Scand J Rehab Med 25: 107–116, 1993

STROKE REHABILITATION: IDENTIFICATION OF TARGET GROUPS AND PLANNING DATA

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ABSTRACT. In order to ascertain the need for late stroke rehabilitation in South-West Stockholm (SWS) and explore the conditions for experimental stroke outcome research, we followed a population-based, systematic sample of incident stroke patients, hospitalized during the period 1987–1988, using computer files and a telephone interview. The annual incidence of first-ever or recurrent transitory ischaemic attack (TIA) or acute stroke during the period was 2.83 per 1000. In December 1989, approximately 3% of these incident patients declared subjective residual dysfunction, were living at home and were considered potential candidates for rehabilitation. The estimated prevalence of home-bound individuals with residual dysfunction due to stroke was 0.74 per 1000 (95% CI 0.51–1.04). The average duration of hospitalization for these patients was 95.2 days. Approximately 3/4 of them were interested in further conventional rehabilitation. The group not interested in this therapy were mainly females and were older. They scored lower in personal ADL and mental activity, but similarly in motor function. We concluded that the prevalent need for rehabilitation after stroke in the SWS community amounted to at least 1/1000. Early rehabilitation in the community, linked to post-acute stroke care with reduction of hospital stay would be functionally and socially advantageous and cost-effective for more than 25% of the incident stroke cases. Stroke rehabilitation and clinical follow-up are closely related processes that should be evaluated simultaneously.

Key words: care, disability, epidemiology, planning, rehabilitation, stroke.

In two recent papers, Thorngren & Westling described the current magnitude and costs of stroke care in a defined Swedish population (23, 24). Long-term hospitalization accounted for 74% of this expenditure. They suggested, as have other authors, that progress in stroke care would partly depend on a more efficient use of the available resources. New forms of stroke management are needed.

In accordance with a State report, the development of medical rehabilitation in Sweden should be: 1) based on primary care, 2) supported by the hospital rehabilitation departments, and 3) connected with the medical services at the work place (1). Further definition of a policy for the rehabilitation of victims of specific neurological disorders, such as stroke, requires input from clinical, sociomedical, and epidemiological expertise (17). Unfortunately the epidemiological surveys have not met the planning requirements for programme operations in stroke rehabilitation. For example, large-scale surveys have revealed that the prevalence of stroke in the Western world ranges from 4.4 to 8.0 per 1000 (25). However, the proportion requiring rehabilitation services is not known.

The aims of this study were to identify in an urban Swedish population: a) an indicator of the need for stroke rehabilitation among non-institutionalized individuals, and b) the local conditions for experimental evaluation research, economic transfers and policy change in stroke rehabilitation.

MATERIAL AND METHODS

Study population and medical services

The study focused on the population settled in South-West Stockholm County (SWS). In 1988 343,550 inhabitants lived here. Up to September 1991, acute somatic care for stroke patients was provided by the Departments of Medicine and Neurology at Huddinge Hospital (HH), and the Department of Medicine at Södertälje Hospital (SH). Private hospital stroke-care services for the SWS population or at the above-

Table I. *Age-distribution of the study population and the patients discharged with TIA or acute stroke diagnosis in South-West Stockholm during 1988*

Health care area or hospital	Age groups	Population	Number of patients per department	
			Neurology	Medicine
Huddinge	0–14	41 667	0	0
	15–44	103 308	31	11
	45–64	48 202	120	89
	65–74	18 864	146	149
	75–	12 398	112	208
	All ages	224 439	409	457
Södertälje	0–14	23 496	—	0
	15–44	56 506	—	5
	45–64	25 948	—	56
	65–74	7 812	—	116
	75–	5 349	—	161
	All ages	119 111	—	338
SWS	All ages	343 550	409	795

mentioned hospitals were considered to be nil. Stroke care was delivered to the SWS population, at low cost to the patients, by the public health care system. Patients with suspected or firmly established TIA or stroke diagnosis were usually referred to emergency hospital departments in SWS where, upon confirmation of this diagnosis, they most frequently underwent further examination including CAT and hospitalization for observation or care, even for short periods of time. Patients with acute stroke from two municipalities, comprising approximately 90,000 inhabitants, Södertälje and Salem, were preferably admitted to the Medical Department at SH. Patients with acute stroke from the other municipalities were hospitalized at HH. Except for the cases in which specific problems required expertise in neurology or internal medicine, patients with acute stroke were hospitalized in medical or neurology wards on a birth date basis. Up to the spring of 1988, those born in the months from January to June were attended in the neurology wards. After this time, this proportion was reduced to those born in one of the first four months of the year. Individuals suffering from subarachnoidal haemorrhage were frequently referred to a neurosurgical department and subsequently hospitalized at HH or SH. In general, diagnoses in clinical practice at HH and SH have in recent years complied with internationally accepted definitions of TIA and stroke (4).

The coded diagnoses at discharge from hospitals and a 10-digit identification code for each patient were systematically registered with the In-patient Diagnosis Register of Stockholm County. Consecutive discharges from different departments or wards during a hospital stay resulting in registration of a new acute stroke diagnosis for the same patient were chained and deemed to correspond to a single stroke episode. Data from this register were used for determining the annual incidence of TIA and stroke during 1987–1988. The age distributions of the study population in the SWS county and of the patients discharged with diagnosis of acute stroke or TIA from the above-mentioned hospital departments during 1988 are listed in Table I.

Quantification of the need for rehabilitation services

We adopted a follow-up procedure which provides a longitudinal view of the post-acute stroke process (6, 23, 24), and we modified it in order to obtain approximate, conservative estimates of prevalence of stroke survivors who declared dysfunction due to stroke as described below. First, the SWS population was studied, focusing on the proportion born during the months determining hospitalization for acute stroke in the Neurology department at HH. This proportion was taken as a large-scale systematic sample of the SWS population. Patients with registered ICD-9 codes 430–438 at discharge, TIA or acute stroke, were selected for follow-up if they fulfilled the following inclusion criteria: under 80 years of age and having undergone hospitalization in neurological wards at HH during the period 1987–1988 for 10 days or more. In order to validate the registered diagnoses using reported criteria (4), the medical records were examined by a neurologist, JPC. Since: a) the patients born during the months of January–April were generally allocated to the Neurology Department wards; b) the acute stroke events preceded the prevalence day—December 31st 1989—by between one and three years; and c) survival after incident TIA and stroke in a Swedish population is known (22), the number of individuals in the SWS population who needed rehabilitation on the prevalence day was estimated using the following algorithm

$$N = A \times 12/4 \times 4/3 \times 4/2 = A \times 8$$

A being the number of individuals who manifested dysfunction due to stroke and interest in further rehabilitation among the patients followed, and 12/4, 4/3 and 4/2 the adjustment ratios for date of birth, population in the hospital's catchment area and year of incident stroke, respectively. It was assumed: 1) that the ratio 12/4 adjusts for hospital's department since only the individuals born in the four-month period January–April were sampled; 2) that the ratio 4/3 corrects for hospital selection because the size of

Table II. *Follow-up of patients under 80 years of age, discharged from the Department of Neurology at Huddinge Hospital with diagnosis of acute stroke, after hospitalization for 10 days or longer, during 1987–1988*

Outcome	Number	Percent
Death (during or after the hospital stay)	58	27
Hospitalized long-term care	23	11
Moved out of SWS	7	3
Not available by telephone	11	5
Inappropriate for specific rehabilitation*	36	17
Subjective complete functional recovery	47	21
Still disabled, living at home:		
Rehabilitation potentially beneficial	32	15
—Not interested in participating in further rehabilitation	8	4
—Interested in further rehabilitation	24	11
—Interested in one-year experimental home-rehabilitation programme	24	11
Total	214	100

* Due to dementia, mental disease, serious malignancies, etc., or potentially excluded from an experimental study, for example, due to subarachnoidal haemorrhage, concurrent CNS traumatic lesion, etc.

the HH catchment population was approximately 3/4 of the SWS population; and 3) that the ratio 4/2 corrects in part for follow-up restricted to patients with stroke incident during a 2-year period, this procedure thus giving an approximate estimate of the prevalence of survivors of stroke incident during the 5-year period preceding the prevalence day. Another, seemingly reasonable assumption embodied in the last-mentioned procedure was that stroke-related dysfunction established one year after acute stroke, persists during the following 4-year period (22). Ninety-five percent confidence intervals were obtained for sample-based prevalences using Schoenberg's procedure (19).

Information pertaining to rated and validated variables for the above-mentioned set of prevalent stroke victims was obtained in December 1989 by means of the In-patient Diagnosis Register and a semi-structured telephone interview conducted by a nurse or a physiotherapist, BS and MH, respectively. Register data referred to the period between the date of discharge following the acute event and December 1989, and consisted of: 1) duration of hospital stays in neurological, medical, and long-term or neurological rehabilitation wards; 2) hospital diagnosis after the stroke event; 3) deaths; and 4) changes of residence. When cognitive or communication problems were mentioned in the hospital records or suspected by the interviewer, the interview was also conducted with an adult member of the patient's family—invariably the spouse—who turned out to be available in most cases; where not available, however, the patient was deemed "not accessible". Questions on subjective activities of daily life (ADL), and motor and psychical activity were worked out based on the Hamrin & Wohlin activity index (7). The sections aimed at rating consciousness and orientation were excluded, and that concerning cognitive activity reformulated. In addition, data were obtained during the interview about post-discharge utilization of open care, and the subjective need for rehabilitation at the present time.

The information obtained by telephone for individuals who declared dysfunction due to stroke on the prevalence day was validated by comparing it against data obtained from a personal interview conducted in the patients' home, details of which have been reported elsewhere (27). The scores for functional activity obtained from the Hamrin-Wohlin scale were combined with those corresponding to the motor activity, as assessed by the shortened Lindmark scale (14). ADL ratings from the Hamrin-Wohlin scale were compared against ADL scores from corresponding items on the Katz's index (11). The scores given by each of the above-mentioned tests were dichotomized into functional or dependence and nonfunctional categories. Sensitivity and specificity for detection of functional activities and independence level by telephone (as compared to the results of the direct examination at home) were all obtained. Ninety-five percent confidence intervals were calculated for these proportions (13, 19). A Spearman Rank coefficient was obtained for scale scores.

In order to ascertain costs arising from hospitalization after stroke and identify the target group generating stroke survivors requiring rehabilitation, we plotted the data for duration of hospital stay of these patients on a graph of similar data reported for the population attended for stroke at SH in 1984 (8).

Data analysis

For the study variables, three comparisons were systematically run: 1) patients with lesions in the dominant hemisphere vs patients with non-dominant hemisphere lesions; 2) persons willing to receive more rehabilitation as usually provided in SWS vs those who were not; and 3) the same comparison stratified by gender. The statistical significance of differences found in the comparisons was assessed using the two tailed Fisher test for 2×2 tables, the Wilcoxon Rank Sum test for scale scores, a test for comparison of medians, and the Student's t-test for means. In the last-mentioned case, the Cochrane and Schatterwaite approximations were used when the variances were found to be significantly different. Statistical significance for deviation of normality distribution was tested using the Shapiro-Wilk W statistic (20). The calculations were effected using the SAS package (18).

RESULTS

One thousand two hundred and four hospitalizations resulting in a new diagnosis of TIA or acute stroke were registered in SWS in 1988. This corresponds to an incidence rate of 2.82 per 1000. On the other hand, 30% of the hospital stays of patients with TIA or acute stroke in the Neurology Department at HH in 1987–1988 were 10 days or longer. Furthermore, 28% corresponded to 214 patients under 80 years of age at hospitalization.

The breakdown by different categories of the above-

Table III. *Prevalent identified stroke survivors fulfilling requirements for rehabilitation, among patients hospitalized with acute stroke 1987–88 in the Dept. of Neurology HH broken down by location of lesion*
In parentheses, percent values.

Characteristic	Dominant hemisphere	Non dominant hemisphere	*p*-value
Proportion	18/32	14/32	0.725[d]
Mean age in years	67.0	65.8	0.710[a]
Use of health care in the past			
Mean hospitalization period (days)	97.7	92.1	0.999[b]
Mean duration of rehabilitation			
Months in hospital	1.1	1.3	0.349[b]
Months in day-care	4.3	3.3	0.465[b]
Months in open care	0.8	2.8	0.381[b]
Mean functional state score			
Total ADL	33.4	34.7	0.101[c]
Movement	4.8	5.4	0.121[c]
Hygiene	5.4	5.9	0.241[c]
Clothing	5.1	5.6	0.252[c]
Eating	6.0	6.0	—
Bladder function	6.0	5.9	0.284[c]
Bowel function	6.0	6.0	—
Communication	9.2	11.1	0.082[c]
Motor function in affected hemibody			
Total hemibody	9.7	10.3	0.314[c]
Arm	3.2	3.4	—
Hand	2.8	3.1	—
Leg	3.7	3.8	—
Mental activity	5.8	5.7	0.817[c]
Family and social situation			
Living alone	6 (33.3)	3 (21.4)	0.694[d]
Living with family member	12 (66.5)	11 (78.6)	0.694[d]
Living with family member			
Without handicap	8 (44.5)	9 (64.3)	0.308[d]
Living in home for the elderly	4 (22.2)	0	0.113[d]
Requiring home service	6 (33.3)	2 (14.3)	0.412[d]
Still working in same field	1 (5.5)	0	1.000[d]
Working in another field	0	1 (7.8)	0.419[d]
Early retirement	5 (27.8)	3 (23.1)	1.000[d]
Current use of health care			
In contact with district physician	9 (50.0)	9 (64.3)	0.490[d]
In contact with district nurse	12 (66.7)	6 (42.9)	0.283[d]
In day-care unit	4 (22.2)	5 (35.7)	0.453[d]
In some kind of rehabilitation programme at present	6 (33.3)	10 (71.4)	0.073[d]
Interested in further rehabilitation	13 (72.2)	11 (78.6)	1.000[d]
Accepted participation in project	13 (72.2)	11 (78.6)	1.000[d]

[a] *t*-test.
[b] Median test.
[c] Wilcoxon 2-sample test.
[d] Fisher exact test.

Table IV. *Characteristics of prevalent identified stroke survivors fulfilling requirements for rehabilitation, broken down by interest in participation in rehabilitation programme*

In parentheses, percent values.

	Participation in rehabilitation programme				
				p-value	
Characteristics	All	Interested	Not interested	Normality test[a]	For differences
Number	32	24	8		—
Male/female ratio	19/13 (59.4)	18/6 (75.0)	1/7 (12.5)		0.003[c]
Mean age in years	66.5	65.3	70.0	0.516	0.202[b]
Lesion located left	18 (56)	13 (54)	5 (62.5)		1.000[e]
Infarct	16	11	5		
Haematoma	2	2	0		
Other	0	0	0		
Lesion located right	14 (43.8)	11 (45.8)	3 (37.5)		1.000[e]
Infarct	11	9	2		
Haematoma	2	1	1		
Other	1	1	0		
Communication problem					
Severe	4 (12.5)	3 (12.5)	1 (12.5)		
Mild	6 (18.5)	4 (16.5)	2 (25.0)		
Use of health care in past					
Mean hospitalization period (days)	95.2	97.8	87.4	0.0084	0.999[c]
Mean duration of rehabilitation					
Months in hospital	1.2	1.4	0.6	<0.0001	0.308[c]
Months in day-care	3.8	5.1	0	<0.0001	0.044[c]
Months open care	1.6	2.2	0	<0.0001	0.020[c]
Mean functional state score					
Total ADL	33.9	34.7	31.9		0.003[d]
Movement	5.1	5.4	4.1		0.003[d]
Hygiene	5.6	5.8	5.1		0.063[d]
Clothing	5.3	5.5	4.9		0.189[d]
Eating	6.0	6.0	6.0		—
Bladder function	5.9	6.0	5.8		0.097[d]
Bowel function	6.0	6.0	6.0		—
Communication	10.1	10.1	10.0		0.770[d]
Total motor function	21.9	22.0	21.9		0.752[d]
Mental activity	5.8	5.9	5.3		0.017[d]
Family & social status					
Living alone	9	6 (25.0)	3 (37.5)		0.654[e]
Living with family member	23	18 (75.0)	5 (62.5)		0.654[e]
Living with family member without handicap	17	13 (54.2)	4 (50.0)		1.000[e]
Living in home for the elderly	4	3 (12.5)	1 (12.5)		1.000[e]
Requiring home service	8	5 (20.8)	3 (12.5)		0.378[e]
Still working in same field	1	1 (4.2)	0		1.000[e]
Working in another field	1	1 (4.2)	0		1.000[e]
Early retirement	8	7 (30.4)	1 (12.5)		0.642[e]
Current use of health care					
In contact with district physician	18	13 (54.2)	5 (62.5)		1.000[e]
In contact with district nurse	18	11 (45.8)	7 (87.5)		0.053[e]
In day-care unit	9	7 (29.2)	2 (25.0)		1.000[e]
In some kind of rehabilitation programme at present	16	12 (50.0)	4 (50.0)		1.000[e]

[a] For 32 individuals.
[b] *t*-test.
[c] Median test.
[d] Wilcoxon 2-sample test.
[e] Fisher exact test.

Table V. *Characteristics of prevalent identified female stroke survivors fulfilling requirements for rehabilitation*

	Participation in rehabilitation programme			
			n-value	
Characteristics	Interested	Not interested	Normality test[a]	For differences
Proportion	6/13	7/13		0.592[e]
Mean age in years	67.5	71.7	0.420	0.384[b]
Use of health care in the past				
Mean hospitalization period (days)	94.2	74.1	0.600	0.475[b]
Mean duration of rehabilitation				
Months in hospital	1.5	0.7	0.004	0.187[c]
Months in day-care	4.0	0	<0.0001	0.111[c]
Months in open care	2.8	0	<0.0001	0.040[c]
Mean functional status score				
Total ADL	35.7	31.9		0.005[d]
Movement	5.7	4.1		0.021[d]
Hygiene	6.0	5.3		0.212[d]
Clothing	6.0	4.7		0.043[d]
Eating	6.0	6.0		—
Bladder function	6.0	5.7		0.440[d]
Bowel function	6.0	6.0		—
Communication	11.3	10.9		0.696[d]
Total motor function	23.3	22.3		0.938[d]
Mental activity	6.0	5.4		0.210[d]
Family and social situation				
Living alone	3	2		0.592[e]
Living with family member	3	5		0.592[e]
Living with family member without handicap	3	4		1.000[e]
Living in home for the elderly	1	1		1.000[e]
Requiring social services	3	2		0.592[e]
Still working in same field	0	0		—
Working in another field	1	0		0.462[e]
Early retirement	0	0		—
Current use of health services				
In contact with district physician	3	5		0.592[e]
In contact with district nurse	3	7		0.070[e]
In day-care unit	0	1		1.000[e]
In some kind of rehabilitation programme	0	3		0.192[e]
Contact with open-care facility	0	2		0.462[e]

[a] For 13 individuals.
[b] *t*-test.
[c] Median test.
[d] Wilcoxon 2-sample test.
[e] Fisher exact test.

mentioned 214 incident TIA or stroke patients, after follow-up by telephone and using the register in December 1989, is presented in Table II. There was high attrition due to death, 27%, recovery of function, 22%, or long-term placement at geriatric wards and nursing homes, 11%. Twenty-four patients—18 males and 6 females—fulfilled requirements for further rehabilitation and were willing to participate in an eventual experimental trial. Eight persons—1 male and 7 females—fulfilling requirements for home rehabilitation were not interested in further rehabilitative activities and considered their participation in the trial unlikely. All 32 had presented stroke.

The estimated prevalence of home-bound stroke victims with subjective dysfunction based on the 32-person sample was 0.74 (95% CI 0.51–1.04) per 1000.

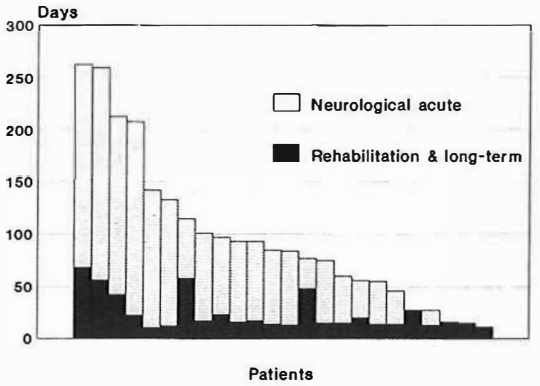

Fig. 1. Duration of hospital stay of a systematic sample of patients with acute stroke, attended during 1987 and 1988 in the Neurological Department wards at Huddinge Hospital, living at home in December 1989.

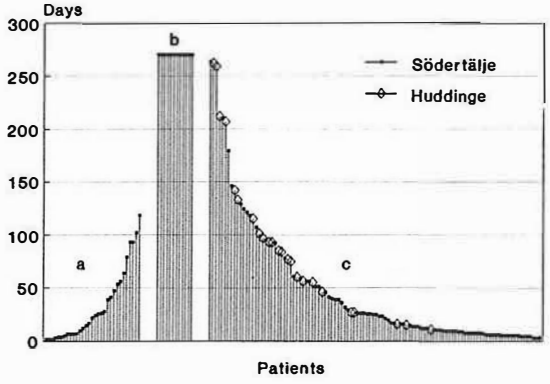

Fig. 2. Comparative overview of duration of hospital stay for patients attended for acute stroke in clinical departments of two general hospitals in South-West Stockholm. The patients admitted to Södertälje Hospital in 1984: a) died; b) remained hospitalized after 270 days, or c) were discharged from hospitals to their homes. The patients from Huddinge Hospital are those described in Fig. 1.

In one of the 32 prevalent cases, the coded diagnosis, viz., ischaemic stroke, was considered to be uncertain. Sixteen of these 32 patients were involved in rehabilitation at day-care centres, or had contact with physiotherapists, but most victims of stroke in the non-dominant hemisphere were included in this group, 10/14. The rehabilitation activities were minimal in most cases. One-third were partly satisfied with the rehabilitation received. One-third were aphasic. The group of 32 patients was not evenly distributed by hemispheric site of lesion (see Table III), but no statistically significant differences were found between groups according to site of lesion. The proportion of patients in rehabilitation was higher among those with non-dominant hemisphere lesions, 71.4% vs 33.3%, $p = 0.073$. The proportion of persons refusing participation in rehabilitation among those with non-dominant hemisphere lesions, 5/18, was not significantly higher than that found among those with right hemisphere lesions, 3/14.

The estimated prevalence of home-bound stroke victims with subjective dysfunction and need for rehabilitation was 0.56 (95% CI 0.36–0.83) per 1000, based on 24 prevalent stroke victims who declared their interest in further rehabilitation. This prevalence gave an estimated number of 192 individuals in similar conditions in the SWS population.

The characteristics of the groups made up of those interested and those not interested in participation in a rehabilitation programme are presented in Tables IV and V. The groups differed considerably in age, gender, length of hospitalization due to stroke, current use of rehabilitation services and primary care services, ADL score and psychical activity. As seen in Table IV, the group interested in rehabilitation was principally composed of men, 75%; performed better in ADL—particularly mobility—and psychical activity; had used more rehabilitation services in day-care as well as primary care after stroke; and was more involved in rehabilitation. The group not interested was, on average, 4.7 years older and basically made up of women, 7/8. When the comparison was made among women (see Table V), most differences persisted, but were of low statistical significance, except for ADL scores for movement, hygiene and clothing, length of rehabilitation treatment in open care and ($p = 0.070$) current, regular contact with a district nurse.

The duration of hospitalization due to stroke for the 24 prevalent patients willing to participate in rehabilitation programmes is depicted in Fig. 1. The average duration was 95.2 days, SD 70.9. A considerable proportion, 10/24, corresponded to patients hospitalized for 2–4 months.

In Fig. 2, the durations of the 24 hospital stays of the home-bound patient group are plotted on the graph to represent duration of hospitalization in medical and long-term rehabilitation clinics at Södertälje Hospital for stroke patients incident in 1984 and discharged to their homes. The prevalent home-bound stroke victims fulfilling requirements for and willing to participate in home-rehabilitation programmes constitute a group whose post-stroke hospital stays corresponded approximately to those of 25% of the incident cases.

Table VI. *Results of the validation procedure*
In parentheses, p values and 95% confidence intervals.

Compared measurements	Spearman Rank Coefficient (*p*-value)	For independence status	
		Sensitivity	Specificity
Hamrin-Wohlin functional activity vs Lindmark's motor capacity (scores for paretic side)	0.70 (0.0003)	19/40[a] 0.48 (0.53–0.32)	114/120[a] 0.93 (1.00–0.72)[b]
ADL Hamrin-Wohlin vs ADL extended Katz	—	3/10[a] 0.30 (0.58–0.03)	50/50[a] 1.00 (1.00–0.67)[b]

[a] Number of measurements categorized as presence or absence of dysfunction, independent or dependent function.
[b] 95%. CI obtained from a Poisson distribution (16).

At hospitalization for acute stroke in SH in 1984, this group presented an ADL Katz-index score between levels D and F (9).

The results of the validation procedure are listed in Table VI. The subjective information obtained by telephone showed low sensitivity, high specificity and a good correlation with the rating scores ascribed by the therapists during the home visit.

DISCUSSION

This study has shown that the need for rehabilitation for stroke victims in SWS is perceived by at least one prevalent non-institutionalized individual among 2000, and that the prevalence of self-reported stroke-related dysfunction amounts to at least 1 in 1000. Most of these persons present motor dysfunction and one-third are aphasics. In spite of the lack of perceptual assessment due to the difficulties inherent in screening such deficits by telephone, the higher frequency of patients with non-dominant hemisphere lesions in late post-stroke rehabilitation programmes may confirm that perceptual deficits play a significant role in demand for these services (5).

About 25% of the prevalent stroke victims with dysfunction living at home, who would be potentially good candidates for beneficial rehabilitation treatment, do not want to participate in further rehabilitation. The discordant pattern observed for this group—similar motor dysfunction, but lower transfer and mental activity, older age, and predominantly female—suggests that depression or other mood disorders, frequent consequences of stroke (9, 21), or lack of adequate coping might underlie the low ADL level reported. Since these patients may have ineffective links with primary care nurses, alert systems for follow-up of stroke patients in SWS and in other populations might be needed for the diagnosis and treatment of post-stroke mood disorders. The resistance to change apparent in late rehabilitation should be explored in greater detail (3).

The comparability of these results is limited by the methodology, i.e. telephone interview, restriction of the follow-up to 28% of the incident hospitalizations, and lack of validation of registered incident stroke diagnosis. For example, it is likely that the high case fatality of 27% is related to exclusion of TIA and minor stroke cases with short hospital stays. The selection induced by the systematic sampling of hospital, department, duration of hospitalization and age, which is required both for an in-depth analysis of cases relevant for rehabilitation and for logistic reasons, enhances rather than undermines the usefulness of the data for planning purposes. The good correlation observed between communication, motor deficits and ADL scores from telephone interviews and those obtained by the therapists, as well as the high specificity and low sensitivity, suggest that our results regarding functional level and prevalence are reliable underestimates.

The group interested in further rehabilitation displays a marked heterogeneity in age, sex and ADL scores. The excess of male subjects among the potential target population for late stroke rehabilitation in the community might be explained by the higher incidence of stroke in men at an earlier age and the availability of healthy spouses for male stroke victims (15). Our results in Sweden confirm that stroke patients living at home enjoy a considerable amount of informal care and that resources for stroke rehabilitation could be found among potential assistants in specific programmes (2, 10). The development of

home-based rehabilitation for each person in this heterogeneous group requires mapping a wide range of activities suitable as a basis for task-oriented rehabilitation programmes (16). Patients with dysfunction at Katz levels of D to F soon after acute stroke, who have access to potential informal caregivers, could constitute a preferential target group for rehabilitation in the community.

The average duration of hospital stay for major stroke in Lund was 97 days (23, 24). This figure included data on patients who had died, were chronically hospitalized, had completely recovered, or did not want to participate in rehabilitation. Stroke survivors living in the community in SWS, who manifested a need for rehabilitation 1–3 years after acute stroke, had hospital stays of similar duration, a mean of 97.8 days. Our results suggest that the monetary cost of new management strategies for such stroke survivors can be compensated by savings resulting from the shortening of the long hospitalization periods in medium- and long-term rehabilitation wards. All potential benefits and risks of a post-stroke care programme—including those not related to rehabilitation—should be taken into account: for example, those attaching to early diagnosis of depression. These and other data suggest that rehabilitation and follow-up of stroke victims should be embodied in a single process subject to ongoing economic and policy appraisal. This would require that the multiple public service organizations providing care for stroke—day-care and primary care centres, hospital acute medical and neurological clinics, and medium and long-term rehabilitation wards—collaborate in experimental stroke-outcome research. Since a trial for home rehabilitation requires that entry and randomization take place in the wards for acute stroke, transfer from acute care to long-term or rehabilitation care should be effected under experimental conditions, taking into account the alternative of home rehabilitation and follow-up. In any well defined policy for stroke care and rehabilitation in Sweden, already in the planning process, it is not only competition but also agreement across units delivering public services that should be borne in mind. Such a collaboration could be a crucial element in such experimental designs and relevant for ethical clearance.

We conclude that: 1) the prevalence of home-bound stroke victims with subjective dysfunction due to stroke was high enough to be considered a potential target group for rehabilitation services; 2) a more precise definition of functional status coupled with identification of personal interests and existing resources is needed for design of rehabilitation programmes; and 3) undetected depression secondary to stroke may affect an important proportion of these patients. Home-bound rehabilitation with reduction of hospital stay for selected patients can be functionally and socially advantageous and cost-effective. Evaluation of this process requires simultaneous consideration of rehabilitation and other aspects of post-acute stroke care.

ACKNOWLEDGMENTS

We gratefully acknowledge the comments from Peter Allebeck, Vasilios Kostulas, Hans Link and Ake Siden, and the assistance of Michael Benedict, Martha Messman and Mar Martin. This study was supported by the Swedish Medical Research Council (B88-27-8330-01), the Swedish Academy of Medicine and the Spanish Ministry of Foreign Affairs.

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