CHAPTER 8

HOME-BASED REHABILITATION RANDOMISED CONTROLLED TRIAL

8.1 Introduction

In Australia, rehabilitation of older persons following conditions such as hip fracture, joint replacement and stroke usually occurs in hospital. However, in many countries most, if not all, rehabilitation is carried out in the community. This is particularly the case in developing countries with guidelines for community-based rehabilitation published by the World Health Organisation [129]. In Canadian rural communities, multidisciplinary rehabilitation consultation services provided on an outreach basis are associated with a high level of consumer satisfaction [130]. An alternative view is offered by a Cochrane review of Hospital in the Home (2000), regarding avoidance of admission following stroke. This review concluded that there was no evidence to support a home hospitalisation program as a substitute for hospital care [74]. In Australia, some hospitals have successfully initiated home-based programs, e.g. Julia Farr Centre Adelaide [131] and Hornsby Ku-ring-gai Hospital in Sydney. Similarly, the Central Sydney Area Health Service's Hospital in the Home Project successfully offered acute care in the home to older people as a pilot program [132,133]. Domiciliary rehabilitation has been reported to be safe and cost-effective in an early discharge program for proximal femoral fracture in Queensland [134]. One United Kingdom RCT has shown that outcomes at six months following home rehabilitation for older people are similar to an inpatient program [98].

Early supported discharge home-based programs for rehabilitation of stroke patients have potential for reducing the length of hospital stay [135]. Patients who participate in these programs may benefit by receiving rehabilitation that is tailored to their own goals and undertaken in their own environment. It is anticipated that this approach may also further enhance the patients' quality of life and physical function as well as reducing the cost of rehabilitation. There

may be the additional option of co-ordinated rehabilitation care being managed by the patients' own GPs.

The author developed a model of care based on the rehabilitation principles of multidisciplinary care, functional measurement, case conferencing and progressive patient care planning. The novel feature was to include the patient's GP as an active member of the multi-disciplinary team. The expected outcome was to deliver an increased period of rehabilitation in the community with a corresponding reduction of inpatient rehabilitation. The barriers between inpatient and community rehabilitation were expected to break down with a support infrastructure and rehabilitation program tailored to the individual patient's needs. Thus the patient would have the opportunity and choice to access rehabilitation as an inpatient, day hospital patient or home treatment patient. This service would be delivered as a continuum of care managed by a single team using a single medical record. Hospital-based occupational therapists and physiotherapists would be enabled to deliver treatment at home or in the hospital. Consultant rehabilitation management would be complimentary to medical management that would become the responsibility of the GP when the patient was at home.

A home-based rehabilitation (HBR) service for the lower North Shore of Sydney, based at Greenwich Hospital, was established while the author occupied the role of Director of Rehabilitation in May 1997. This new service provided an opportunity for the author to evaluate the functional outcomes of a group of home-based rehabilitation patients. This was conducted through a randomised controlled trial design. The Aged Care and Rehabilitation Medicine Department of the Royal North Shore Hospital (RNSH), the rehabilitation team at Greenwich

Hospital and lower North Shore GPs who were members of the Northern Sydney Division of General Practice agreed to collaborate in providing the support infrastructure for this program. In addition, the establishment of this service was associated with the closure of ten inpatient beds at Greenwich Hospital.

8.2 Developing the HBR service

The service, which commenced operation from Greenwich Hospital, appointed a nurse with a background in community health who acted as Case Manager and provided regular nursing care during normal working hours. Arrangements with local private nursing services were put in place where after-hours or weekend care was required. In addition, the Case Manager had the responsibility for data collection, patient recruitment and liaison with GPs and staff. Occupational therapists and physiotherapists consulted or visited regularly to supervise rehabilitation programs.

GPs were invited to register interest to participate in the program by applying for registration as Associate Medical Officers at Greenwich Hospital, thereby ensuring access to patients prior to discharge. In December 1997, the program was extended to include patients admitted to Royal North Shore Hospital whose GPs were members of the Department of General Practice of that hospital. During the course of the program, this arrangement was further amended to allow GPs the option of either pre-discharge hospital visits to eligible patients or the furnishing of information via telephone contact with the Case Manager and faxed consultation sheets. This had the effect of increasing the number of eligible GPs and patients.

The protocol developed for general practitioners was developed in consultation with members of the Division of General Practice. It was agreed that a number of criteria should be satisfied before patients were transferred to home-based care. These criteria included the following:

1) GPs to provide patient information to rehabilitation team prior to commencement of rehabilitation, by completing a patient consultation sheet documenting known factors that may influence likelihood of successful completion of rehabilitation.
2) GPs to visit patients twice weekly at home.
3) GPs to provide regular feedback to the rehabilitation team.

Members of the Division of General Practice and a steering committee (which the author chaired) developed a GP consultation sheet. This patient care summary sheet would fulfil the dual function of a hospital discharge summary and a HBR acceptance document.

Three special skills workshops were conducted for GPs registered with the service who had accepted appointment as Associate Medical Officers to Greenwich Hospital. The workshops were designed to increase knowledge in the area of stroke rehabilitation, orthopaedic rehabilitation and peripheral vascular disease including management post lower-limb amputation.

From March 1997, 58 members of the Division of General Practice registered as Associate Medical Officers at Greenwich Hospital. Between May 1997 and April 1999, 62 GPs attended 102 patients participating in the Home-Based Rehabilitation program. Of these, 52 were members of the Northern Sydney

Division of General Practice. Between May 1997 and June 1998, 35 GPs attended some or all three project meetings incorporating special skills workshops.

8.3 Aims and hypotheses of the HBR study

As previously stated, rehabilitation of older persons following conditions such as hip fracture, joint replacement or stroke usually occurs in hospital. This project sought to evaluate rehabilitation in the home as an alternative to hospital-based rehabilitation. The aim of the project was to compare home-based rehabilitation with hospital-based rehabilitation. The three areas of study were quality of life, physical function and health care costs. The project tested the hypothesis that there would be no significant difference in outcomes in these three areas between in-home versus inpatient rehabilitation.

8.4 Methods

This study was conducted concurrently at Royal North Shore Hospital (RNSH), Greenwich Hospital, and in the Lower North Shore community by the Aged Care & Rehabilitation Medicine Departments of RNSH and Greenwich Hospital over two years (1998/99). A Consort Statement is in Appendix 4. Ethics approval of the home-based rehabilitation project at RNSH was submitted in October 1997 to Northern Sydney Area Health, and the study commenced in January 1998.

Patients were selected as per the agreed inclusion criteria (Table 8.1). A baseline assessment was undertaken on referral, as per inclusion criteria numbers 1 to 3 for eligibility. These criteria stipulated that the patient was, or had been, treated at RNSH, was living in the lower North Shore region at a place other than a

Table 8.1 **Home-based rehabilitation study inclusion criteria**

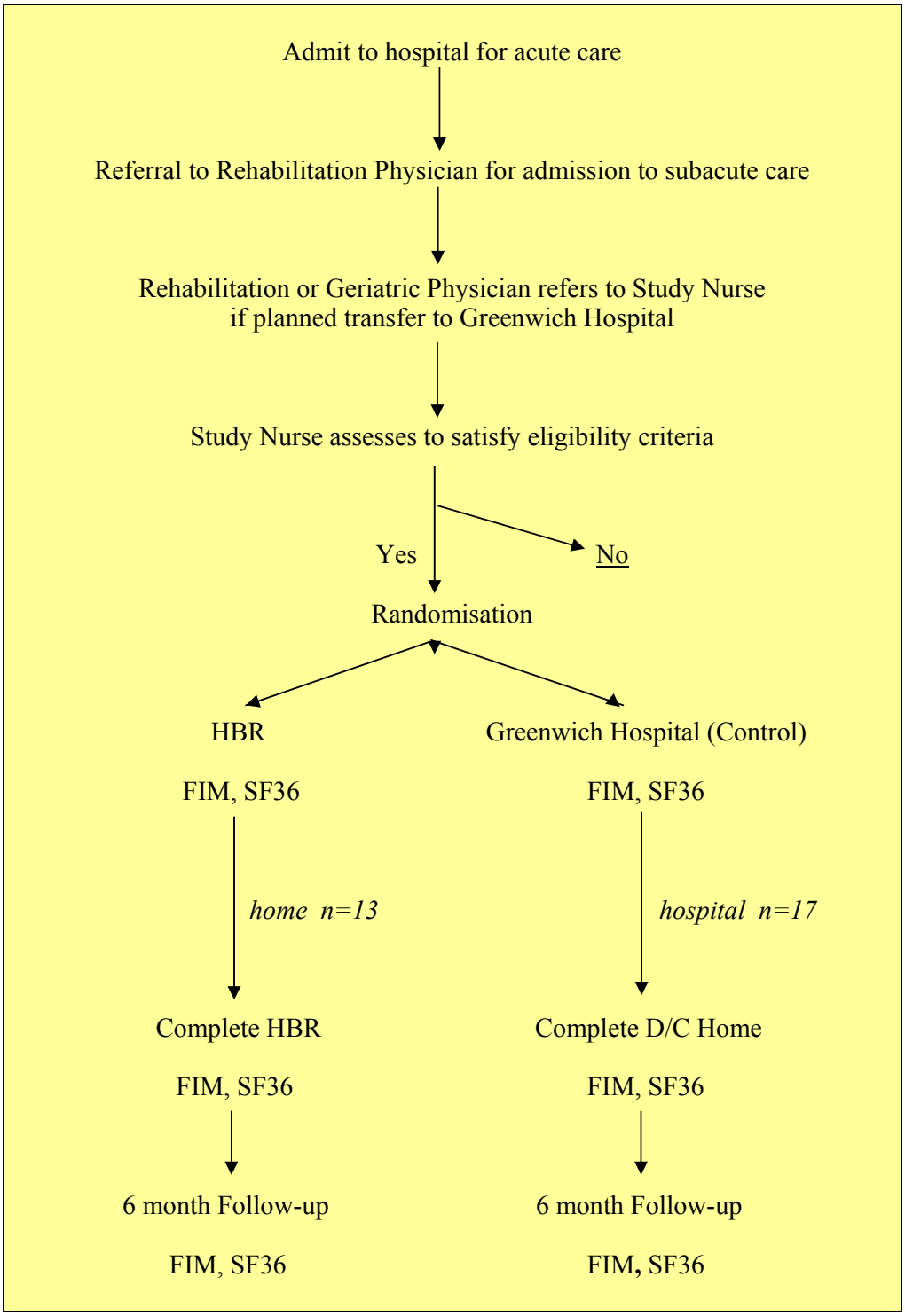
1. **Patients referred from Royal North Shore Hospital**
2. **Place of residence:**
   - Patient living in Lower North Shore (LGAs)
   - Independent living unit
   - Hostel
   - House
3. **Agreement of patient, local doctor and carer to participate in programme**
4. **Functional conditions:**
   - Toileting independently
   - Bed transfers independently
   - Mobility within the home
   - Independent in activities of daily living prior to admission
   - Self-medicating or medication supplies by carer
   - Ability to communicate
   - Co-operative and cognitively intact (usually MMSE > 24)
5. **Environmental considerations:**
   - Access to meals
   - Access to carer (in home or in close proximity)
   - Commitment of local doctor to two visits /week
   - Local doctor to communicate with team
6. **Rehabilitation goal within four weeks**

nursing home, and that the patient, carer and GP were willing to participate. A GP who was appointed as an Associate Medical Officer and appeared on the list carried by the project nurse was deemed to be willing to participate. Patients who were eligible were then assessed by the project nurse within functional, environmental and rehabilitation limits set by this study. When selected patients satisfied this baseline assessment, and had consented, they were randomised for home-based rehabilitation or control (i.e. inpatient) using a sequence of randomly generated numbers (Figure 8.1).

More detailed measures of function (FIM), quality of life (SF36) and cognition (MMSE) were collected from all patients within 48 hours after allocation to the HBR or control group. Functional measures (FIM) and quality of life (SF36) were collected again at completion of rehabilitation and at six-month follow-up. A measure of cognition (MMSE) was also collected again at six-month follow-up. A glossary of outcome measures is contained within the publications and CD in Appendix 5.

Patients allocated to HBR were visited by their GP before discharge from hospital. Visiting GPs provided relevant information on a GP consultation sheet. After discharge, HBR patients were visited by the community nurse and a physiotherapist as agreed at a case conference or on a needs basis. They were also expected to be visited twice weekly by their GP. A team of hospital specialists and rehabilitation staff, including physiotherapists, occupational therapists and nursing staff managed the rehabilitation of the Control (inpatients) group at Greenwich Hospital.

Figure 8.1 **Flow Diagram of RCT**



Data were analysed to compare the mean scores for each of the outcome measures for the two independent samples. A two-tailed t test was used to determine the significance, if any, for differences in the means. Data were analysed on an intention-to-treat basis. One patient was excluded from analysis following randomisation. This patient had been referred from a hospital other than RNSH and did not fulfil the selection criteria. The overall analysis was facilitated by use of the SPSS statistical software package.

A direct comparison of costs of the two patient groups' rehabilitation was performed for home-based versus hospital rehabilitation. Daily (*per diem*) costs for inpatient rehabilitation beds and acute beds were available through personal communication with health-service finance managers. The use of average daily bed costs and Medicare item numbers was used to establish a crude costing for inpatient and non-admitted components of care.

8.5 Results of HBR randomised controlled trial

Thirty patients were recruited, with 13 in the HBR group, and 17 in the Control group. All measurements occurred on the full sample at recruitment.

Functional data was incomplete at the end of rehabilitation (13 HBR, 16 Control) with one patient lost in the Control group. There were seven HBR and ten Control who were lost for six-month follow-up, with data available for analysis in six HBR and seven control. The MMSE exam was completed at recruitment on the full sample (13 HBR, 17 Control), and incomplete with seven HBR and ten Control lost for follow-up at six months. The SF36 was incomplete at the end of rehabilitation (11 HBR, 16 Control) with two HBR and one Control lost.

There were three males in the HBR group and six males in the Control group. The mean age of the HBR group was 77.1 years (SD 12.1) and the Control group was 74.5 (SD 9.1). There were patients in each of the five diagnostic categories for HBR and Control patients (Table 8.2).

Table 8.2 **Baseline data for RCT of home-based and hospital rehabilitation; n=30**

Item	HBR (SD); n=13	Control (SD); n=17
Age	77.1 (12.1)	74.5 (9.1)
Sex Male, n=9	3 (23%)	6 (35%)
Female, n=21	10 (77%)	11 (65%)
MMSE	27.2 (2.2)	28.2 (2.1)
Total FIM	106.6 (9.0)	106.0 (10.9)
SF36 Physical Component score	38.8 (9.8)	38.9 (10.2)
SF36 Mental Component score	44.7 (10.3)	43.0 (11.3)
Diagnosis: Stroke	1 (8%)	4 (24%)
Fractured neck of femur	4 (31%)	4 (24%)
Joint replacement	2 (15%)	3 (17%)
Other surgical /ortho	3 (23%)	4 (24%)
Other medical	3 (23%)	2 (11%)

There was no significant difference between the two groups in functional state as measured by the FIM at the commencement of rehabilitation (Table 8.3). The mean FIM motor score for the HBR was 74.2 (SD7.8) and the mean FIM motor score for the Control group was 72.7 (SD10.1). The FIM cognitive scores were also similar for the two groups. The mean score for the HBR group was 32.5 (SD2.0) and the Control group 33.1 (SD 3.1). The total mean FIM score for the HBR group was 106.6 (SD 9.0) and 106.0 (SD 10.9) for the Control group.

Table 8.3 **FIM at recruitment for home-based rehabilitation**

Functional item	HBR (SD); n=13	Control (SD); n=17	Difference in means	95% Confidence Interval	p value
Eating	6.6 (0.7)	6.9 (0.3)	-0.1	-0.6 to 0.1	0.154
Grooming	6.6 (0.5)	6.9 (0.3)	-0.3	-0.6 to 0.1	0.092
Bathing	5.4 (1.1)	5.4 (1.1)	0.0	-0.9 to 0.8	0.948
Dressing upper	6.2 (1.2)	5.9 (1.3)	0.3	-0.6 to 1.3	0.457
Dressing lower	4.8 (1.2)	5.1 (1.1)	-0.3	-1.2 to 0.5	0.399
Toileting	5.8 (1.1)	5.6 (1.2)	0.2	-0.7 to 1.0	0.773
Bladder Mgt	6.8 (0.4)	6.1 (1.5)	0.7	-0.3 to 1.6	0.150
Bowel Mgt	6.2 (0.4)	6.3 (0.8)	0.1	-0.5 to 0.4	0.793
Bed-chair w'chair transfer	5.8 (1.1)	5.8 (1.2)	0.0	-0.9 to 0.9	0.992
Toilet transfer	5.6 (1.0)	5.5 (0.9)	0.1	-0.6 to 0.8	0.808
Tub/shower transfer	5.5 (1.0)	5.4 (0.8)	0.1	-0.5 to 0.8	0.697
Walk/w'chair locomotion	5.5 (0.9)	5.0 (1.5)	0.5	-0.4 to 1.5	0.260
Stairs locomotion	3.3 (1.9)	2.8 (1.7)	0.5	-0.8 to 1.9	0.418
Comprehension	6.5 (0.5)	7.0 (0.0)	-0.5	-0.8 to -0.3	0.001
Expression	6.7 (0.5)	6.9 (0.5)	-0.2	-0.6 to 0.2	0.295
Social interaction.	6.5 (0.8)	6.6 (0.7)	-0.1	-0.7 to 0.4	0.499
Problem solving	6.4 (0.7)	6.2 (1.3)	0.2	-0.7 to 1.0	0.708
Memory	6.5 (0.5)	6.5 (1.1)	0.0	-0.7 to 0.6	0.835
Motor sum	74.2 (7.8)	72.7 (10.1)	1.5	-5.5 to 8.4	0.671
Cognitive sum	32.5 (2.0)	33.1 (3.1)	-0.4	-2.8 to 1.2	0.408
TOTAL	**106.6 (9.0)**	**106.0 (10.9)**	**0.6**	**-7.1 to 8.1**	**0.871**

Quality of life

The SF36 health survey was performed at recruitment (Table 8.6) and showed no significant differences between the HBR and Control samples for sub-unit or component scores.

FIM outcomes

The mean total FIM score at completion of rehabilitation for the HBR group was 119.8 (SD 3.4) which was significantly higher by 4.1 points than the mean FIM of 115.7 (SD 6.5) for the Control group (p=0.038, 95% C.I. 0.3 to 7.9). The sub-units of the FIM score demonstrated that the mean motor score for HBR of 86.1 (SD 2.2) was higher by 3.3 points than the Control group mean score of 82.8 (SD 4.9) which was statistically significant (p=0.023, 95% C.I.0.5 to 6.1). The sub-units are detailed in Table 8.4. The bathing sub-unit was the only one significantly higher in the HBR group.

The sample size at six months follow-up was small (HBR 6, Control 7) and very little inference can be gained from these data (Table 8.5). There was no significant difference in motor, cognitive or total FIM score at the 6-month follow-up review.

Table 8.4 **FIM at completion of rehabilitation**

Item	HBR (SD); N=11	Control (SD); n=16	Mean Difference	95% Conf. Interval	p value
Eating	7.0 (0.0)	6.9 (0.3)	0.1	-0.1 to 0.2	0.333
Grooming	7.0 (0.0)	6.8 (0.5)	0.2	-0.1 to 0.5	0.188
Bathing	6.6 (0.5)	5.9 (1.0)	0.7	0.1 to 1.3	0.025
Dressing upper	7.0 (0.0)	6.8 (0.6)	0.2	-0.1 to 0.6	0.104
Dressing lower	6.5 (0.5)	5.8 (1.3)	0.7	-0.0 to 1.5	0.052
Toileting	6.6 (0.5)	6.7 (0.6)	-0.1	-0.5 to 0.4	0.826
Bladder Mgt	6.9 (0.3)	6.8 (0.5)	0.1	-0.2 to 0.4	0.458
Bowel Mgt	6.9 (0.4)	6.6 (0.5)	0.3	-0.1 to 0.6	0.154
Bed,chair w'chair tranfer	6.9 (0.4)	6.8 (0.6)	0.1	-0.2 to 0.5	0.543
Toilet transfer	6.5 (0.5)	6.3 (0.6)	0.2	-0.2 to 0.7	0.222
Tub/shower transfer	6.6 (0.5)	6.2 (0.7)	0.4	-0.1 to 0.8	0.083
Walk/w'chair locomotion	6.1 (0.3)	5.9 (0.3)	0.2	-0.1 to 0.4	0.089
Stairs locomotion	5.6 (0.7)	5.5 (0.6)	0.1	-0.4 to 0.7	0.579
Comprehension	7.0 (0.0)	6.6 (0.5)	0.4	0.1 to 0.6	0.009
Expression	6.9 (0.5)	6.8 (0.4)	0.1	-0.3 to 0.4	0.801
Social interaction.	6.8 (0.6)	6.5 (0.7)	0.3	-0.2 to 0.8	0.243
Problem solving	6.4 (1.2)	6.4 (0.8)	0.0	-0.7 to 0.8	0.886
Memory	6.6 (1.1)	6.6 (0.6)	0.0	-0.7 to 0.7	0.979
Motor sum	86.1 (2.2)	82.8 (4.9)	3.3	0.5 to 6.1	0.023
Cognitive sum	33.6 (2.7)	32.9 (2.3)	0.7	-1.2 to 2.7	0.419
TOTAL	**119.8 (3.4)**	**115.7 (6.5)**	**4.1**	**0.3 to 7.9**	**0.038**

Table 8.5 **FIM at six-month follow-up**

Item	HBR (SD); n=6	Control (SD); n=7	Mean Difference	95% Conf. Interval	p value
Eating	7.0 (0.0)	6.9 (0.4)	0.1	-0.2 to 0.5	0.356
Grooming	7.0 (0.0)	7.0 (0.0)	0.0	N/a	N/a
Bathing	6.8 (0.4)	6.6 (0.79)	0.2	-0.5 to 1.0	0.461
Dressing upper	7.0 (0.0)	6.7 (0.8)	0.3	-0.4 to 1.0	0.356
Dressing lower	6.8 (0.4)	6.4 (1.0)	0.4	-0.5 to 1.0	0.346
Toileting	7.0 (0.0)	6.9 (0.4)	0.1	-0.2 to 0.5	0.356
Bladder Mgt	6.7 (0.5)	6.9 (0.4)	-0.2	-0.8 to 0.4	0.473
Bowel Mgt	7.0 (0.0)	6.7 (0.5)	0.3	-0.2 to 0.7	0.172
Bed, chair w'chair transfer	6.8 (0.4)	6.9 (0.38)	-0.1	-0.5 to0.46	0.916
Toilet transfer	6.8 (0.4)	6.6 (0.5)	0.2	-0.3 to 0.8	0.339
Tub/shower transfer	6.5 (0.6)	6.1 (0.7)	0.4	-0.4 to 1.1	0.321
Walk/w'chair locomotion	6.7 (0.5)	6.4 (0.5)	0.3	-0.4 to 0.9	0.432
Stairs locomotion	6.2 (1.6)	5.6 (2.2)	0.6	-1.7 to 2.9	0.580
Comprehension	7.0 (0.0)	7.0 (0.0)	0.0	N/a	N/a
Expression	7.0 (0.0)	7.0 (0.0)	0.0	N/a	N/a
Social interaction.	7.0 (0.0)	7.0 (0.0)	0.0	N/a	N/a
Problem solving	7.0 (0.0)	7.0 (0.0)	0.0	N/a	N/a
Memory	7.0 (0.0)	7.0 (0.0)	0.0	N/a	N/a
Motor sum	88.3 (3.4)	85.6 (4.3)	2.7	-2.0 to 7.5	0.226
Cognitive sum	35.0 (0.0)	35.0 (0.0)	0.0	N/a	N/a
TOTAL	**123.3 (3.4)**	**120.6 (4.3)**	**2.7**	**-2.0 to 7.5**	**0.226**

Table 8.6 **SF36 at Recruitment**

Item	HBR (SD); n=13	Control (SD); n=17	Mean Difference	95% Confidence Interval	p value
Physical Function	36.1(12.1)	38.0(11.0)	-2.1	-10.5 to 6.8	0.670
Role-Physical	22.2(5.1)	22.6(4.9)	-0.4	-4.1 to 3.4	0.839
Bodily Pain	45.5(11.1)	46.3(12.7)	-0.2	-10.0 to 8.3	0.848
General Health	51.3(12.1)	47.2(7.7)	3.1	-3.3 to 11.6	0.260
Vitality	53.5(9.2)	51.5(12.0)	2.0	-6.2 to 10.2	0.624
Social Function	46.4(14.0)	44.0(12.3)	2.4	-7.5 to 12.2	0.630
Role-Emotional	17.3(5.1)	17.2(5.2)	0.1	-3.8 to 4.0	0.971
Mental Health	54.1(12.9)	54.0(12.8)	0.1	-9.6 to 9.9	0.977
Physical Component Score	38.8(9.8)	38.9(10.2)	-0.1	-7.7 to 7.4	0.970
Mental Component Score	44.7(10.3)	43.0(11.3)	1.7	-6.5 to 9.9	0.935

The results at the completion of rehabilitation suggest differences in SF36 scores, with increased scores in the Control group (Table 8.7). The Physical Function score was 26.8 (SD 7.2) in the home-based group, with a higher score in the Control group of 31.8 (SD 8.3) which was not statistically significant. Physical Role recorded a low score of 17.7 (SD 0.0) in the HBR group compared to 21.7 (SD 4.4) in the Control group which was statistically significant (p=0.004 95% CI 1.5 to 6.5). The overall physical component score in the home-based group was 31.8 (SD 6.2) which was lower though not significantly different from the Control group with a score of 36.6 (SD 7.6).

Table 8.7 **SF36 at completion of rehabilitation**

Item	HBR (SD); n=13	Control (SD); n=14	Mean Difference	95% Conf. Interval	p value
Physical Function	26.8 (7.2)	31.8 (8.3)	-5.0	-11.2 to 1.1	0.104
Role-Physical	17.7 (0.0)	21.7 (4.4)	-4.0	-6.5 to 1.5	0.004
Bodily Pain	43.1 (9.0)	48.7 (10.2)	-5.6	-13.3 to 1.9	0.136
General Health	44.7 (9.4)	48.9 (9.6)	-4.2	-11.8 to 3.3	0.259
Vitality	44.6 (9.2)	55.0 (9.0)	-10.4	-17.6 to -3.1	0.007
Social Function	32.9 (8.5)	47.9 (9.0)	-15.0	-21.9 to -8.0	<0.001
Role-Emotional	12.8 (4.9)	19.0 (3.7)	-6.2	-9.6 to -2.7	0.001
Mental Health	52.6 (10.5)	55.0 (10.0)	-2.4	-10.6 to 5.7	0.545
Physical Component Score	31.8 (6.2)	36.6 (7.6)	-4.8	-10.3 to 0.6	0.078
Mental Component Score	39.4 (8.1)	47.4 (7.0)	-8.0	-14.1 to -2.0	0.011

At the completion of rehabilitation, the home-based group had a mental component score of 39.4 (SD 8.1) which was significantly lower than the Control group which had a score of 47.4 (SD 7.0), (p=0.011 95% CI 2.0 to 14.1.). The sub-units, which contributed to the mental component score and demonstrated significantly lower scores were: Vitality (p=0.007), Social Function (p<0.001) and Emotional Role (p=0.001).

There were only a small number of patients followed up within the home-based group and seven in the Control group. This small sample makes any conclusions

questionable. The two groups were very similar with no significant differences in either the component scores or sub-units of the SF36 survey (Table 8.8).

Table 8.8 **SF36 at six-month follow-up**

Item	HBR (SD); n = 6	Control (SD); n = 7	Mean Difference	95% Conf. Interval	p value
Physical Function	25.4 (3.9)	23.3 (4.4)	2.1	-2.9 to 7.3	0.371
Role-Physical	47.8 (11.7)	40.4 (14.2)	7.4	-8.4 to 23.3	0.324
Bodily Pain	47.8 (14.7)	39.6 (13.7)	8.2	-9.4 to 25.8	0.326
General Health	54.2 (15.3)	43.2 (13.5)	11.0	-6.9 to 28.9	0.202
Vitality	53.2 (17.1)	36.6 (14.7)	16.6	-3.3 to 36.5	0.092
Social Function	20.9 (0.0)	19.2 (4.4)	1.7	-2.4 to 5.7	0.356
Role-Emotional	64.6 (3.7)	59.7 (11.1)	4.9	-5.5 to 15.3	0.308
Mental Health	40.5 (15.8)	34.2 (14.9)	6.3	-12.6 to25.3	0.474
Physical Component Score	38.6 (13.6)	31.9 (14.4)	6.7	-10.5 to23.8	0.412
Mental Component Score	51.7 (9.9)	44.2 (10.9)	7.5	-5.1 to 20.3	0.216

Resource utilisation

The length of stay data indicated some differences between the two samples of patients (Table 8.9). The mean time in acute care prior to transfer to rehabilitation was longer for the HBR group by 5.4 days. This was 15.8 days (SD 10.7) in the HBR group, but not significantly greater than the Control group with 10.4 days (SD 6.4). This difference in acute length of stay would have been

beyond the control of the rehabilitation team although still forms part of the total episode of care.

The intervention did not affect the period of inpatient subacute rehabilitation for the HBR group. The HBR group length of stay was 17.5 days (SD 15.1) which was not significantly different from the Control group's length of stay of 15.9 days (SD 0.9). In fact, when the HBR community care period of 19.5 days (SD 9.6) was added to inpatient subacute care of 17.5 days (SD 15.1), then the combined period of HBR care was 37.0 days (SD 20.3), significantly higher than the period for the Control group of 15.9 days (SD 9.0), (p=0.001, 95% CI 9.8 to 32.3). This difference cannot be accounted for by interruptions to rehabilitation. These interruption days, where one or more patients were readmitted to acute care, were 1.0 days (SD 3.6) for the HBR group and 1.8 days (SD 7.5) for the Control group. They were not significantly different.

Table 8.9 **Length of stay for sub-units of care**

Average length of stay	HBR (SD); n=13	Control (SD); n=17	Mean diff	95% Conf. Interval	p value
Acute Bed (acute)	15.8 (10.7)	10.4 (6.0)	5.4	-1.0 to 11.7	0.093
Rehab (sub acute)	17.5 (15.1)	15.9 (9.0)	1.6	-7.5 to 10.6	0.733
Interrupted Rehab (acute)	1.0 (3.6)	1.8 (7.5)	0.8	-5.5 to 3.8	0.719
Days on HBR (community)	19.5 (9.6)	N/a	N/a	N/a	N/a
Combined HBR (community) and Control Rehab (sub acute)	37.0 (20.3)	15.9 (9.0)	19.6	9.8 to 32.3	0.001

A crude estimate of resource utilisation has been performed using average bed day costs for acute care @ $550 per day, and sub-acute rehabilitation bed day costs @ $255 per bed day. This was based on a quote from personal communication with an area health service finance source in 2004. The cost of community care or home-based rehabilitation has been estimated using a nurse home visit at the same rate as an allied health visit. An allied health home visit is $52.85 as per the Medicare schedule fee (1 Nov 2004), item numbers 10960 to 10970. The Medicare schedule fee has also been applied to GP and specialist home and hospital visits for the same year with appropriate item numbers. All medical and allied health interventions are listed in Table 8.10. Costs attributed to those items which are additional to hospital care only are marked with an asterisk (Tables 8.10 and 8.11).

Table 8.10 Human resource input for Home-Based Rehabilitation; (n=13)

Item	Mean number of services per patient	S.D.
Day therapy	0.00	0.00
GP hospital visit*	0.62	0.51
GP home visit*	3.62	1.80
Specialist hospital visit*	2.08	1.32
Specialist home visit*	0.15	0.38
Registrar attend	2.15	3.21
Case conference*	3.69	1.32
Nurse hospital visit	15.23	11.59
Nurse home visit*	6.54	3.20
Physio hospital visit	3.38	3.04
Physio home visit*	6.31	4.85
Occupational therapist hospital	2.62	1.71
Occupational therapist home*	0.85	2.51
Social work hospital	1.77	1.69
Social work home*	0.38	0.65
Other hospital	1.77	1.36

* These items are attributed to home-based rehabilitation.

Table 8.12 and Figure 8.2 display costs for the two groups. The costing follows closely the length of stay which in itself is a guide to resource utilization. The mean bed cost per HBR patient of $4453 (SD $3851) was not significantly different from the Control mean bed cost of $4065 (SD $2287). The additional cost for the community component of care for the HBR group was $1547 (SD $580). This resulted in a combined cost for the HBR group for all attributed sub-units of the total episode of care (acute, subacute and community) of $15094 (SD $5259). This combined cost was significantly greater by $4299 than the Control group with a combined cost of $10794 (SD $4513), (p=0.023, 95% CI $533 to $8066).

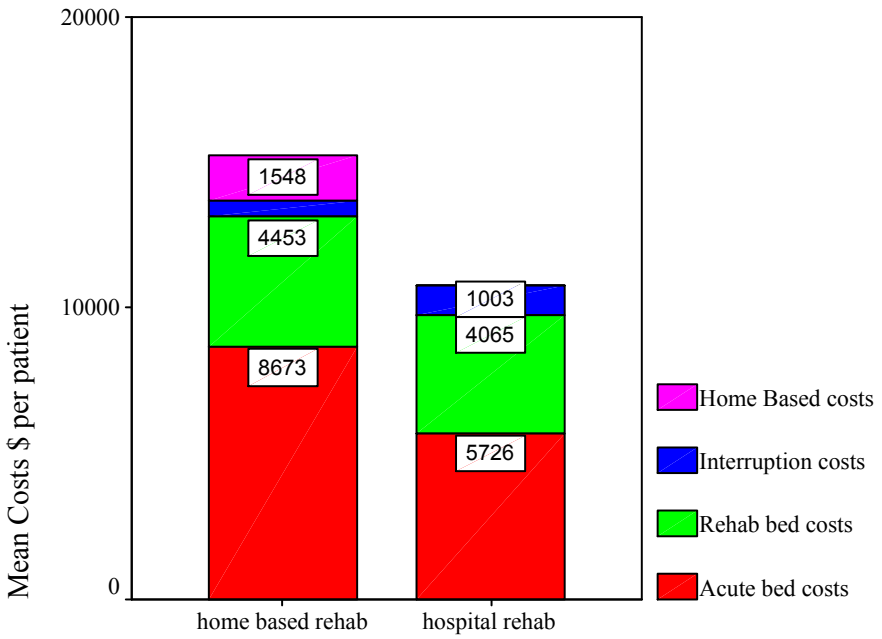
Table 8.11 **Home-based care costs**

Item	Mean number of services	SD	Cost	SD
Total GP Home visit*, item 59	4.2	2.2	$121	$60
Total GP Home Visit*, item 89			$21	$17
Total specialist*, item 110	2.2	1.5	$106	$47
Total specialist*, item 116			$87	$79
Total nurse*, items 10960-70	6.5	3.2	$365	$179
Total physio*, items 10960-70	6.3	4.9	$352	$271
Total occupational therapy*, items 10960-70	0.8	2.5	$47	$140
Total social work*, items 10960-70	0.4	0.7	$21	$36
Case Conference*, item 820	3.7	1.3	$427	$152
Total $ costs			**$1547**	$580

Table 8.12 **Costs $ per patient episode of care**

Episode Costs $	HBR (SD); n=13	Control (SD); n=17	Mean Difference	95% Conf. Interval	p value
Interruption acute costs	$550 (1983)	$1003 (4135)	$553	-$3007 to $2102	0.719
Rehab bed costs	$4453 (3851)	$4065 (2287)	$388	-$1919 to $2694	0.733
Acute bed costs	$8673 (5907)	$5726 (3295)	$2947	-$525 to $6418	0.093
Total HBR care costs	$1547 (580)	$0 (0)	$1547	$1197 to $1898	N/a
Total costs of HBR vs hospital rehab	$15094 (5259)	$10794 (4513)	$4299	$533 to $8066	0.023

Figure 8.2 **Costs of home-based and hospital rehabilitation**



Home Based Rehabilitation vs Hospital Costs

8.6 Discussion and conclusions

There are limitations to this study as the sample size was small. The intention was to recruit at least three to four times the number of participants who were finally recruited. Unfortunately a change in leadership within the Division of General Practice was combined with staff concerns involving a perception that patients not selected for home-based treatment would be disadvantaged. This resulted in the abandonment of the RCT. A descriptive study of all patients treated on HBR was continued, and is reported in the next chapter of this thesis.

In spite of the small sample, there were some interesting and unexpected findings. There were 58 GPs appointed as Associate Medical Officers, many of whom were willing to participate in learning the basic principles of rehabilitation of older people. They also demonstrated their ability to communicate and participate as part of a multidisciplinary team.

The two patient groups were reasonably well matched for age, sex, and diagnostic problems. There was a greater number of stroke patients treated in the Control group (n=4) than in the HBR group (n=1). Conclusions can be formed from results at the completion of rehabilitation even though there were a number of dropouts in both the HBR (n=2) and Control (n=1) groups. The six-month follow-up sample was small, and no reliable inferences can be drawn from these data.

The lengths of stay for both groups, HBR and Control, were similar for sub-acute inpatient care. This study has demonstrated that substitution of HBR for sub-acute hospital care failed in the model developed. The resource implications are that HBR was an additional cost to hospital rehabilitation and significantly

($p<0.001$) increased costs by about one-third for the rehabilitation component of care. This was partly due to the increased length of acute stay, although there was no indication from the functional scores that the HBR and Control groups were different when commencing rehabilitation. This also supports the observation that HBR developed as an "add on" to existing care.

There were only two patients who satisfied the criteria for entry to HBR while in an acute hospital bed. Both of these patients stayed 12 days from the date of assessment to the date of commencement of HBR. These delays were entirely due to failure of attendance by the patient's GP. In one case, it transpired that the patient's GP was on leave and the locum was not prepared to visit the hospital. In the other case, a delay of 12 days occurred for no apparent reason. There was also delay for the remaining 11 HBR patients when two GPs failed to visit and one GP took 12 days to respond. The remaining patients had a GP visit on the same day (n= 5) or next day (n=3). The non-attending GPs' patients were still accepted onto the program if the GP agreed to treatment by phone. Discussion with the project nurse suggested that GPs with sessional work in group practices or medical centres may have experienced a problem in relation to their ability to provide timely visits or response.

The functional data at the completion of rehabilitation demonstrated a significantly better score in the HBR group when compared to the Control group ($p=0.038$). This was almost entirely due to a significant improvement in the FIM motor score ($p=0.023$). There was only an insignificant improvement in the FIM cognitive score. This suggests that there may be a better improvement of motor skills for patients treated in their own environment. It could also mean that motor skills continue to improve in all patients following discharge from hospital.

The significantly poorer mental component score on the SF36 scale (p=0.011) suggests that the support networks provided by HBR are not as good as that provided in hospital care. It may also indicate that many patients have a decrease in Mental Component Score and mood after discharge from the supportive hospital environment. This study did not test on discharge factors such as the patients' own realisation of long-term disability or loneliness on discharge. It may be that older people after a period of supportive care enjoy being in hospital.

The overall outcome has demonstrated that HBR successfully provided an extra period of rehabilitation in the home with a multidisciplinary team including the patient's own GP in most cases. The period of HBR demonstrated improvements of motor function using the FIM score. The patients' Mental Component Score was worse at the completion of rehabilitation than patients treated in hospital. This home-based rehabilitation was provided in addition to traditional inpatient subacute rehabilitation with no reduction in average length of stay. It was also associated with increased costs for this additional care.