

HOME REHABILITATION AFTER STROKE

Reviewing the Scientific Evidence on Effects and Costs

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Abstract

Objectives: The question addressed here is whether home rehabilitation after stroke is better and/or less expensive than the more conventional alternatives, i.e., rehabilitation during inpatient care, day care, and outpatient visits—alone or in combinations appropriate to disease stage and patient needs. Home rehabilitation is managed by teams of professionals who train patients at home.

Methods: The scientific literature was systematically searched for controlled studies comparing outcomes and costs of home rehabilitation with the more conventional strategies.

Results: The abstracts of 204 papers were evaluated, from which 89 were selected for greater scrutiny. From the 89 studies, we found 7 controlled studies involving 1,487 patients (6 of the 7 were randomized, 4 of the 6 assessed costs). No statistically significant differences, or tendencies toward differences, were revealed as regards the outcome of home rehabilitation versus hospital-based alternatives. Thus, home rehabilitation was neither better nor worse at improving patients' ability to manage on their own or resume social activities. Depression and reduced quality of life were common in all groups of patients and caregivers, irrespective of the rehabilitation strategy. In the four randomized studies that reported on costs, home rehabilitation was found to be less expensive than regular day care, but not less expensive than conventional strategies even though hospital stay was reduced.

Conclusion: The outcomes and costs of home rehabilitation after stroke seem to be comparable to alternative treatment strategies.

Keywords: Cerebrovascular disorders, Rehabilitation, Home care services, Economics, Systematic review

During the 1990s, the opportunities to rehabilitate post-stroke patients at home expanded as interest in stroke increased and as health services faced economic cutbacks. This review, based on the scientific literature, addresses the question of whether organized rehabilitation

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in the home after stroke is better or less expensive than more conventional treatment strategies.

METHODS

Home rehabilitation has been defined as a specific training strategy, usually managed by a team of professionals, to rehabilitate stroke patients in their own homes directly following the acute hospital stay. The service may or may not be organized to shorten inpatient stay. Home rehabilitation represents an alternative to the more common rehabilitation strategies, which may involve inpatient stay, day rehabilitation at specific centers, or outpatient-based training. The conventional alternatives selected depend on the needs of the individual patient and may change as the course of disease changes.

The literature was searched via MEDLINE, Cochrane Library, Cinahl, Econlit, ArbSpriline, ABI Inform, and Sociological Abstracts for references from 1966 to December 1999. Keywords used in various combinations were: stroke, rehabilitation, home care services, domiciliary services, economics, randomized and controlled studies. Two types of rehabilitation studies were excluded: a) those where patients represented mixed disease groups; and b) those where both the experimental and control groups received conventional rehabilitation but where extra contact with nurses or social workers at home were tested. Only controlled studies, randomized and quasi-experimental, were included. The quality of the economic estimates was evaluated using a three-grade scale: high, moderate, and low. This assessment was based on weighing the quality factors described by Drummond and Jefferson (3).

The search yielded 204 studies that were reviewed by two individuals, independently of each other, 89 of them in greater detail. Additional studies were identified through reference lists, overview articles, meeting summaries, and personal contacts.

The rehabilitation results are reported for both patients and family members. Positive outcomes for patients included achieving improved function as regards activities of daily living (ADL), with greater ability to manage on their own, a higher quality of life, less depression, or a higher level of social activity. Positive outcomes for family members included greater satisfaction with care, less stress, less depression, and higher quality of life. Various well-validated instruments were used in the studies to measure these functions.

Since the outcome measures vary, the results cannot be synthesized by meta-analysis. So as not to overlook small differences pointing in the same direction, we also analyzed nonsignificant tendencies toward differences among the groups. "NS positive" denotes a positive tendency, suggesting benefits from home rehabilitation, while "NS negative" denotes a negative tendency.

RESULTS

Seven studies addressing the effects of home rehabilitation were identified and found to be of acceptable quality (Table 1). The most recent were from Stockholm (11) and New Zealand (1), with the remainder from Great Britain (5;9;10;13). The papers were published between 1985–99 in journals with peer-review systems. Six of the studies are randomized. The randomization process was appropriately executed, and the studies have been subjected to ethical review. The nonrandomized study used concurrent control groups living within the same healthcare district, but in a different area than the patients who received home rehabilitation (10). Blind assessment was an objective in five of the studies (Table 1). Calculations of study power were either not mentioned (10); done and adhered to (1;5;9;13); or recruitment of patients did not reach the desired power level (8;11). Four of the randomized studies include an economic analysis.

Table 1. Studies of Home Rehabilitation (Home) Compared with Rehabilitation in Hospital, by Day Care, Outpatient Visits, or Mixtures Thereof as Needed (Conventional)

Author, follow-up (ref. no.)	Study design (no. of patients)	Results										Comparison groups; blinding of assessments; comments		
		Baseline comparison					Patients						Carers	
		Home	Conv.	Effects	Difference home/conv.	Measurements	Effects	Difference home/conv.	Measurements	Difference home/conv.	Measurements			
Wade et al. 6 months (10)	CT (432)	Age ADL, independent % Hospital stay, 53 days	72 14 16	74 16	ADL, independent % Depression Social activities	NS pos NS neg NS	Barthel Wakefel Frenchay	Stress	NS neg	GHQ	Home rehab. vs conventional; comparison of two districts with 440 and 417 patients. Surviving and followed-up: 233 and 199 = 432			
Young & Forster ^a 6 months (13)	RCT (124)	Age ADL, Barthel Hospital stay, 53 days	70 16	72 15	Motor ADL Depression Social activities	Improved ^b Improved ^b NS neg NS pos	Motor, walking Barthel NHP > 30 Frenchay	Stress	NS pos	GHQ	Home rehab. vs day care (6 h, 2/week for 2 months); blind assessment			
Gladman et al. 6 months (5)	RCT (327)	Age ADL, Barthel Hospital stay, 29 days	70 16	70 17	ADL, extended ADL Quality of life Death/institut.	NS pos NS neg NS NS neg	Nouri Barthel NHP	Social activ. Quality of life	NS neg NS neg	Base N-LSIZ	Home rehab. vs conventional; blind assessment			
Gladman et al. 6 months (4)	RCT (451 = 124 + 327)				ADL Depression Death/institut Walk outdoors	NS NS neg NS neg NS pos	Barthel NHP > 30				Conjunct analysis of the two studies above			
Rudd et al. 12 months (9)	RCT (331)	Age ADL, independent % Hospital stay, days after randomizing	70 10 19 6 ^b	72 12 25 12	ADL Depression Quality of life Satisfaction	NS NS pos NS neg NS pos	Barthel Hospital depr. NHP	Stress Satisfaction	NS neg NS	Strain ind. Stroke spec.	Home rehab. vs conventional; blind assessment; shortened hospital stay; walking and mental state similar			

Rodgers et al. 3 months (8)	RCT (92)	Age ADL, Barthel Hospital stay, days	73 15 13 ^b	73 13 22	ADL, extended Quality of life Handicap	NS pos NS neg NS pos	Nottingham Global Health Oxford	Stress	NS	GHQ	Home rehab. vs conventional; shortened hospital stay
Widén et al. 3 months (11)	RCT (81)	Age ADL, independent % Hospital stay, days	71 17 14 ^b	73 20 29	ADL, independent % ADL, extended Quality of life Motor Social activ.	NS pos NS pos NS neg NS pos NS pos	Katz Katz SIP Lindmark Frénchay	Quality of life Satisfaction	NS neg NS pos	SIP	Home rehab. vs conventional; blind assessment; shortened hospital stay
Baskett et al. 3 months (1)	RCT (100)	Age Hospital stay, days	68 33	72 24	ADL Walking Depression Anxiety	NS neg NS neg NS NS neg	Barthel 10 m Hospital depr. and anxiety	Depression Stress	NS neg NS pos	GHQ GHQ	Home rehab. + self training vs conventional; Blind assessment; Equivalent results
Total	1,487 patients				No statistically significant difference	NS pos 12 NS neg 12		No stat. sign. difference	NS pos 3 NS neg 6		

Abbreviations: RCT = randomized controlled trial; CT = nonrandomized controlled trial; NS pos = nonsignificant difference, positive tendency for home rehabilitation; NS neg = non-significant difference, negative tendency for home rehabilitation.

Hospital stay is expressed as the median no. of days, except in the Stockholm study where the mean is given.

Effect measurements are performed with various scores, which are referred to in the respective papers. Most commonly used for ADL = Barthel and Katz index; Quality of life = NHP Nottingham Health Profile and SIP Sickness Impact Profile; Depression = NHP > 30, Wakefield Depression Inventory; Anxiety, stress = GHQ General Health Questionnaire, Hospital anxiety and depression scale; Social activities = Frénchay index.

^a In this study all conventional patients had regular day care only.

^b Statistically significant difference between home rehabilitation and conv.

Is Home Rehabilitation Better Than Other Forms of Care?

Table 1 presents the results from the seven studies on home rehabilitation after stroke as well as the conjunct analyses of two of them. A total of 1,487 patients were included. At baseline the patients had similar mean ages, around 70 years. Less than 23% were independent in ADL, and their mean scores were about three-quarters of the maximum capacity. Home rehabilitation started after hospital stay, which lasted from 2 to 5 weeks. There were no important differences between trial and control groups in the studies.

As regards the results, only two statistically significant differences between home rehabilitation and conventional alternatives occurred. This was in the study by Young and Forster (13), but when the material was pooled with Gladmans et al. (5), yielding 451 individuals, the differences between the groups disappeared completely (4). Thus, there were no statistically significant differences in outcomes between home rehabilitation and conventional care regarding ADL functions, depression, quality of life, or social activities in patients, nor regarding stress, social activities, satisfaction, depression, and quality of life for family members. In three of the studies a shortening of the hospital stay by 6–14 days was achieved by involvement of the experiment team for hospital discharge and planning.

Regarding statistically nonsignificant trends, Table 1 shows that summarizing all outcome variables for the patients yielded 12 NS-positive and 12 NS-negative trends. The corresponding figures for outcomes in family members were 3 NS-positive and 6 NS-negative trends for the home rehabilitation groups. Hence, there are no tendencies toward differences in any direction between home rehabilitation and conventional care.

Is Home Rehabilitation Less Expensive Than Other Forms of Care?

Four of the randomized studies presented in Table 1 included an economic analysis (Table 2). Two studies were large, and two were small. Altogether, costs were evaluated in 845 patients. Young (12) compared the costs of home rehabilitation with those of regular day care, while the other three compared home rehabilitation costs with the costs for conventional treatment including various combinations of hospital stay, day care and outpatient rehabilitation. Costs were evaluated from a provider perspective, and the studies have the characteristics of cost-minimization analyses. Young and Forster (12) and Gladman et al. (6) studied only the rehabilitation phase, while McNamee et al. (7) and Beech et al. (2) included the initial inpatient period. The last two authors made the economic analyses of the London and Newcastle studies presented in Table 1. Young and Forster studied the first 8 weeks following the acute care phase, Gladman et al. and McNamee et al. followed the patients for 6 months, and Beech et al. for 12 months (Table 2). Gladman used the cost base for the 14 months while the study was under way and excluded the initial and final phase to arrive at a cost that represented routine care. McNamee also included the start-up costs for home rehabilitation.

Indirect costs were included in only one of the four studies. Young assessed the indirect costs as the emotional distress of the patient and main caregiver. Home-based rehabilitation was not found to create greater stress. Measurement of lost earnings was not considered relevant since the majority of the patients and main carers were retired.

The quality of the economic estimates is high in two studies and moderate in two. Young found home rehabilitation to be significantly less costly than day care (6 hours, two times a week for 2 months) and Gladman found home rehabilitation to be 27% more costly (significance tests not performed) compared with conventional care. In closer analysis, home rehabilitation was shown to be less expensive than day care, but more expensive than the combination of other interventions in ambulatory care that are used in conventional care for milder disease stages.

Table 2. Costs of Home Rehabilitation (Home) Compared with Rehabilitation in Hospital, by Day Care, Outpatient Visits, or Mixtures Thereof as Needed (Conventional Care)

Author (ref. no.)	Comparison groups	Follow-up period	Study design, no. of patients	Type of economic evaluation	Year prices were calculated	Cost/patient		Sensitivity analysis	Indirect costs	Comment	Economic study quality rating
						Median, home/conv.	Average, home/conv.				
Young & Forster (12) ^a	Home vs day care	8 weeks	RCT 95	Cost min.	1988–89	£385/620 ^b		Yes	Yes	Home rehab. 62% less costly compared to day care ^b	High
Gladman et al. (6)	Home vs conv. care	6 months	RCT 327	Cost min.	1989–90	£408/320(?)		Yes	No	Home rehab. 27% more costly compared to routine care (?)	Moderate
McNamee et al. (7)	Home vs conv. care	6 months	RCT 92	Cost min.	1995–96	£7,155/7,480 NS		Yes	No	No difference as regards costs	Moderate
Beech et al. (2)	Home vs conv. care	12 months	RCT 331	Cost min.	1997	£6,800/7,432(?)		Yes	No	Home rehab. 8% less costly compared to routine care (?)	High

Abbreviations: RCT = randomized controlled trial; Cost min. = cost minimization analysis; Conv. = control group; NS = not significant; (?) = significant tests not performed.

^a In this study all conventional patients had regular day care only.

^b Statistically significant difference between home rehabilitation and conv.

Neither McNamee nor Beech found any statistically significant differences between the groups as regards costs, although the length of hospital stay was reduced in both studies. Further analysis showed that home rehabilitation had been more expensive than conventional care for the least ill patients, but substantially more cost-effective for the seriously ill patients.

It is difficult to make the costs comparable, particularly among different countries, and therefore the findings must be viewed with some reservation. However, it appears that home rehabilitation costs less than regular day care, probably due to expensive transportation for patients to the latter and many more hours' involvement for personnel. In comparison to conventional care, it appears that home rehabilitation is not less expensive, even though the average length of hospital stay could be reduced. This is due mainly to the fact that conventional care is less expensive during periods when patient symptoms are mild and ambulatory care services are an alternative. Home rehabilitation may be more economically advantageous if combined with early hospital discharge and offered only to patients when they are less functional and have more complex transportation needs.

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