University of Groningen

Domiciliary therapy during inpatient rehabilitation treatment for patients with an acquired brain injury

Boonstra, AM; Spikman, JM; Wijbrandi, Wilma

Published in:
International Journal of Rehabilitation Research

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2005

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Boonstra, AM., Spikman, JM., & Wijbrandi, W. (2005). Domiciliary therapy during inpatient rehabilitation treatment for patients with an acquired brain injury: A preliminary study. *International Journal of Rehabilitation Research*, 28(3), 211-218.

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

Domiciliary therapy during inpatient rehabilitation treatment for patients with an acquired brain injury: a preliminary study

Anne M. Boonstra¹, Wilma Wijbrandi¹ and Jacoba M. Spikman^{1,2}

The objective was to assess the feasibility of additional domiciliary treatment for patients with an acquired brain injury while they are still inpatients at a rehabilitation centre. This cohort study included 22 patients with an acquired brain injury (mainly stroke) and with moderate to severe neuropsychological deficits. After two observational home visits for goal setting to determine the aim of the treatment, domiciliary treatment was given once a week in addition to the therapy at the rehabilitation centre. The number of home visits depended on the time interval between admission and time of inclusion in the study. The main outcome measures were (1) a semi-structured interview with patients and partners or children, (2) a questionnaire filled in by the attending therapist(s) before and after each therapeutic home visit and (3) the functional level of the patient. All but one of the patients and all partners and therapists were satisfied with the domiciliary treatment. Most of the main goals were attained during the treatment. The main goals during the domiciliary treatment were in the domains of domestic activities and leisure. A 90–120 min duration of the treatment sessions seems most feasible. It was concluded that domiciliary treatment for inpatients is feasible and seems useful for patients with moderate to severe cognitive impairments.

Ziel der Studie war die Beurteilung der Durchführbarkeit einer zusätzlichen Hausbehandlung für Patienten mit erworbenem Gehirntrauma während ihres stationären Aufenthaltes in einer Reha-Klinik. Diese Kohortenstudie umfasste 22 Patienten mit erworbenem Gehirntrauma (vorwiegend Hirnschlag) und mit mäßigen bis schweren neuropsychologischen Ausfällen. Nach zwei Heimbisuchen zwecks Beobachtung und Festlegung des Behandlungsziels fand einmal pro Woche eine Hausbehandlung begleitend zur Therapie in der Reha-Klinik statt. Die Zahl der Hausbesuche war abhängig vom zeitlichen Abstand zwischen der stationären Aufnahme und dem Zeitpunkt des Studieneinschlusses. Die wichtigsten Resultate waren (1) ein teilstrukturiertes Interview mit Patienten und Partnern oder Kindern, (2) ein Fragebogen, der von dem/ den anwesenden Therapeut(en) vor und nach jeder therapeutischen Heimbehandlung ausgefüllt wurde, und (3) die Funktionen des Patienten. Mit Ausnahme von einem Patienten waren alle Patienten sowie alle Partner und Therapeuten mit der Hausbehandlung zufrieden. Im Behandlungsverlauf wurden die meisten Hauptziele erreicht. Die Hausbehandlung zielte primär auf Bereiche wie Haushaltstätigkeiten und Freizeitaktivitäten ab. Eine 90–120minütige Behandlungsdauer schien besonders gut realisierbar. Daraus ließ sich folgern, dass eine Hausbe-

handlung für stationär behandelte Patienten nicht nur möglich ist, sondern für Patienten mit mäßigen bis schweren kognitiven Schäden auch nützlich scheint.

El objetivo fue evaluar si es viable o no realizar tratamiento domiciliario adicional a pacientes con daño cerebral adquirido que aún se encuentran hospitalizados en un centro de rehabilitación. Este estudio de cohorte incluyó a 22 pacientes con daño cerebral adquirido (principalmente por derrame cerebral) y con déficit neuropsicológico moderado o severo. Después de dos sesiones experimentales destinadas a establecer los objetivos del tratamiento, se llevó a cabo el tratamiento domiciliario una vez a la semana, como complemento de la terapia recibida en el centro de rehabilitación. El número de sesiones de tratamiento domiciliario dependió del intervalo de tiempo transcurrido entre el ingreso y el momento de inclusión en el estudio. Las principales medidas de los resultados fueron 1) una entrevista semiestructurada a los pacientes y a sus parejas o a sus hijos, 2) un cuestionario que llenaba el terapeuta (o los terapeutas) encargado(s) de realizar el tratamiento domiciliario, antes y después de cada sesión, y 3) el grado de funcionalidad del paciente. Todos los pacientes, excepto uno, y todas las parejas de los mismos y los terapeutas quedaron satisfechos con el tratamiento domiciliario. Durante las sesiones de tratamiento se cumplieron la mayoría de los objetivos. Los principales objetivos del tratamiento domiciliario estuvieron relacionados con las esferas de las actividades domésticas y las recreativas. Parecen ser que las sesiones de tratamiento de entre 90 y 120 minutos de duración son las más factibles. Se llegó a la conclusión de que el tratamiento domiciliario a pacientes ingresados es viable y que parece ser de utilidad para pacientes con alteraciones cognitivas moderada o severa.

L'objectif était d'évaluer la faisabilité d'un traitement complémentaire à domicile pour les patients souffrant de lésions cérébrales acquises alors qu'ils sont encore patients en ambulatoire dans un centre de rééducation. Cette étude portait sur 22 patients souffrant de lésions cérébrales acquises (principalement suite à des accidents vasculaires) et présentant des déficiences neuropsychologiques modérées à sévères. Après deux visites d'observation à domicile en vue de définir les objectifs du traitement, le traitement a été administré à domicile une fois par semaine en complément des séances au centre de rééducation. Le nombre de visites à domicile dépendait du délai entre l'admission au centre et la participation à l'étude. Les principales mesures adoptées étaient (1) un

entretien semi-structuré avec les patients et leurs conjoints ou enfants, (2) un questionnaire rempli par le thérapeute participant avant et après chaque visite à domicile et (3) le niveau fonctionnel du patient. Tous les patients, à l'exception d'un seul, tous les conjoints et tous les thérapeutes se sont déclarés satisfaits du traitement à domicile. La plupart des objectifs fixés ont été atteints pendant le traitement. Les principaux objectifs du traitement à domicile portaient sur les activités domestiques et de loisir. Des séances de durée 90–120 min semblent les mieux adaptées. Il a été conclu que le traitement à domicile pour les patients en ambulatoire constituait une option réalisable et qui paraît utile pour les patients souffrant de difficultés cognitives modérées à sévères. *International Journal of Rehabilitation Research* 28:211–218 © 2005 Lippincott Williams & Wilkins.

Introduction

Acquired brain injury (ABI), such as stroke and traumatic brain injury, may have severe and long-lasting physical, cognitive, emotional and social consequences for patients and their families. Some of the patients who survive an ABI receive multidisciplinary rehabilitation treatment to restore their functioning and activities of daily living (ADL). Depending on the level of physical and cognitive functioning, admission to a rehabilitation centre is necessary for a proportion of these patients to get adequate treatment and care.

Many patients with ABI have neuropsychological deficits (Hochstenbach *et al.*, 1998; Spikman *et al.*, 2000). Some of these patients, especially those with executive and memory deficits (Berg *et al.*, 2000; Fasotti and Spikman, 2002), can be expected to have specific difficulties transferring the skills they have learned from one setting to another. If all training occurs in a clinical setting, the home situation will remain unfamiliar to the patient and the new skills acquired at the rehabilitation centre may be difficult to transfer to the home environment. Therefore, some clinicians have postulated that therapeutic interventions should be provided in the home situation. Home-based rehabilitation has been proposed to address these problems and recent trials indicate that interventions involving occupational therapy or physiotherapy at home or an early discharge home are feasible and possibly effective (Forster and Young, 1992; Rodgers *et al.*, 1997; Gilbertson *et al.*, 2000; Indredavik *et al.*, 2000). However, other authors (Gladman *et al.*, 1993; Rudd *et al.*, 1997; Widén Holmqvist *et al.*, 1998; Anderson *et al.*, 2000; Mayo *et al.*, 2000; Özdemir *et al.*, 2001; Askim *et al.*, 2004; Lincoln *et al.*, 2004) found no overall differences between domiciliary treatment and hospital-based services, nor benefits from early discharge. One possible cause of this difference may be that only certain subgroups benefit from domiciliary treatment (Gladman *et al.*, 1993; Indredavik *et al.*, 2000; Disler and Wade, 2003).

International Journal of Rehabilitation Research 2005, 28:211–218

Keywords: acquired brain injury, stroke, rehabilitation, domiciliary therapy, cohort study

¹Revalidatie Friesland Rehabilitation Centre, Beetsterzwaag and ²Department of Neuropsychology, Groningen University Hospital, The Netherlands.

The study was supported by 'De Friesland' health insurers.

Correspondence and requests for reprints to Anne M. Boonstra, Revalidatie Friesland, PO Box 2, NL-9244 ZN Beetsterzwaag, The Netherlands.
Tel: +31 512389329; fax: +31 512389244;
e-mail: annemarijke.boonstra@revalidatie-friesland.nl

Received 4 November 2004 Accepted 27 January 2005

For many patients with ABI, the sequelae of the ABI are such that discharge to the home situation is not feasible or safe and inpatient rehabilitation with 24 h care is required. We assumed that it is particularly the subgroup of patients with moderate to severe neuropsychological deficits who are still in an inpatient setting who may benefit from domiciliary therapy. It is particularly in this subgroup that difficulty in transferring learned abilities from the inpatient setting to home may hamper further rehabilitation and safe functioning at home.

Before conducting a clinical trial to test this assumption, we first wanted to investigate whether additional domiciliary therapy for patients still resident in a clinical setting is feasible and why domiciliary therapy may or may not be useful. According to Ballinger *et al.* (1999), the content of a therapy needs to be understood before outcomes can be truly interpreted and properly measured.

The present study aimed to assess the feasibility of domiciliary treatment, additional to conventional therapy, for patients with an ABI who are still inpatients of a rehabilitation centre; to examine the goal-setting process during the therapy; to assess the level of satisfaction with the programme among the patients; and to identify factors affecting the usefulness of the programme, if usefulness should be demonstrated. A cohort study design was chosen for this purpose.

Methods

Setting

The 'Revalidatie Friesland' Rehabilitation Centre is a regional centre catering for a mixed urban and rural area of approximately 3400 km² with approximately 640 000 inhabitants.

Patients

Patients admitted to the 'Revalidatie Friesland' Rehabilitation Centre between March 2001 and September

2003 because of an ABI with moderate to severe neuropsychological deficits were included in the study if they were able to make the transfer to a common car. Excluded were patients younger than 18 years, those with ABI due to brain tumour or a progressive illness such as multiple sclerosis and those with severe co-morbidity greatly influencing function and activities. Twenty-two patients were included. Informed consent was obtained from all patients. None of the patients who were asked to participate refused. The local medical ethics committee evaluated the study protocol and approved the study.

Domiciliary therapy

After admission to the rehabilitation centre, patients entered the regular therapy scheme with physiotherapy, occupational therapy, consultations with a social worker and, if indicated, speech therapy. In addition, they received regular nursing care. Physical therapy was given according to the Bobath principles. After patients had been included in the study, which could be at any time during their inpatient rehabilitation, they continued inpatient treatment. In addition to the conventional therapy, a therapist took each patient with them in the car for a home visit once a week. After a home visit, the patient returned to the rehabilitation centre with the therapist. The home visit programme started with two observational visits to inspect the situation and observe the patient's performance at home and to set goals. The observational home visits were done by the occupational therapists, mostly together with the cognitive therapist. After these first observational visits, the home-based therapy started. Further home visits were made with various therapists of the multidisciplinary team, depending on the goal(s) to be attained. The patient's partner or one of their children was encouraged to be present during the home visits.

The frequency of the therapeutic home visits was once a week, sometimes less if circumstances prevented a visit. The standard duration of each home visit was set at 2 h, but this could be shortened or lengthened by the therapist if needed, depending on the patient's mental or physical fatigability or the time required to practise a particular activity. Patients were discharged home within 2 weeks after their last home visit.

Assessments

Patient characteristics

Demographic characteristics of the patients (age, sex and marital status) were recorded. Data on the etiopathogenesis of the ABI, the onset date and the time interval until rehabilitation were inferred from medical records. These characteristics are listed in Table 1.

During the initial period, a neuropsychologist performed a neuropsychological examination. Detailed information

Table 1 Characteristics of the 22 patients included

	Median	Inter-quartile range
Age (years)	58	48–70
Time from onset to admission ^a (days)	30	18–55
Time between admission and discharge (days)	151	100–192
	<i>n</i>	
Sex (men/women)	8/14	
Diagnosis		
Stroke (infarction)	12	
Stroke (haemorrhage)	4	
Postanoxic encephalopathy	4	
Traumatic brain injury	1	
Encephalitis	1	
Partner (yes/no)	19/3	

^aTime from the onset of the acquired brain injury to admission to the rehabilitation centre.

on the neuropsychological tests can be obtained from the first author (AMB) on request. Patients were included if the neuropsychologist's interpretation of the tests led to a conclusion of moderate to severe cognitive disorder. One patient was not tested at all due to severe aphasia and visual impairment. Observations of this patient by the occupational therapist and psychologist showed neuropsychological impairments, but we were unable to quantify these.

Functional assessments

The patients' functional status was assessed after inclusion in the study, that is, just before the start of the domiciliary therapy, as well as just after its completion, using the Barthel Index (Mahoney and Barthel, 1965), the Hoensbroeck Disability Scale (HDS) (Törenbeek *et al.*, 1998) and the first part of the Árnadóttir OT-ADL Neurobehavioral Evaluation (A-one): (Gardarsdóttir and Kaplan, 2002). The Barthel Index is a functional evaluation by means of a questionnaire filled in by a patient's physician or nurse, with ratings from 0 to 20. The HDS is a questionnaire to assess the physical, mental and social functioning and communication domains, scored by patients' therapists and nurses. The A-one (part one) assesses the following domains: dressing, grooming and hygiene, feeding, transfers and mobility and communication. It is an observational instrument, administered by an occupational therapist. The HDS and the A-one both use scores from 0 to 100. In all three assessments, higher scores indicate better functioning.

Other assessments

Patients and their partners were interviewed before and after the domiciliary therapy (including observational home visits). If patients had no partner, one of their children was interviewed. Before the domiciliary therapy, patients were asked what main goal they wanted to attain. If a patient was severely aphasic, the goal set by their

partner was recorded. The goals were categorized by one of the authors (AMB) using the categories of the Rehabilitation Activity Profile (RAP) (Jelles *et al.*, 1992): mobility, communication, personal care, occupation and relationships, with the mobility category divided into indoor and outdoor mobility and the occupation category into leisure, domestic activities and professional activities. A category 'other' was added, which could involve things like 'increasing self-confidence' or a general goal like 'increasing independence'.

After the domiciliary therapy, patients and their partners, or if there was no partner, the previously interviewed child, were asked whether they had experienced the domiciliary therapy as useful or not and why, whether the main goal had been attained (the categories were no, to some extent, for the greater part or completely) and whether they were satisfied with the domiciliary therapy (by giving a mark between 0 = not satisfied at all and 10 = very much satisfied).

The occupational therapists who administered the observational home visits were asked to record the main goal set for the domiciliary therapy. They categorized the goals according to the RAP domains mentioned above.

The therapists involved in the domiciliary therapy were asked which goals were set for each particular home visit and what the main goal was. They also categorized the goals according to the RAP domains. After each home visit, the therapists were asked to provide information about travelling time, duration of the home visit, whether this duration had been suitable, too short or too long, whether the goals for the visit had been attained (the categories were no, to some extent, for the greater part or completely) and whether they had experienced any problems during the visit. They were also asked to indicate whether they considered the home visit useful or not. In order to analyse why domiciliary therapy may be useful, the answers of the therapists to these questions were categorized by one of the researchers (AMB) as follows:

- (1) the patient has difficulties transferring tasks from one setting to another;
- (2) the patient functions better at home than at the rehabilitation centre;
- (3) specific activities were trained at home or in an environment that could not be imitated at the rehabilitation centre;
- (4) the therapist can help improve the patient's insight into their functioning and disabilities;
- (5) the therapist can help improve the partner's or relative's insight into the patient's functioning and disabilities;
- (6) the therapist gains a better understanding of the patient's home situation;

- (7) the patient's partner can be more usefully involved in the treatment;
- (8) the patient's self-confidence increases.

For most patients, the therapists mentioned several reasons for usefulness during the treatment, which means that the reasons mentioned for a particular patient could cover several categories.

The degree to which a goal had been attained during the domiciliary therapy was analysed for the main goals only and was done as follows: the goal was tracked in the questionnaires from consecutive home visits and the final judgement was used in the analysis. The number of main goals was smaller than the number of home visits, because a goal was frequently not attained in one home visit.

Statistical analysis

Data were entered and analysed by means of the descriptive and non-parametric statistics in the SPSS statistical analysis program, version 11 for Windows. Because the data were not normally distributed, we used the median (50th percentile), the range and quartiles (25th–75th percentiles: inter-quartile range (IQR)). The difference in functioning before and after the domiciliary therapy was tested using the non-parametric Wilcoxon's matched-pair rank test. The chosen significance level was $\alpha = 0.05$.

Results

Twenty-one patients, 19 partners and one of the children of each of the three patients without partners were interviewed before the start of the domiciliary therapy. One patient could not be interviewed due to severe aphasia. Data from the interview with one patient and partner at the end of domiciliary treatment were lost. Three partners refused to be interviewed at the end of the domiciliary therapy. All but one of the patients had been discharged from the stroke unit of a general hospital to the rehabilitation centre. One patient, with encephalitis, was initially discharged home after her hospital admission but was admitted to the rehabilitation centre because her functional problems were too severe.

Domiciliary therapy

Start, duration and frequency

The first observational home visit was performed in the seventh week after admission for one patient, in the eighth week for three patients and in the ninth week or later for all other patients. The median time between admission to the rehabilitation centre and the first observational home visit was 62 days (IQR, 32–97 days).

Four patients had only two observational home visits. These patients were found to be functioning well enough

Table 2 Characteristics of the therapeutic home visits of 18 patients

	Median	Range	Inter-quartile range
Number per patient	4	2–22	3–7
Duration of therapy session (min)	120	15–165	90–120
Travelling time (min) ^a	60	20–150	60–90

n (total) = 108.

^aTravelling time without getting into and out of the car.

Fig. 1

Number of therapeutic home visits (*n* (total) = 94, 14 missing pieces of data) with durations shorter than 80 min, 80–105 min and 110–130 min and longer than 130 min, showing the therapists' opinion about this duration (too long, adequate or too short).

at home to be discharged home. For the other 18 patients, the domiciliary therapy started after the observational home visits. A total of 108 domiciliary visits were made, with a median of four per patient and a range of 2–22 visits (IQR, 3–7). The other characteristics of the domiciliary therapy are presented in Table 2. Two home visits with one patient were shortened (to 15 min) because of personal circumstances of the partner or because the patient felt ill. Most of the therapeutic home visits (53 of the 108) took approximately 2 h, as planned, but a considerable number (19 of the 108) were shortened to approximately 90 min because of mental or physical fatigue on the part of the patient or because the training of a specific activity did not take more time. The therapists mostly rated the planned duration of the therapy as good (see Fig. 1).

Therapists involved

The disciplines of the therapists performing the therapeutic home visits are listed in Table 3. The most common discipline involved in the domiciliary therapy was that of the occupational therapist (73% of the therapeutic home visits). A speech therapist was sometimes involved, in the case of patients with aphasia, mostly in combination with another therapist.

Goals

The domains of the main goals stated by patients and occupational therapists after the observational home

Table 3 Disciplines of the therapists carrying out the therapeutic home visits

Attending discipline	Number of home visits
Occupational therapist	70
Physiotherapist	8
Speech therapist	1
Cognitive therapist	1
Leisure therapist	15
Combination (two therapists) ^a	13

n (total) = 108.

^aCombinations were used for six patients: occupational therapist and speech therapist in seven visits; physiotherapist and cognitive therapist in two visits; physiotherapist and speech therapist in two visits; occupational therapist and physiotherapist in two visits.

Fig. 2

Main goals set by patients before the start of domiciliary therapy and by occupational therapists after the observational home visits, categorized by domain (none, indoor mobility, outdoor mobility, self-care, domestic activities, leisure, communication and 'other').

visits are shown in Figure 2. In one case it was decided that the patient could be discharged home after the occupational therapist had already defined a goal. As the domiciliary therapy got underway, main goals changed and so several goals for the individual therapeutic home visits could be set for each patient. Figure 3 shows the domains of the main goal of each home visit, for all 108 therapeutic home visits.

Table 4 shows whether the main goals set by the patients before the start of the domiciliary therapy and those set by the therapist before each therapeutic home visit were attained during the domiciliary therapy. The reasons mentioned by the therapists as to why some goals were not attained were that certain goals appeared to be unrealistic because of the patient's cognitive disorders, or that the patient was discharged home although some specific goals had not yet been attained.

Usefulness and problems

After the home visits, only six of the 108 therapy sessions were not considered useful by the therapists. The causes

Fig. 3

Main goals set by the therapists before each therapeutic home visit (n (total) = 108), categorized by domain (indoor mobility, outdoor mobility, domestic activities, leisure, professional activities, communication and 'other').

Table 4 Extent to which goals were attained during the domiciliary therapy

Who set the goal?	Was the goal attained?			
	No	To some extent	For the greater part	Completely
Patient	0	3	8	9
Therapist	4	8	26	20

were (1) patient was too tired, (2) no added value of treatment at home over treatment at rehabilitation centre, (3) treatment could not be administered due to family circumstances; (4) patient refused to practise the planned activity, (5) patient became ill and (6) goal of the visit was unclear. The reasons why the therapists considered the therapy to be useful are given in Table 5.

Satisfaction with the therapy among patients and their partners or children

All but one of the patients were satisfied with the domiciliary therapy. The one patient who was not satisfied reported that 'she had not learned much'. All partners or children considered the domiciliary therapy to be useful. The reasons mentioned by the patients and partners or children for why the domiciliary therapy was useful were not very specific, including expressions like 'it is pleasant to practise at home' and 'home is different from the rehabilitation centre'.

The marks (on a scale from 0 to 10) for the domiciliary therapy given by the patients and their partners or children ranged from 0 to 9 and from 5 to 9, respectively, both with a median of 8 (IQR, both 7–8).

Functional level of the patients

The functional level of the patients increased during the period of domiciliary treatment. The scores on the

Table 5 Factors that are important for indicating domiciliary therapy or that determine the usefulness of the domiciliary therapy

Factor	Number of patients for whom the factor was mentioned
Patient has difficulties transferring tasks	8
Patient functions better at home	4
Specific activities were trained	8
Improving the patient's insight	4
Improving the partner's or family's insight	8
Improving the therapist's insight	9
Involving the partner in the treatment	6
Increasing the patient's self-confidence	4

Table 6 Functional status of the patients before and after the domiciliary therapy

	Before domiciliary therapy (median (inter-quartile range))	After domiciliary therapy (median (inter-quartile range))	P-value
Barthel Index	18.5 (14–20)	19 (18–20)	0.005
A-one			
Dressing	65 (30–97)	100 (88–100)	0.002
Grooming and hygiene	75 (54–100)	100 (100–100)	0.003
Transfer and mobility	100 (57–100)	100 (100–100)	0.012
Feeding	94 (72–100)	100 (100–100)	0.018
Communication	92 (48–100)	100 (94–100)	0.063
Total score	77 (66–94)	99 (93–100)	0.001
HDS			
Physical score	84 (60–93)	91 (75–97)	0.000
Mental score	64 (55–75)	75 (64–85)	0.000
Social score	38 (25–49)	48 (44–60)	0.001
Communication	61 (40–84)	69 (56–83)	0.050
Total score	62 (62–71)	69 (61–79)	0.001

Barthel Index, Árnadóttir OT-ADL Neurobehavioral Evaluation (A-one) and Hoensbroeck Disability Scale (HDS), difference tested with the non-parametric Wilcoxon's matched-pair rank test.

Barthel Index, HDS and A-one before and after the domiciliary therapy are listed in Table 6. All patients were ultimately discharged home.

Discussion

This study shows that domiciliary treatment for patients with ABI during inpatient rehabilitation is feasible. Several practical problems were encountered, but most of them were surmountable and the majority of the home treatment sessions were useful.

All patients had initially been admitted to a stroke unit of a general hospital after the ABI. All but one were discharged to the rehabilitation centre. One patient was discharged home. She skewed the data of the characteristics as shown in Table 1. Nevertheless, we had no reasons to exclude her because she met the inclusion criteria and her neuropsychological impairment was comparable to that of the other patients.

The therapists in our study mentioned that some patients functioned better at home than at the rehabilitation centre. This is in agreement with the findings of

Park *et al.* (1994) and Darragh *et al.* (1998), who showed that patients who have had a stroke and are living at home perform instrumental ADL tasks better in a familiar setting than in an unfamiliar setting.

The therapists perceived the possibility of informing and involving the patients' partners as an important advantage of the domiciliary treatment. Lincoln *et al.* (2004) showed that carers of patients treated by the community stroke team were under less strain and more satisfied with aspects such as the emotional support they received. This is in agreement with our finding that it is easier to inform and involve the carers in domiciliary therapy than in the usual care.

Another important aspect mentioned by the therapists was that the domiciliary therapy sessions gave them an opportunity to gain better insight into the patients' home circumstances. Observing a patient at home gives a better impression of patients' real disabilities and activities, allowing more realistic goal setting.

In our study, the goal-setting process was used to decide which therapist was to carry out the therapeutic home visits. Because the goals were mainly in the domains of domestic activities and leisure, occupational therapists were involved in most cases. However, physiotherapists were involved especially for goals in the mobility domain and speech therapists for those in the communicative domain. This proved to be useful in teaching patients and partners to communicate in practical situations.

Although the domiciliary therapy in our study was not restricted to any specific discipline, nurses were not involved in the treatment at home. This was probably because only one patient mentioned personal care as the most important goal and this goal could be achieved by practising personal care at the rehabilitation centre. In addition, transferring of personal care activities from the rehabilitation centre to home may be less difficult than more complex activities in the domains of housekeeping and leisure.

Our study showed that the duration of the therapy sessions (approximately 90–120 min) was appropriate. Sometimes the duration was shortened or lengthened because of mental or physical fatigue on the part of the patient or because the duration was adapted to the activity. Most reports of similar studies in the literature do not mention the frequency and duration of the therapy sessions, though one article (Gilbertson *et al.*, 2000) reports a duration of 30–45 min and another (Özdemir *et al.*, 2001) reports one of 2 h. Reporting frequency and duration of therapy is important, because this may explain differences between the findings of various studies. Kwakkel *et al.* (1997) have shown that the intensity of the therapy is probably related to its effectiveness.

Although home-based therapy has been regarded as a promising development in the care of ABI patients for some years now, a recent meta-analysis by the Cochrane Collaboration (2000) found no evidence that home-based treatment differs from conventional treatment in terms of patient outcomes, caregiver health or resource utilization. It is, however, a challenge to clinicians to find the subgroups of patients who could benefit from home-based therapy and to define the best model for such therapy (Disler and Wade, 2003). Domiciliary therapy for patients in an inpatient setting seems a promising option for the subgroup of patients with moderate to severe cognitive impairment. To our knowledge, no randomized controlled trial has as yet been performed to show the effectiveness of domiciliary therapy for patients in an inpatient setting. The design of the present study also precludes conclusions on effectiveness. Although the patients in our study did show an improvement in functional scores before and after the domiciliary therapy, and this improvement may have been facilitated by the domiciliary therapy, the rehabilitation treatment as a whole and natural recovery will have contributed too. More research in this field is clearly needed.

Acknowledgements

We are grateful to Kirsten Lamberts and Robert Waaksma (psychologists) and Willy Mulder (secretary) for their help and assistance in this study.

References

- Anderson C, Rubenach S, Mhurchu CN, Clark M, Spencer C, Winsor A (2000). Home or hospital for stroke rehabilitation? Results of a randomised controlled trial. 1. Health outcomes at 6 months. *Stroke* **31**:1024–1031.
- Askim T, Rohweder G, Lydersen S, Indredavik B (2004). Evaluation of an extended stroke unit service with early supported discharge for patients living in a rural community. A randomized controlled trial. *Clinical Rehabilitation* **18**:238–248.
- Ballinger C, Ashburn A, Low J, Roderick P (1999). Unpacking the black box of therapy – a pilot study to describe occupational therapy and physiotherapy interventions for people with stroke. *Clinical Rehabilitation* **13**:301–309.
- Berg LJ, Schmidt I (2000). Cognitive rehabilitation of memory disorders. In: Brouwer WH, van Zomeren AH, Berg LJ, Bouma JM, de Haan EHF, editors. *Cognitive Rehabilitation: A Neuropsychological Approach*. Amsterdam: Boom; pp. 143–166.
- Cochrane Collaboration (2000). Services for reducing duration of hospital care for acute stroke patients: early supported discharge trialists. *Cochrane Database System Review* **2**:CD000443.
- Darragh AR, Sample PL, Fisher AG (1998). Environment effect on functional task performance in adults with acquired brain injuries: use of the assessment of motor and process skills. *Archives of Physical Medicine and Rehabilitation* **79**:418–423.
- Disler PB, Wade DT (2003). Should all stroke rehabilitation be home based? *American Journal of Physical Medicine and Rehabilitation* **82**:733–735.
- Fasotti L, Spikman JM (2002). Cognitive rehabilitation of central executive disorders. In: Brouwer WH, van Zomeren AH, Berg LJ, Bouma JM, de Haan EHF, editors. *Cognitive Rehabilitation: A Neuropsychological Approach*. Amsterdam: Boom pp. 107–124.
- Forster A, Young J (1992). Stroke rehabilitation: can we do better? *British Medical Journal* **305**:1146–1147.
- Gardarsdóttir S, Kaplan S (2002). Validity of the Árnadóttir OT-ADL neurobehavioral Evaluation (A-ONE): performance in activities of daily living and neurobehavioral impairments of persons with left and right hemisphere damage. *American Journal of Occupational Therapy* **56**:499–508.
- Gilbertson L, Langhorne P, Walker A, Allen A, Murray GD (2000). Domiciliary occupational therapy for patients with stroke discharged from hospital: randomised controlled trial. *British Medical Journal* **320**:603–606.

- Gladman JRF, Lincoln NB, Barer DH (1993). A randomised controlled trial of domiciliary and hospital-based rehabilitation for stroke patients after discharge from hospital. *Journal of Neurology, Neurosurgery and Psychiatry* **56**:960-966.
- Hochstenbach J, Mulder T, Limbeek van J, Donders R, Schoonderwaldt H (1998). Cognitive decline following stroke: a comprehensive study of the cognitive decline following stroke. *Journal of Clinical and Experimental Neuropsychology* **20**:503-517.
- Indredavik B, Fjærtøft B, Ekebergf G, Løge AD, Mørch B (2000). Benefit of an extended stroke unit service with early supported discharge. *Stroke* **31**:2989-2994.
- Jelles F, Bennekom CAM, van Lankhorst GJ, Sibbel CJP, Bouter LM (1995). Inter- and intra-rater agreement of the rehabilitation activities profile. *Journal of Clinical Epidemiology* **48**:407-416.
- Kwakkel G, Wagenaar RC, Koelman TW, Lankhorst GJ, Koetsier JC (1997). Effects of intensity of rehabilitation after stroke, a research synthesis. *Stroke* **28**:1550-1556.
- Lincoln NB, Walker MF, Dixon A, Knights P (2004). Evaluation of a multi-professional community stroke team: a randomized controlled trial. *Clinical Rehabilitation* **18**:40-47.
- Mahoney FI, Barthel DW (1965). Functional evaluation: the Barthel Index. *Maryland State Medical Journal* **14**:61-65.
- Mayo NE, Wood-Dauphinee S, Côté R, Gayton D, Carlton J, Buttery J, et al. (2000). There's no place like home; an evaluation of early supported discharge for stroke. *Stroke* **31**:1016-1023.
- Özdemir F, Birtane M, Tabatabaei R, Kokino S, Ekuklu G (2001). Comparing stroke rehabilitation outcomes between acute inpatient and nonintense home settings. *Archives of Physical Medicine and Rehabilitation* **82**:1375-1379.
- Park S, Fisher AG, Velezo CA (1994). Using the assessment of motor and process skills to compare occupational performance between clinic and home settings. *American Journal of Occupational Therapy* **48**:697-709.
- Rodgers H, Soutter J, Kaiser W, Pearson P, Dobson R, Skilbeck C, et al. (1997). Early supported hospital discharge following acute stroke: pilot study results. *Clinical Rehabilitation* **11**:280-287.
- Rudd AG, Wolfe CDA, Tilling K, Beech R (1997). Randomised controlled trial to evaluate early discharge scheme for patients with stroke. *British Medical Journal* **315**:1039-1044.
- Spikman JM, Deelman BG, Zomer van H (2000). Executive functioning, attention and frontal lesions in patients with chronic closed head injury. *Journal of Clinical and Experimental Neuropsychology* **2**:325-338.
- Torenbek M, Heijden van der GJMG, Witte de LP, Bakx WGM (1998). Construct validation of the Hoensbroeck Disability Scale for Brain Injury in acquired brain injury rehabilitation. *Brain Injury* **12**:307-316.
- Widén Holmqvist LW, Koch von L, Kostulas V, Holm M, Widsell G, Tegler H, et al. (1998). A randomised controlled trial of rehabilitation at home after stroke in Southwest Stockholm. *Stroke* **29**:591-597.
- Young JB, Forster A (1992). The Bradford community stroke trial: results at six months. *British Medical Journal* **204**:1085-1089.