

A PILOT STUDY OF REHABILITATION AT HOME AFTER STROKE: A HEALTH-ECONOMIC APPRAISAL

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ABSTRACT. This study aimed at describing the health-economic implications and organisational issues of rehabilitation at home in south-west Stockholm of 15 acute stroke patients, mean age 68.2, male:female ratio 9:6, independent in feeding and continent one week after their stroke. Average patient satisfaction with different dimensions of care was 92%. Perceived dysfunction, by means of the Sickness Impact Profile, 3 months after stroke was highest for Recreation-and-Pastime, Home Management and Ambulation. Between 3-12 months after stroke, functional improvement was particularly seen in Home Management, Recreation-and-Pastime and Emotional Behaviour. Three fourths of the patients received help with different ADL tasks from a family caregiver and 1/5 from home service assistants. According to the scores for subjective health of the spouses and time used to help the patient, the burden that the programme put on the patient's family was modest, temporary and in accordance with preferences reported by the elderly in Sweden. The mean duration of hospital stay for patients under rehabilitation at home was 14 days and for a selected comparison group with similar ADL-grade, 27 days. The mean number of therapy sessions at home was 11. Each home visit took 3.2 hours, 60% of which were direct patient time. In the selected comparison group, 1/3 was referred to other departments for rehabilitation and care, and 40% had contacts with day-care and paramedical professionals after discharge from the hospital. During the first year after stroke, the average, direct, *per capita* cost for rehabilitation at home amounted to SEK 127,730 divided between hospital care (50%), followed by contribution by family caregivers (18%), rehabilitation at home (10%), out-patient visits to physicians and nurses

(8.8%), home-help service (7%), auxiliary equipment (2%), medication (1.5%), home adaptation (1%) and transportation service (0.3%). This organisational model of home-based rehabilitation of stroke patients constitutes a feasible, possibly less expensive alternative and complement to current rehabilitation in hospital and primary care, which could be further developed and evaluated.

Key words: cerebrovascular disorders, rehabilitation, home, patient satisfaction, health quality, family caregivers, health economy.

INTRODUCTION

The increasing challenge to the health-care system posed by the growing number of elderly patients with major, resource-consuming, neurological diseases generates interest in research on the effectiveness of health-care utilisation and technology assessment (29). In Sweden, the ongoing development of primary health care will presumably lead to altered rehabilitation services for stroke patients (28). Such modifications in Stockholm should fit the health political and organisational program denoted as the "Stockholm model" (22). Some of its main goals were defined as: 1) increased freedom of choice for patients; 2) improved quality, continuity, accessibility and productivity of health services; and 3) improved influence by personnel. An important strategic research task for stroke service development will be to link information on activities at hospital and out-patient environments in order to describe the whole process of care (2).

In the Stockholm model, however, the way in which health-care service development initiatives might be implemented has been poorly described. Research targeted at developing stroke rehabilitation in south-west Stockholm has been carried out in recent years (18, 19, 32, 33). In this journal we have previously reported a pilot study of 15 stroke patients who were offered early discharge combined with rehabilitation at home as an alternative to sustained rehabilitation at the Department of Neurology or transfer to other departments for rehabilitation (32). The pilot study sought to lay the foundation of a randomised controlled study, currently under way. Patients, intervention characteristics and outcomes were presented (32). The goal of the present paper, based on the above material, was to pinpoint the health-economic implications and organisational issues raised by such intervention.

MATERIALS AND METHODS

Type of stroke, major neurological deficits, comorbidity, functional status, coping abilities, family situation and professional status of the patients have already been described (32). The mean age was 68.2 years (range 45–79) and the male:female ratio, 9:6. Eleven of the patients were born in Sweden, and 4 in other countries.

Patient satisfaction and subjective health

In order to identify aspects of the present organisation of home-based rehabilitation which were acceptable and others which needed improvement as regards patient satisfaction (4), a modified shortened version of a questionnaire used in a Swedish study of patients with rheumatoid arthritis (1) was used. It contained 18 statements which the patients had to agree or disagree with on a five-graded scale. The statements covered seven dimensions as per the taxonomy originally developed by Ware (20, 31), namely: art of care, technical quality of care, accessibility/convenience, finances, availability, continuity, and efficacy/outcome of care. Two statements covered patients' active participation in discharge- and rehabilitation-programme planning, respectively. The questionnaire was presented at the follow-up home visit, 3 months post stroke. The patients were asked to fill it in after the home visit and return it to the Department of Neurology at Huddinge Hospital.

In order to evaluate patients' subjective health, a Swedish version of the Sickness Impact Profile (SIP) (26) in interview form was completed 3, 6 and 12 months after the acute stroke episode.

Family involvement, consequences and estimated cost

Institutional rehabilitation substituted by early discharge combined with rehabilitation at home may imply transfer from formal to informal care and increase the burden on family caregivers (5). We therefore obtained information from the patient on dependency in ADL according to the extended Katz index (11) and on the identity of those

providing support, at discharge, and 3, 6 and 12 months after stroke. Estimation of both the time sacrificed by family caregivers in helping the patient and the cost of such time was based on data computed for time-use and cost in the event of such help being replaced by home-help service (12, 30). Reduction in caregivers' work time was also recorded.

In order to describe the consequences of caring and changes over time (9) for the family caregiver, we assessed the subjective health of spouses living with patients, by means of a SIP interview form, 3 and 12 months after acute stroke. After the interview, the spouses were asked to indicate if reported declines in different areas of activities had arisen as a consequence of the caregiving furnished to the stroke patients.

Resource use and cost of health care

Direct costs were calculated for treatment, rehabilitation and care. The economic evaluation included cost of hospital and out-patient care, medication, technical aids, home adaptation, transport and home-help service, and informal care. The bases for calculating resource utilisation and cost for different health-related cost items are presented in Table I. Indirect cost, e.g. lost production, was not included. In order to get a rough estimate of differences in direct cost for patients receiving rehabilitation at home—the intervention group (IG)—and for those not affected by the intervention a less select and larger-sized comparison group (CG)—we compared resource utilisation of hospital and out-patient care, and causes for recurrent hospitalisation during the first year post-stroke in the two groups. From 15th September 1991 until 31st May 1992, approximately 40% of all incident stroke patients hospitalised for 7 days or more, viz., 173 patients, were tested using Katz' index of ADL, 5–12 days after hospitalisation (32). Sixty-three of these had similar ADL-grade, A–E according to Katz' index, and were discharged to their own homes within 6 months after the acute stroke episode, coming to constitute the CG. For patients in the CG, mean age was 72 years and the male:female ratio, 32:31. For reasons discussed elsewhere (32), severely disabled patients were overrepresented and aphasics underrepresented in the IG.

In spite of the exploratory nature of this study, statistical significance was assessed in some comparisons. For deviation from normality, changes in SIP for patients over time, and differences in duration of hospital stay, the Shapiro & Wilks' statistics, Wilcoxon signed rank and sum rank tests were used, respectively.

RESULTS

Patient satisfaction with care in the IG is presented in Table II. Reported patient satisfaction with different dimensions of care was 73%–100%. Causes for dissatisfaction were: unmet demand for water exercises, 1; amount of training at home, 3; installation of outdoor staircase banister, 1; electrically-operated elevator-door opening device, 1; burdensome cost of medical services, 2; scant contact with the physician, 1; lack of patient participation in the planning of hospital discharge and home training programme, 4 and 2, respectively.

Table I. Different health-related cost items, basis and source for resource utilisation and direct cost calculation for patients in the pilot study

Cost items	Basis for resource utilisation and source	Basis for cost calculation and source
Hospital care	Number of days in hospital care. Computerised register at Stockholm County Council (SCC)	Average cost/day at 1990 cost levels. SCC Administrative Department.
Out-patient care	Number of visits to hospital and primary care. Computerised register at SCC.	Average cost/visit at 1990 cost levels. SCC Administrative Department.
Medication	Prescription of daily dose of different drugs, three, six and twelve months after stroke multiplied by number of days not in hospital care. Interview during follow-up home visits.	Per-unit drug price, based on cheapest package (7).
Technical aids	Use of different types of technical aids. Interview during follow-up home visits.	Market prices per unit were available and used.
Home adaptation	Type of adaptation made. Occupational Therapy Department and Local Authorities (LA).	Payment for equipment and installation. LA.
Health-related transport service	Number of journeys. Computerised register at SCC.	Registered payment for each journey. Computerised register at SCC.
Home-help service	Average time for assistance/week according to ADL-grade. Interview during follow-up home visits. Number of visits/months and security alarm. LA.	Cost/hour for average time for assistance/week according to ADL-grade and cost for security alarm (30).
Informal care	Average time for assistance/week according to ADL-grade. Interview during follow-up home visits.	Cost/hour for average time for assistance/week were similar contribution to be made by home-help service (30).
Rehabilitation at home	Time (min) for physical, occupational and speech therapy and travel distance (km). Our study protocol.	Preliminary estimated cost/min at 1992 cost levels. Department of Physical Therapy, Occupational Therapy, and Phoniatrics & Logopedics at Huddinge Hospital.

The magnitude and changes over time in subjective dysfunction as per SIP for IG-patients who completed all interviews after stroke ($n = 12$) are presented in Table III. Wide range and skew distribution of values were frequently found in most categories. Perceived dysfunction 3 months post-stroke was highest for Recreation-and-Pastime, Home Management and Ambulation. The greatest functional improvements between 3 and 12 months were found in the categories of Home Management, Recreation-and-Pastime, and Emotional Behaviour. Lesser but statistically significant improvements ($p < 0.05$), during this period, were seen in Emotional Behaviour and Communication. Comparisons of all available data yielded similar results. Two out of 3 patients who were in full gainful employment before stroke went back to work during the study period.

At discharge, 6 of the patients received help from a family caregiver in both personal and instrumental ADL, but 5 solely in instrumental ADL. Between 3–12 months after stroke, 2 of the patients still received help from a family caregiver in both personal and instrumental ADL tasks. Three males were assisted only in cooking, a task they used to perform before

they had their stroke. For 10 patients it was the spouse who acted as the main provider of support. Of the 10 spouses, 7 were female and 3 were male, mean age 68.4 years, range 50–83. One patient, a 45-year-old woman living without spouse, received help from her retired mother and her 2 daughters. Three patients received home-help service.

SIP-based subjective dysfunction scores for spouses who completed both interviews are presented in Table IV. In general, SIP scores reflected modest dysfunction, decreasing over time. Comparison of all available data yielded similar results. Twelve months post-stroke, one spouse reported declines in Social Interaction, Emotional Behaviour, Mobility and Recreation-and-Pastime due to the giving of care to the stroke patient and not merely to her own health situation.

A breakdown of use of physical, occupational and speech therapy at home for IG-patients is presented in Table V. Approximately 60% of therapy time was devoted to therapy sessions at home, 25% to travel and 14% to organisation, planning and documentation of therapy. The physical therapist was always selected to be the case-manager (32). As a result, physical therapy took the lion's share of therapy

Table II. Number of patients in the intervention group, $n=15$, who manifested need of and satisfaction with different dimensions of quality of care

Dimension and related matters	Number of patients			
	Manifested need	Satisfied	Dissatisfied	Uncertain
Art of care				
Sympathy from staff	–	15	0	0
Kind treatment	–	15	0	0
Technical quality of care				
Good information	–	15	0	0
Training specifically tailored to the condition	–	14	1	0
Technical aids	12	12	0	0
Workplace adaptation	0	–	–	–
Home adaptation	8	6	2	0
Public transport	10	10	0	0
Accessibility/convenience				
Easy to get in touch with staff	–	15	0	0
Finances				
Cost of care	–	12	2	1
Availability				
Contact with all expertise needed	–	15	0	0
Adequate training at home	–	11	3	1
Continuity				
Meeting same staff during training at home	–	15	0	0
Efficacy/outcomes of care				
Satisfied with the care received	–	14	1	0
Participation in discharge planning	–	11	4	0
Participation in planning home training programme	–	13	1	1

Table III. Mean, median and range scores for subjective dysfunction as per SIP, 3 (SIP 1), 6 (SIP 2) and 12 months (SIP 3) after stroke, and changes in median scores for patients in the intervention group, who completed all interviews, $n=12$.

Possible range, increasing dysfunction, 0–100

Category	SIP 1			SIP 2			SIP 3		
	Mean	Median	Range	Mean	Median	Range	Mean	Median	Range
Overall SIP	10.7	11.1	2.0–19.1	9.3	8.4	1.1–21.9	8.6	6.8	1.0–23.6
Physical dimension	9.4	7.1	1.3–26.4	8.7	5.7	0.0–31.1	10.2	6.8	0.0–36.1
Ambulation	16.9	17.1	0.0–37.4	16.7	15.0	0.0–46.8	16.4	10.1	0.0–46.8
Mobility	6.7	0.0	0.0–24.5	4.6	0.0	0.0–28.9	5.0	0.0	0.0–51.0
Body care and movement	7.2	6.3	0.0–25.0	6.8	3.5	0.0–25.4	9.4	6.9	0.0–30.7
Psychosocial dimension	9.8	8.8	0.0–20.5	8.1	8.2	1.9–18.9	6.6	4.7	0.0–18.3
Social interaction	7.4	3.3	0.0–26.5	7.5	2.7	0.0–37.0	6.4	4.8	0.0–29.5
Alertness behaviour	10.3	4.3	0.0–55.6	6.4	0.0	0.0–47.4	3.9	0.0	0.0–10.0
Emotional behaviour	16.5	11.1	0.0–51.6	11.5	9.7	0.0–53.0	11.0	0.0	0.0–45.8
Communication	7.6	9.5	0.0–21.1	7.8	0.0	0.0–40.4	5.6	0.0	0.0–20.1
Independent categories									
Sleep and rest	14.4	10.9	0.0–35.9	14.6	12.2	0.0–35.9	11.4	10.7	0.0–35.9
Eating	4.2	5.2	0.0–11.0	2.4	0.0	0.0–10.9	2.8	0.0	0.0–11.3
Work	15.6	0.0	0.0–70.1	13.3	0.0	0.0–70.1	5.8	0.0	0.0–70.1
Home management	19.7	18.3	0.0–46.6	13.3	9.2	0.0–44.6	18.1	0.0	0.0–66.5
Recreation and pastime	16.8	21.0	0.0–37.0	16.7	15.2	0.0–38.6	13.3	4.3	0.0–44.8

Table IV. Mean, median, range and change in mean scores for subjective dysfunction as per SIP for spouses in the intervention group who completed interviews 3 (SIP 1) and 12 months (SIP 2) after stroke, $n=8$. Possible range 0–100

Category	SIP 1			SIP 2		
	Mean	Median	Range	Mean	Median	Range
Overall SIP	5.5	0	0–28.5	2.3	0.5	0–12.2
Physical dimension	6.2	0	0–38.4	2.2	0	0–13.9
Ambulation	7.2	0	0–37.4	1.0	0	0–8.0
Mobility	7.3	0	0–50.8	7.1	0	0–47.6
Body care and movement	5.0	0	0–34.4	1.0	0	0–7.7
Psychosocial dimension	3.3	0	0–16.5	0.9	0	0–3.6
Social interaction	6.6	1.8	0–27.5	1.6	0	0–9.0
Alertness behaviour	3.3	0	0–26.3	0	0	0–0
Emotional behaviour	0	0	0–0	1.6	0	0–12.6
Communication	0	0	0–0	0	0	0–0
Independent categories						
Sleep and rest	14.4	0	0–73.3	8.7	0	0–50.1
Eating	0.8	0	0–6.1	0	0	0–0
Work	0	0	0–0	0	0	0–0
Home management	8.9	0	0–77.1	5.8	0	0–46.1
Recreation and pastime	16.4	0	0–70.9	8.4	0	0–40.5

Table V. Resource utilisation in time (hours) and cost (SEK) for physical, occupational and speech therapy at home for patients receiving such therapy in the intervention group

Resources	Physical therapy median mean range ($n=15$)	Occupational therapy median mean range ($n=8$)	Speech therapy median mean range ($n=2$)	Total therapy median mean range ($n=15$)
Time				
Treatment time	17.0 18.2 11.7–33.4	3.5 3.4 0.5–5.0	7.3 7.3 3.5–11.0	19.4 20.9 11.7–33.4
Organisation, planning and documenting time	2.3 3.1 1.5–6.3	1.8 2.0 0.5–3.3	6.0 6.0 2.0–10.0	4.3 4.9 1.8–13.6
Travel time	6.5 7.8 4.0–17.0	1.8 1.9 0.8–3.8	6.0 3.6 0.0–7.5	8.6 8.7 4.5–17.0
Total time	27.5 29.1 17.3–56.7	7.5 7.1 1.0–10.5	17.0 17.0 5.5–28.5	33.0 35.1 18.6–60.5
Cost				
Total time cost*	8 970 10 470 6 240–20 400	2 715 2 543 360–3 780	6 120 6 120 1 980–10 260	10 740 12 046 6 690–21 780
Travel cost**	178 301 114–950	117 146 0–396	0 0 0–0	317 379 178–950
Total cost	9 120 10 771 6 610–21 350	2 835 2 688 360–3 996	6 120 6 120 1 980–10 260	12 104 12 835 6 868–21 595

* SEK 6/min ** SEK 2.2/km

time. The mean number of home visits for each patient was 11, range 4 to 27, and that of time for each home visits was 3.2 hours. Average cost for each therapy session at home was SEK 1,166 and average cost for rehabilitation at home per patient was SEK 12,835.

In Table VI we present average resource utilisation and estimated cost for hospital and out-patient care during the first year after acute stroke, including rehabilitation at home, per user and per patient in the IG and the CG. At 14 days, the mean length of stay during initial hospitalisation for the IG-patients was 48% lower than that for those in the CG, $p = 0.3668$. One third of all CG-patients were referred to other departments for rehabilitation and care. The proportions of patients in the IC and the CG were similar with regard to recurrent hospitalisation, 27% and 32%, respectively. Fracture or recurrent stroke as causes of hospitalisation, or death as a preventive factor for recurrent hospitalisation were not more frequent in the IG, 1/15, 1/15, 1/15, than in the CG, 2/63, 9/63, 4/63, respectively. However, a 135% difference in mean length of recurrent hospitalisation was found between the CG, 17 days, and the IG, 40 days, where a single patient was hospitalised for 134 days due to a recurrent stroke. Similar proportions of patients in both groups visited physicians in out-patient care. One patient in the IG had contact with an occupational therapist in primary care and the training was co-ordinated with the domiciliary rehabilitation programme by the case-manager. Approximately 40% of the patients in the CG had contact with day care or different paramedical professions after the initial hospitalisation period. Few of them—8% and 13%—had contact with physical and occupational therapists, but a large proportion—21%—did have contact with speech therapists.

Use and cost for other various health-related items in the IG, not recorded for the CG, are set out in Table VII. Only one patient was healthy before stroke. Twelve patients were on antiplatelet, 2 on anticoagulant, and 3 on insulin treatment. Technical aids for ADL and locomotion included bathtub seats and assistance rails, 8, shower benches and walking frames, 7, raised toilet seats and walking sticks, 6. One patient had his bathroom reconstructed, and supporting handles were installed for 4 others. Eleven patients had a certificate for health-related transport service and 7 used it. The estimated mean time for home-help for each supported person was 4

hours/week for one year after acute stroke, and that provided by family caregivers was 7 hours/week during the first 3 months and 3 hours/week from 3–12 months after acute stroke.

To sum up, the average, direct, per capita cost during first year post-stroke among IG-patients totalled SEK 127,730, predominantly accounted for by the cost of hospital care (50%), followed by that of the contribution made by family caregivers (18%), rehabilitation at home (10%), out-patient visits to physicians and nurses (8.8%), home-help service (7%), auxiliary equipment (2%), medication (1.5%), home adaptation (1%) and transport service (0.3%). The information lacking as regards use and cost of different health-related items in the CG constituted 31% of the total direct cost in the IG. The average, total, direct per capita cost of hospital and out-patient care, including home-based rehabilitation, was SEK 1,752 higher for patients in the IC. Average direct cost for initial hospitalisation was SEK 23,832 higher per patient in the CG. When expenditures for recurrent hospitalisation were excluded, total direct per capita cost proved SEK 14,514 lower for IG-patients.

Due to the experience gained by the paramedical professions through this new care alternative, combining home-based rehabilitation with a one-year follow-up programme, ward discharge planning procedure was modified to be more individually oriented.

DISCUSSION

While home-based rehabilitation for patients with stroke has raised considerable interest in Sweden and other countries (3, 7, 8, 34), there is an urgent need for descriptive and evaluative information about this form of treatment prior to any large-scale implementation. This study provides a detailed view of the health-economic implications of such an intervention, soon after stroke, in a small group of patients—moderately selected by age and degree of dysfunction—with Katz ADL-grade A–E. The results of this exploratory intervention should be judged with caution due to patient selection, sample size and the Swedish urban study background and not generalised for application in fields other than design of further costly research and development of this form of care.

Patient satisfaction is a component of stroke-care quality which has not been reported on to date. Appropriate evaluation of our results based on com-

Table VI. Number of patients, average resource utilisation and cost per user and patient during the first year post-stroke for hospital and out-patient care, for patients in the intervention group, $n=15$, and for patients in the comparison group, $n=63$

Cost items	Cost (SEK)/ resource unit	Intervention group			Comparison group			Mean cost (SEK)	Patient	User	Patient	
		Number of patients	Resource utilisation Number of units	Mean (range)	Mean cost (SEK)	Number of patients	Resource utilisation Number of units					Mean (range)
Hospital in-patient care, (days)												
Initial hospitalisation		15	14(2-42)	30 952	30 952	63	27(6-181)	54 790	54 790	54 790	54 790	
Neurology department	2 190	15	14(2-42)	30 952	30 952	63	13(6-29)	27 775	27 775	27 775	27 775	
Rehabilitation department	1 881	-	-	-	-	3	51(40-65)	95 304	4 538	95 304	4 538	
Geriatric department	1 743	-	-	-	-	14	51(10-153)	88 146	19 588	88 146	19 588	
Other hospital departments	3 085	-	-	-	-	4	15(7-22)	45 503	2 889	45 503	2 889	
Recurrence hospitalisation	3 085	4	40(2-134)	124 171	33 112	20	17(1-95)	53 065	53 065	53 065	16 846	
Hospital out-patient care, (visits)												
Neurology department	1 412	11	3(1-13)	4 236	3 106	39	3(1-27)	3 729	3 729	3 729	2 308	
Physician	not available	-	-	-	-	2	2(1-3)	-	-	-	-	
Nurse	not available	-	-	-	-	-	-	-	-	-	-	
Other departments												
Physician	1 324	11	7(1-20)	8 907	6 532	43	7(1-61)	9 237	9 237	9 237	6 305	
Nurses and others	not available	5	3(1-7)	-	-	13	2(1-4)	-	-	-	-	
Day care	1 078*	-	-	-	-	4	34(9-53)	36 922	36 922	36 922	2 344	
Physical therapist	450**/360***	15	18(12-33)	10 771	10 771	2	18(2-33)	8 100	8 100	8 100	257	
Occupational therapist	450**/360***	8	3(0.5-5)	2 668	1 423	5	6(2-18)	2 700	2 700	2 700	214	
Speech therapist	450**/360***	2	7(4-11)	6 620	883	13	5(1-18)	2 250	2 250	2 250	464	
Social worker	-	-	-	-	-	1	1	450	450	450	7	
Primary care centres (visits)												
Physician	685	8	2(1-5)	1 624	866	36	4(1-30)	2 835	2 835	2 835	1 620	
Nurses and others	260	7	6(1-16)	1 534	716	33	10(1-174)	2 718	2 718	2 718	1 423	
Physical therapist	284	-	-	-	-	3	11(3-15)	3 019	3 019	3 019	144	
Occupational therapist	746	1	3	2 238	149	3	1(1-2)	746	746	746	36	
All items		15		88 510	88 510	63		86 758	86 758	86 758	86 758	

* per day, ** per visit, *** per hour for rehabilitation at home for patients in the intervention group.

Table VII. Number of patients, mean and range of resource utilisation and cost for different health-related items per user in the intervention group during the first year post-stroke

Cost items	n	Resource utilisation mean (range)	Cost (SEK)/user mean (range)
Number of drugs	15	5(1-10)	1 916(108-7 376)
Technical aids, number of items	14	5(1-19)	3 287(51-12 960)
Home adaptation			15 780
Reconstruction of bathroom	1		954(875-1 128)
Supporting handles	4		
Transport service			1 071(314-7 895)
Number of journeys	7	7(2-51)	
Home-help services			
Number of visits per month	3	8(8-90)	36 624(35 280-45 559)
Number of hours	3	218(172-271)	32 200
Security alarm	1		
Informal care			31 802(5 880-59 052)
Number of hours	11	189(35-352)	

parable data—broken down by age, values and expectations—for other diseases is problematic. Patient satisfaction with care in our study was similar and, for some items, better than that observed in a Swedish study on rheumatoid arthritis (1). Dissatisfaction at the amount of therapy received being over too short a period was approximately 25% in both studies. Less dissatisfaction with involvement in discharge and treatment planning was found in our study, and for out-of-pocket expenses for cost of care. We believe that our intervention met patient-satisfaction standards desirable in Sweden for chronic ailments (1).

Subjective health is important when assessing the effects of a given intervention for stroke patients (10). Compared with a Stockholm general population sample of approximately the same age group, our patients perceived more dysfunction at 3 months post-stroke in the areas of Recreation-and-Pastime, Home Management, and Ambulation (14). In our study as well as the Swedish stroke study by Nydevik & Hulter Åsberg (15) the highest sickness impact was found in Home Management and Recreation-and-Pastime. While increased sickness impact over 6-36 months after stroke was found both in physical and psychosocial aspects for the above-mentioned patients (15, 16), we nonetheless observed a decreasing impact during the 3 to 12-month post-stroke period. Then again, differences in mean age, ADL-grade and follow-up times between the patients studied render comparison difficult.

In a nation-wide sample of elderly living at home in

Sweden, informal care was at least twice as extensive as formal care (13), and 3/4 received help from relatives after discharge from acute hospital (25). The elderly in Sweden demonstrated a strong preference for informal help where short-term illnesses were concerned (13). Almost 3/4 of IG-patients received help from a family caregiver at the time of discharge from hospital, as compared with 1/5 from home-service assistants. The need for help from family caregivers dramatically decreased from discharge to 3 months post-stroke. The mean total SIP score for the spouses in the IG 3 months and one year post-stroke was slightly higher than and similar to that of a general population sample of approximately the same age (14). While stroke can diminish quality of life and also alter the life-style and well-being of patients' families (15), our results suggest that the burden our programme puts on spouses is modest, temporary and fits the preferences of the elderly in Sweden. However, 1/5 of the average total cost for per capita health-related items among IG-patients corresponded to the estimated cost of support in different ADL tasks by family caregivers.

The stroke services, economically relevant in Sweden (24, 27, 29), which might essentially be affected by our intervention were: initial and recurrent hospital stay, and day- and out-patient care. The proportion of ADL-independent IG-patients was 1/4, and further care in rehabilitation and geriatric departments had been planned for 2/3 of them (32). Corresponding figures for the CG were 3/4 and 1/3, with the latter in fact being referred to such departments.

Despite the fact that the IG had a considerably higher proportion of more affected patients, a 48% shorter mean duration of initial hospitalisation was seen. This points to a possible and large reduction in initial hospitalisation by virtue of the intervention. Then again, it is hazardous to draw conclusions from differences in recurrent hospitalisation between the groups. The disproportionately large mean cost for recurrent hospital stay in the IG—97% higher than that for the CG—can be explained by the presence of one seriously affected IG-patient who had recurrent stroke, and by random variation. Assuming a 48% reduction in costs for initial hospitalisation, corresponding to a 30% decrease in total cost in the CG, with an increase of 10% for rehabilitation at home, this would imply a 20% reduction in total costs if no monetary compensation to relatives be considered.

Unfortunately, the small study size limited examination of organisational issues. Two major problems were the difficulties encountered in incorporating speech therapy—a hospital service considerably used by out-patients as seen above—into our programme and establishing co-operation with therapists in primary care, particularly in patients which received the longest rehabilitation programme. However, rehabilitation of moderately affected stroke patients is still almost non-existent in primary care in south-west Stockholm. Since the intervention appears to have implied a considerably higher reduction in total direct costs among the more disabled patients, these programmes might gain in effectiveness when implemented in collaboration with hospital departments for long-term care. Traditions and poor communication between research and administrative departments may explain difficulties in working out an efficient staff policy geared to appropriate manpower recruitment for a small-sized study. While no other major organisational problems were identified, our experience confirmed that communication between the hospital on the one-hand and primary care on the other is a risky link in the chain of care for stroke patients (17). Professionals may not spontaneously join multidisciplinary groups for health-care development, and pilot studies should be given early attention by organisations responsible for development of stroke services. In addition, the current framework of financial, administrative and competitive relationships as defined in the Stockholm model may call for *ad hoc* interpretations and application in the case of specific problems such as stroke care.

We thus conclude that this organisational model of home-based rehabilitation for stroke patients might offer a feasible alternative and complement to current in-hospital rehabilitation and primary care, an alternative which should be further developed and evaluated.

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