outside the resouces available for this study.

Generalisability of findings

The inconsistency in the findings of recent economic evaluations comparing hospital at home schemes with acute hospital care in the United Kingdom[7 13] may result from differences in the type, size, scope, and organisation of schemes; the context in which the service is operating (including differences in costs of the routine care to which hospital at home is being compared); and utilisation of the scheme. Our results are most likely to be generalisable to schemes of similar organisation, size, and scope. The context of rising emergency admissions in which this scheme is operating is also of importance in assessing whether the costs described here are applicable in other situations.

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Contributors: JC led the design of the economic evaluation, led in the development of data collection instruments for the economic evaluation, analysed the economic data, led the writing of the paper. SHR contributed to the design of the economic evaluation and assisted in the development of data collection instruments, collected the economic data, and contributed to the writing of the paper. TJP contributed to the design of the economic evaluation and data analysis and to writing the paper. DJG participated in the design of the economic evaluation and data analysis and contributed to writing the paper. JP and MAD participated in the design of the economic evaluation and conributed to the interpretation of data and writing the paper.

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Endpiece

Alternative definitions

Deliberation: The act of examining one's bread to determine which side it is buttered on.

Ambrose Bierce, *The Cynic's Word Book* (1906), subsequently titled *The Devil's Dictionary*

Primary care: core values

Core values in a changing world

Ian R McWhinney

Summary points

All key relationships in primary care—with patients, with colleagues in practices and in the wider health service, and with local communities—are underpinned by basic, core values passed down by tradition

Primary care practitioners must guard these values, recognising that values may be affected by evolution in health care and its delivery

Primary care must, however, ensure that this is a conscious and explicit evolution, rather than an erosion left too late to remedy

This is the first in a series of six articles reflecting on the core values that will underpin the development of primary care

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In 1920, the Dawson report advocated a population based approach to the organisation of health services, the allocation of resources, and the training of health care staff.[1] It also introduced the concepts of primary and secondary levels of care and of primary care health centres. For several decades these ideas lay dormant, until medical specialisation, fragmentation of health services, and the introduction of publicly funded health care made their logic inescapable. The term "primary care" became common coinage, and in 1978 its fundamental importance was recognised by the World Health Organisation.[2] In the same year, the US Institute of Medicine identified the four essentials of good primary care as accessibility, comprehensiveness, coordination, and continuity.[3]

For most of this century, the typical primary care professional has been a generalist practitioner,[4] usually practising close to the population served by the practice, alone or in a small group, and supported by a small staff. (Generalist practitioners include practitioners from nursing and from general paediatrics or internal medicine.) The key relationship for most of these practitioners is with individual patients who consult about problems they have identified themselves. Until recently, screening for risk factors and early disease in asymptomatic patients has been unusual. But practitioners have often forged strong community links, especially in small towns and rural areas. For all its limitations, generalist practice has represented a strong tradition of personal care, comprehensive in its response to the needs of the people and reasonably accessible in their neighbourhoods and homes. It is on this living tradition that primary care should build as it evolves into new forms.

Traditions are the bearers of values. In a living tradition, there is a perennial debate about how the inherent goods of the tradition are to be realisd. The debate takes on a special poignancy when there is a conflict between one good and another. Alastair Macintyre distinguishes between the internal and external goods of traditional practices and institutions.[5] The external goods are those for which the institution competes, such as prestige, money, market share, power. The internal goods are those that enable members of the institution to practise in accordance with their ideals and to attain fulfilment in their work. Conflicts between these two goods are a perennial issue for all traditions. The relentless pursuit of one good can destroy the other and ultimately bring down the whole institution. The continuing strength of a tradition is the best assurance that these conflicting goods will be reconciled.

The practitioner and the patient

Traditionally, the commitment of the generalist practitioner is to the person, not to "the person with a certain disease." General practice defines itself in terms of relationships, not in terms of diseases or technologies. The commitment is open ended. The relationship is ended only by retirement, removal, death, or a decision by either party to end it.

The key role of the generalist practitioner is responding to the initial presentation of illness, through responding to suffering and making a clinical assessment. How events unfold is profoundly influenced by this initial response. Responding to suffering is a moral obligation. Compassion is not, as some have suggested, conditional on evidence of its effectiveness.[6] Although a practitioner or a practice may enter into a contract with a paying agency, the relationship with a patient is better described as a covenant.[7] A contract sets out the limits of what can be expected of the parties. It says: "I am committed to doing so much, but not more." A covenant is an undertaking to do whatever is needed, even if it goes beyond the terms of the contract. Sticking with a person through thick and thin is hard work: an act of love, not in the affective sense, but in Dostoevsky's sense of active love: "hard work and tenacity and for some people perhaps … a whole science."[8]

The healing relationship between practitioner and patient can take its place beside others in which there are strong moral obligations and mutual commitments, such as those between parent and child and teacher and student. Although continuity is important in all of them, it is not simply a matter of chronological time. There are inevitable breaks of continuity in any relationship. No practitioner can be available to patients at all times. A good relationship, however, requires continuity of responsibility. Responsible practitioners will want to provide a deputy who can give care as close as possible to the care they can provide, and they will want to be present at times of great need. We seem almost to have forgotten the importance in medicine of presence. Of course, this faces us with many conflicting moral choices between obligations to different patients, to our families, and to ourselves.

Continuity in relationships builds trust, creates a context for healing, and increases the practitioner's knowledge of the patient, much of it at the tacit level.[9] Since it concerns responsibility and commitment, it is a moral issue for practitioners of all professions in primary care, and for their patients. A relationship with one doctor is strongly preferred by most patients and doctors, but some patients view it as continuity with a practice, and others give a higher value to accessibility.[10] Patients can have strong feelings of continuing care from a familiar doctor, practice nurse, and receptionist working together.[11] The preconditions of continuity are ready access, competence of the doctor, good communication, and a mechanism for bridging from one consultation to the next.[10] Continuity is a mutual commitment by patient and practitioner.[9 10] A practitioner's sense of responsibility increases with the duration of the relationship and with the number of contacts.[9]

Obstacles to continuity

Some obstacles to continuity, such as long distance commuting and population mobility, are features of modern industrial societies. Others lie in the management of the healthcare system, in communication between primary and secondary sectors, in management of the practice, and in the operations of the primary care team.

Management's drive for efficiency can threaten relationships by rigidly defining professional roles and by penalising practitioners who step outside their role. No doubt it is inefficient for a doctor to attend to an old person's callosities and toenails, but it is through such little services that relationships are built. Some doctors and nurses may have special expertise in managing asthma, diabetes, or advanced cancer, but this does not mean that every one of these patients has to be transferred to their care. A patient's relationship with the primary care practitioner may be broken if there is poor coordination between primary, secondary, and tertiary care sectors. The organisation of a practice may itself be an impediment to continuity.

Relationships with colleagues

Teamwork enhances primary care, but it requires wise leadership, attention to team relationships, and a change in traditional professional values. The growth of teams has been rapid in the past two decades as doctors and nurses have often been joined by social workers, psychologists, counsellors, physiotherapists, and pharmacists. Breaks in continuity, poor coordination, and blurring of responsibility are among the faults attributed to the primary care team.

The evolving nurse-doctor relationship is the key to the future of primary care. Each profession has its central role, but there is much overlap, and the roles should be allowed to evolve over time with minimal direction. The value of teamwork is in the diverse perspectives of the professions. From their integration emerges a new level of care, different from each of the individual perspectives. We have so much to learn from each other, but we can only learn if we approach teamwork with what Wilber calls an aperspectival frame of mind.[12] This means valuing all perspectives, but

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regarding none as final—not even our own. It requires in us a capacity to step out of our own perspective and to view it from outside, as we view those of others. In the same way, the patient-centred clinical method aims to integrate the perspectives of doctor and patient.[13] "No perspective is final," however, is not the same as the moral relativism of "all perspectives are equal."

In a well functioning team the members meet together regularly, learn from each other, and care for each other as well as for their patients. When discussions about patients result in decisions, the responsibility for implementation is clearly defined. Whether it is a longstanding team or one assembled for a particular patient, a team needs a leader. Leadership should be open to any of the practitioners in the team. This is difficult if some team members are in an employer-employee relationship.

Clinical freedom and managed care

The freedom to practice in accordance with the highest standards is highly valued by all professions. Constraints are always present, but clinical freedom allows practitioners the flexibility to make difficult choices between competing priorities. The choices may range from decisions about how much time to spend with a particular patient to the allocation of the practice's resources among preventive, clinical, and managerial functions. With this freedom goes the moral obligation to do everything needed for the individual patient and to use the least resources necessary to attain this end. Family physicians are notable for their restraint in

using resources without impairing the quality of care.[14] At the same time they strongly resist measures designed to limit services at the point of care in the name of efficiency. To clinicians, efficacy—and not efficiency—has the higher value.

Under managed care in its various forms, restrictions on clinicians have now become commonplace. Modern information systems make it possible for managers to monitor and control practitioners' behaviour by such measures as utilisation review, incentives and disincentives, and preauthorisation for procedures and referrals. This is so destructive of professional morale that it may become self defeating. If limits to resources are established by society they can be subject to public scrutiny. The transfer of financial risk to practitioners gives practices the freedom to make their own decisions about the distribution of resources. Self-imposed limits are more tolerable than those imposed from above, but if we stand to gain from the decisions ourselves, our interests are potentially in conflict with those of our patients.[15]

The practice and the community

The population perspective, ensuring that the services of the practice are made available to the whole practice population, has a long tradition in general practice.[16] Information technology has made it easier to maintain the necessary records. But if a practice is going to offer preventive services for asymptomatic patients it must ensure that such services are strongly supported by evidence.[17] The population perspective is also an attitude of mind, a looking beyond the individual patient with head injury, lead poisoning, or salmonella infection to other people at risk from the same health hazards.

Community oriented primary care takes this perspective a step further through systematically identifying health problems in the community, modifying practice procedures, and monitoring the impact of changes.[18–20] Such care is said to require a new kind of hybrid practitioner with competencies in primary care, prevention, epidemiology, ethics, and behavioural science. These roles may be conflicting, competing for time and resources and causing tension in individual practitioners and practices. For the practitioner, community oriented primary care could usurp essential clinical skills. However, the principles of such care can be applied in other ways, such as by collaboration between all practices in a community or geographical locality for purposes such as deputising arrangements, hospital discharge planning, or shared care schemes. A group of community practices could also collaborate with a health unit or social agency to address problems such as homelessness, child poverty, and malnutrition. The Divisions of General Practice in Australia are moving in this direction.[21] In Britain, general practitioners are, increasingly, working together in locality groups, rather than as individual fundholders. They commission (and sometimes purchase) the secondary care for their communities, based on local epidemiology and needs assessment. New legislation will oblige all general practitioners, from 1999, to work together in large primary care groups. These will work with health authorities and local authorities to commission all health care.

The human scale

General practice has traditionally been carried on in small units located close to the homes of patients. Primary care should continue this tradition, continuing to be accessible to patients and avoiding the anonymity and intimidating atmosphere that tends to go with larger institutions. Embedding the practice in the community that it serves helps the staff to form links with the community and to learn about its resources.

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Endpiece

Long term influence of diet in pregnancy

When George Abbot's Mother was with Child of him, she did long for a Jack or Pike, and she dreamt that if she did Eat a Jack, her Son in her Belly should be a *great Man.* Next morning, goeing with her Payle to the River-side, a good Jack accidentally came into her Payle. She took up the desired Banquet, dress'd it and devour'd it almost all herself, or very neare. The child was bred up a scholar in the Town, and by degrees, came to be Arch-Bishop of Canterbury.

John Aubrey (1626–97), *Brief Lives,* on George Abbott (1562–1633)