

Stroke Patients in South Madrid

Function and Motor Recovery, Resource Utilization, and Family Support

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Background and Purpose—The purpose of the present study was to describe the epidemiology of stroke disability and the use of health resources in South Madrid.

Methods—Among a population of 665 168 residents in South Madrid, patients with an acute stroke of clinical onset during March to July 1996 who were seen at a general hospital or at 1 of 3 primary care centers were evaluated at baseline (n=147) and at 3 months (n=110) and 6 months (n=112) after stroke. We assessed the frequencies of stroke and stroke-related residual disability per population unit, as well as the impairment, disability, secondary complications, use of health resources, and impact on quality of life.

Results—In patients ≥ 60 years old, the incidence of stroke with severe residual disability after 6 months was 75 per 10 000, was higher in men, and increased with age; the proportion of survivors among those examined at baseline was 20%. The use of hospital days per population unit was similar to that of reported European data, but the use of other health care resources was less. Patients frequently used bladder and nasal catheters and presented with shoulder pain. Social activities were infrequent and decreased after stroke. Access to technical aids was limited, and home adaptations were exceptional. The impact of stroke on health-related quality of life among patients and main caregivers was modest.

Conclusions—The study shows that in South Madrid, (1) the use of health resources after stroke is low; (2) patients with stroke register low activities of daily living scores with a comparatively small impact on quality of life; and (3) relative to need, the use of rehabilitation, aids, and home adaptations and services was low. (*Stroke*. 2000;31:1352-1359.)

Key Words: family ■ health resources ■ stroke ■ stroke outcome

Stroke mortality rates among the 4.5 million persons in Madrid in 1990 to 1995 (ie, 59.5 and 47.3 per 100 000 for men and women when age adjusted to the European population)¹ rank among the lowest rates in Europe.^{2,3} However, data on stroke incidence, impairment, disability, handicap, or use of health care and social services by patients with stroke in Madrid are lacking. Not only is there a dearth of data of a similar nature for other Spanish populations, but such data are difficult to extrapolate to Madrid in view of the considerable geographical variation in stroke mortality rates across Spain.^{1,3,4} Results from studies on disability or the use of health care and social services based on patients admitted to large Madrid hospitals^{5,6} are difficult to interpret due to frequent selection bias, subsequent referral to other institutions from the emergency wards where patients with stroke are originally observed, and lack of reference to the population source of patients.

With the use of a population-based series of incident stroke patients who were resident in South Madrid (SM) and followed up during 6 months, we sought to describe (1) impairment, disability, and handicap; (2) the use of health care and social resources and of informal care; and (3) the complications of stroke.

Subjects and Methods

Study Population and Health Care Services

The population that generated the patients under study was geographically defined as residents of Public Health District XI in the Madrid Autonomous Region (MAR). This population, which totaled 665 168 on January 1, 1996, according to official statistics, was urban and resident in SM and registered lower economic and educational levels than those of the general population of the MAR.⁷ The majority consisted of persons who had migrated from other Spanish regions during the period of 1960 to 1970.⁷ In practice, 98% of the entire SM population was entitled to receive primary and hospital care supplied free of charge by the public health services run by Spain's INSALUD (National Institute of Health). Acute hospital care was provided by only 1 general hospital, the 12 de Octubre Hospital, a facility that has 1364 beds. As in other urban populations in Spain, patients with acute stroke were in general referred to the hospital emergency ward by general practitioners or specialists at a primary care center or specialized outpatient clinic or reached the hospital emergency ward on his or her or a relative's initiative.⁸ CT scan was a routine examination for all such patients. After an examination by the on-duty neurologist, patients were admitted to the internal medicine, neurology, or rehabilitation ward at the same hospital or at 1 of 4 other institutions for continuing care. Long-term care was provided at 3 institutions, public and private, acting on a prepaid basis. As an exception, the patient was referred from the

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TABLE 1. Medical History, Clinical Diagnosis, and Socioeconomic Characteristics of the Study Patients

Variables	
Age, mean \pm SD, y	72 \pm 12
Sex, F/M	49/51
Medical history	
Stroke	27
Transient ischemic attack	8
Ischemic heart disease	18
Cardiac insufficiency	20
Hypertension	60
Diabetes	25
Respiratory disorder	18
Musculoskeletal disorder	8
CT abnormal during initial hospitalization	87
Clinical diagnosis	
First stroke	68
Recurrent stroke	32
Infarction/hemorrhage lesion	87/13
Right/left hemisphere lesion	47/43
Level of education	
Never schooled	56
Primary studies unfinished	16
Primary studies	17
Secondary studies	10
Illiterate	14
Profession	
Unskilled/blue-collar/white-collar and professionals	55/31/14
Civil status	
Living with spouse	56
Children living at home	45
Housing facilities	
Telephone/heating/elevator	95/51/36
Automobile	23
Insufficient economic situation	24
Independent on Katz personal and instrumental ADL before stroke	41
Frequency at social activities before stroke (0–45)	14 (8–23)*

Values are given as percentages, unless otherwise indicated, of a total of 147.

*Median (IQR).

emergency ward to his or her home for further follow-up by his or her family physician or was hospitalized in another ward at the 12 de Octubre Hospital. Specialists in rehabilitation and physiotherapists and occupational and speech therapists were mainly available at this hospital. The study underwent ethical evaluation by the 12 Octubre Hospital Committee.

Case Identification and Inclusion Criteria

Patients diagnosed with acute stroke at the emergency ward of the 12 de Octubre Hospital and at 3 primary care centers were identified from patient attendance lists by 1 of the authors (M.J.M.). Criteria for inclusion were (1) clinical diagnosis of stroke⁹ by a neurologist at the

12 de Octubre Hospital or a general practitioner at any of the primary care centers, (2) stroke onset between March 3 and July 10, 1996, and (3) permanent or periodic residence in MAR Public Health District XI. To control for referral bias, patients who received care for a stroke in 1996 at 1 of 3 primary care centers with a population coverage of 17 453 were identified and their medical records were examined in 1997.

Evaluation

A protocol was completed that showed clinical and socioeconomic data; level of impairment, disability, and handicap; and secondary complications. In addition, data on the use of hospital and rehabilitation services were collected from patient records or interviews with patients and main caregivers. The protocol was tailored according to the procedure used by Widén Holmqvist et al^{10–12} in the Southwest Stockholm stroke studies. The patients were evaluated at 5 to 10 days, 12 \pm 1 weeks, and 24 \pm 1 weeks after the initial hospitalization. Evaluations were conducted by 8 purpose-trained physiotherapists and, depending on the individual situation, took place at the hospital or in patients' homes. At each point in time, the same evaluation methods were used for mental function,^{13,14} presence of aphasia according to the medical record, motor capacity,^{15,16} time to walk 10 m,¹⁷ manual dexterity,¹⁸ activities of daily living (ADL),^{19–21} and frequency of social activities.²² Health-related quality of life was measured at 3 and 6 months with the use of the Sickness Impact Profile (SIP)²³ for patients who scored \geq 24 on the Mini-Mental State Examination (MMSE)¹⁴ and for main caregivers who agreed to be interviewed.

Epidemiological and Statistical Analyses

Age- and sex-specific incidences were calculated both for stroke and for such events classified into different levels of disability according to the Katz ADL grade at 5 to 10 days and 6 months after stroke onset in the SM population. Age- and sex-adjusted incidences were obtained with use of the European population as reference. The crude prevalence of 2 disability levels in the survivors of the incident stroke population at different time points was also determined. The statistical procedures that were used to evaluate changes over time were χ^2 test plus the following nonparametric tests: McNemar's test for ADL, manual dexterity, and independence in walking 10 m and Wilcoxon's signed rank test for motor capacity, MMSE, frequency of social activities, and SIP.

Results

Two hundred seventeen individuals were registered as diagnosed with acute stroke at the 12 de Octubre Hospital during the study period. Perusal of their medical records resulted in rejection of the stroke diagnosis in 7 cases. Seven additional patients did not belong to the study population. Fifty-six patients were not examined 5 to 10 days after acute stroke: 3 patients were immediately transferred to other towns, 9 patients refused to collaborate, 7 could not be located, and 37 died before examination (for a total of 70 individuals). Therefore, in all, 147 patients were evaluated at a mean of 8 days after the initial hospitalization: 110 patients were evaluated at 3 months, and 112 patients were evaluated at 6 months after stroke. Ten examined patients died within the first 30 days after stroke. At the 3 primary care centers, 43 patients with registered stroke diagnoses received attention in 1996: in 12 cases, records were not available, and 4 patients had not had a stroke but proved to have had a transient ischemic attack (n=3) or myocardial infarction (n=1). A small proportion (5 patients) had had stroke with clinical onset during the study period of March 3 to July 10, 1996. However, although 3 of the 5 were included in our study at the 12 de Octubre Hospital, 2 were not: 1 had received

TABLE 2. Patient Status at 5 to 10 d and 3 and 6 mo After the Stroke

Variable (Range of Scores)	5–10 d (n=147)	3 mo (n=110)	6 mo (n=112)
Presence of aphasia	45 (31)	21 (19)	22 (20)
MMSE score ≥ 24 (0–35)	61 (42)	63 (57)	63 (56)
Motor capacity			
Arm (0–57)	23 (0–51)*	50 (11–57)*	54 (20–57)*
Leg (0–36)	18 (4–29)*	28 (17–36)*	29 (19–35)*
Coordination (0–12)	4 (0–8)*	8 (1–12)*	10 (4–12)*
Mobility (0–27)	12 (1–22)*	21 (11–27)*	24 (17–27)*
Balance (0–21)	10 (2–16)*	15 (9–21)*	18 (11–21)*
Total score (0–153)	65 (11–65)*	121 (64–148)*	133 (81–148)*
Able to walk 10 m			
Without aid	29 (20)	47 (43)	69 (62)
With aid	13 (9)	23 (21)	19 (17)
With aid and supervision	20 (14)	16 (15)	4 (4)
Not able to walk	85 (58)	24 (22)	20 (18)
Median walking time, min	25 (20–35)*	23 (16–30)*	18 (14–28)*
Able to perform Nine Hole Peg Test	55 (37)	67 (61)	77 (76)
Katz ADL grade			
A–E	76 (51)	88 (71)	84 (75)
F–G	71 (49)	22 (29)	28 (25)
Barthel ADL (0–100)			
30–100	...	96 (87)	93 (83)
0–25	...	14 (13)	19 (17)
Frequency of social activities (0–45)		6 (0–16)*	8 (0–19)*
Reported falls	0	41 (38)	40 (39)
Falls resulting in injuries			
Fractures	0	3 (3)	2 (2)
Soft parts	0	13 (13)	11 (27)
Joint pain			
Paretic side	38 (26)	40 (36)	55 (49)
Nonparetic side	12 (8)	14 (13)	23 (20)
Overall	37 (25)	41 (37)	56 (50)
Bladder catheter	31 (21)	8 (7)	3 (3)
Nasal catheter	20 (14)	5 (5)	1 (1)
Bed sores	7 (5)	2 (2)	2 (2)

Values are given as number of patients with percentages in parentheses.

*Median (interquartile range).

emergency care at a different hospital, and the other, having undergone CT examination and diagnosis for stroke at the 12 de Octubre Hospital, had been neither hospitalized nor registered as a stroke patient.

The medical history, clinical diagnosis, socioeconomic characteristics, and ADL and frequency of social activities before stroke of the 147 patients are shown in Table 1. The mean age was 72 years, and 49% were women. The health status of the majority of patients had already been affected before the stroke. More than half of the patients had hypertension, 25% were diabetics, and 18% had previously had a stroke. The vast majority of patients were clinically diagnosed with ischemic infarction. Abnormal CT scans was found for 87% of patients. Fifty-six percent of the patients had not attended school, and 14% declared themselves

illiterate. Insofar as professional status was concerned, most were unskilled. Fifty-six percent were living with their spouses. With regard to housing facilities, 95% had a telephone, 51% had central heating, and 36% had a elevator. Twenty-four percent perceived their economic situation as insufficient. Before the stroke, more than half of the patients were restricted in ADL, and the frequency of social activities was low.

Table 2 lists the presence of aphasia; mental, motor, and walking capacities; manual dexterity; ADL; frequency of social activities; and secondary complications recorded at the 3 evaluation times. Medical records showed that in the acute stage, almost one third of patients had mental function within normal limits and displayed aphasia. At 5 to 10 days after stroke onset, a considerable impairment to motor capacity,

TABLE 3. Mean, Median, and IQR Scores of Health-Related Quality of Life by SIP at 3 and 6 mo for Patients Who Scored ≥ 24 on MMSE After Stroke

Category	3 mo (n=61)			6 mo (n=61)		
	Mean	Median	IQR	Mean	Median	IQR
Overall SIP	31.3	27.1	18.3–39.7	20.6	17.8	8.2–31.0
Physical dimension	21.4	14.4	8.4–32.2	15.1	11.6	1.9–26.0
Ambulation	23.1	10.6	5.7–40.3	17.9	6.5	0.0–33.5
Mobility	26.5	20.4	10.0–87.1	19.4	12.0	0.0–33.9
Body care and movement	25.4	16.6	6.0–36.4	18.3	7.4	0.0–28.6
Psychosocial dimension	29.9	25.3	15.7–41.9	20.9	15.7	4.8–28.8
Social interaction	23.9	22.4	12.0–33.6	17.4	13.7	5.8–23.8
Alertness behavior	34.2	23.4	10.8–54.4	25.9	14.5	0.0–33.1
Emotional behavior	26.2	26.2	8.7–78.5	19.0	11.8	0.0–30.8
Communication	27.6	21.1	11.4–30.7	16.6	5.0	0.0–20.8
Independent categories						
Sleep and rest	31.3	21.4	12.2–34.0	20.2	12.2	9.8–33.8
Eating	15.2	11.3	6.0–17.0	7.5	6.0	0.0–11.3
Work	12.0	0.0	0.0–0.0	8.5	0.0	0.0–0.0
Home management	35.0	23.9	6.8–91.9	24.9	8.4	0.0–48.2
Recreation and pastime	34.4	28.4	12.0–48.3	21.4	16.3	0.0–34.5

0 indicates no subjective dysfunction; 100, maximal subjective dysfunction; IQR, interquartile range.

amounting to as much as 44% of the maximum total score, was observed, with a high proportion of patients unable to walk (58%) or perform the Nine Hole Peg Test (37%). At this point in time, 51% of the patients were of Katz ADL grade A to E, indicating that they were continent and independent in feeding. In general, remarkably higher functional scores, as seen from patient distributions or median values, were evident, especially during the first 3 months after the stroke, and even at 6 months. The frequency of social activities versus the situation before the stroke is described in Table 1; it decreased to 43% at 3 months and recovered to 57% of the initial median value at 6 months. Regarding secondary complications, 38% and 39% of the patients had experienced falls during each of the 3-month intervals, and 5 had had fractures to the hip (n=3), elbow (n=1), or ribs (n=1). The proportion of patients who reported pain increased with time after stroke, and pain in the affected side was reported by 25% of patients at 5 to 10 days and by 37% and 49% at 3 and 6 months, respectively. At the first evaluation, 21% of patients had a bladder catheter, and bedsores were observed in almost 5%. When the analysis was run on the patients for whom data had been recorded at each of the 3 time points (n=103), changes over time were similar. Statistically significant changes between 3 and 6 months were observed for total motor capacity ($P=0.0006$), ability to walk 10 m without an aid ($P=0.001$), and frequency of social activities ($P<0.001$). However, no such changes were observed for independence in Barthel ADL, ability to perform the peg test, or MMSE.

Data on the health-related quality of life on the basis of SIP for patients with an MMSE score of ≥ 24 and for main family caregivers are shown in Tables 3 and 4, respectively. The health-related quality of life for patients was moderately affected, with the median overall SIP score increasing from

27 to 18 points at 3 and 6 months. Stroke had a high impact on the quality of life of main family caregivers: measured as median SIP scores at 6 months, it was 61% of that for patients. Above all, Recreation and Pastime was the most affected SIP category among patients and family caregivers, with similar impact scores being reached. In both cases, the psychosocial dimension was more affected than the physical dimension, but for family caregivers, the decrease in subjective dysfunction with time was small. The changes over time at 3 and 6 months in overall, physical, and psychosocial dimensions of SIP scores proved to be statistically significant ($P<0.001$) for the 53 patients on whom data had been recorded at both time points but not for 23 tested family caregivers ($P=0.287$, 0.114, and 0.098, respectively).

Hospitalization time, resource use of rehabilitation services, and delay in the receipt of therapy are given in Table 5. One third of patients were transferred from the emergency ward of the 12 de Octubre Hospital to other health facilities. The mean duration of initial hospitalization was 26 days for all initially examined patients, although the time for recurrent hospitalization during the first 6 months for 17% of such patients was 22 days. Although 36% of the patients had received physiotherapy during the first 6 months, 66% of those who received physiotherapy had started therapy >3 weeks after stroke onset. Lower percentages (28% and 5%) had received occupational therapy and speech therapy, respectively, with delay in therapy initiation again being very much evident. The proportions of patients receiving therapy decreased considerably during the second quarter after stroke.

Resource use of different health-related services is shown in Table 6. First-degree relatives, mainly women, accounted for informal care for two thirds of the patients. Only 2% of patients received support offered by the formal system.

TABLE 4. Mean, Median, and IQR Scores of Health-Related Quality of Life by SIP of Family Caregivers at 3 and 6 mo After Stroke

Category	3 mo (n=51)			6 mo (n=43)		
	Mean	Median	IQR	Mean	Median	IQR
Overall SIP	14.3	13.6	8.2–16.8	13.9	11.0	4.5–15.7
Physical dimension	5.9	4.6	0.0–10.0	4.9	4.4	0.0–7.1
Ambulation	5.9	0.0	0.0–8.6	4.5	0.0	0.0–0.0
Mobility	14.9	9.8	0.0–23.3	9.7	6.9	0.0–16.6
Body care and movement	3.6	0.0	0.0–3.1	2.9	0.0	0.0–0.0
Psychosocial dimension	15.5	14.2	5.4–21.8	11.5	8.4	4.1–18.4
Social interaction	12.6	0.0	0.0–20.8	16.0	12.3	6.9–24.0
Alertness behavior	17.7	12.4	0.0–28.0	9.6	0.0	0.0–10.0
Emotional behavior	17.8	16.3	0.0–29.3	15.1	10.4	0.0–26.8
Communication	7.9	0.0	0.0–11.4	3.6	0.0	0.0–0.0
Independent categories						
Sleep and rest	12.5	12.2	0.0–12.2	13.6	12.2	0.0–12.2
Eating	3.8	0.0	0.0–5.2	1.4	0.0	0.0–0.0
Work	7.9	0.0	0.0–6.0	9.1	0.0	0.0–0.0
Home management	10.3	0.0	0.0–14.6	5.4	0.0	0.0–6.5
Recreation and pastime	28.7	22.5	8.5–41.9	18.5	16.3	0.0–27.9

0 indicates no subjective dysfunction; 100, maximal subjective dysfunction; IQR, interquartile range.

Technical aids were provided to a few patients: wheelchairs (27%), canes (24%), beds with rails (9%), shower chairs (6%), and bath seats (5%). The installation of support handles or other home adaptations was quite infrequent and was paid for by the users.

The age- and sex-specific incidences of stroke of different ADL categories after onset or 6 months after stroke are depicted in Figure 1. The age-specific incidence of first-ever stroke increased with age and was systematically higher than that for recurrent stroke, which rose less noticeably with age (Figure 1a). The incidence of mild-to-moderate stroke, ADL grade A to E (Figure 1b), increased evenly with age and was systematically higher among men. As seen in Figure 1c, the incidence of severe stroke, Katz ADL grade F to G, was similar for men and women but increased severalfold at ages of >80 years. The incidence of stroke with severe residual dysfunction was lower than that of stroke with mild residual dysfunction and increased particularly with advanced age

(Figure 1d). The crude incidences of initially mild-to-moderate and initially severe stroke per 10 000 person-years among patients aged ≥ 60 years were 16.6 for men and 7.3 for women. The corresponding incidences, age adjusted to the European population, per 10 000 person-years were 16.7 and 6.6, respectively. Crude and age-adjusted incidences for both sexes for stroke with mild-to-moderate residual dysfunction per 10 000 person-years were 12.8 and 12.4, and those for stroke with severe residual disability were 4.8 and 4.4, respectively.

TABLE 6. Number of Patients Using Health-Related Services During the First 6 mo After Stroke

Resource	
Main family caregivers	100 (89)
Spouse	47 (47)
Daughter	23 (23)
Daughter-in-law	19 (19)
Other relatives	11 (11)
Home help service	3 (3)
Help from other persons before stroke	10 (9)
Alarm system before stroke	1 (1)
Contact with patients' organization before stroke	3 (3)
Technical aids provided	
Wheelchair	44 (39)
Stick	38 (34)
Shower chair	14 (13)
Bath sit	13 (12)
Fence bed	19 (17)
Supporting handle (home adaptation)	10 (10)

Values are given as number of patients with percentages in parentheses of a total of 147.

TABLE 5. Hospitalization Resource Use and Delay in Starting Rehabilitation Services During the First 6 mo After Stroke

Resource Use	Mean \pm SD
Initial hospitalization, d	147 \pm 26
Recurrent hospitalization	26 (17) \pm 18
Physiotherapy (visits)	53 (36) \pm 62
Start of therapy >3 wk after stroke	35 (66)*
Occupational therapy (visits)	31 (28) \pm 26
Start of therapy >3 wk after stroke	18 (58)*
Speech therapy (visits)	8 (5) \pm 27
Start of therapy >3 wk after stroke	6 (75)*

Values are given as number of patients with percentages in parentheses.

*Of the total receiving the corresponding therapy.

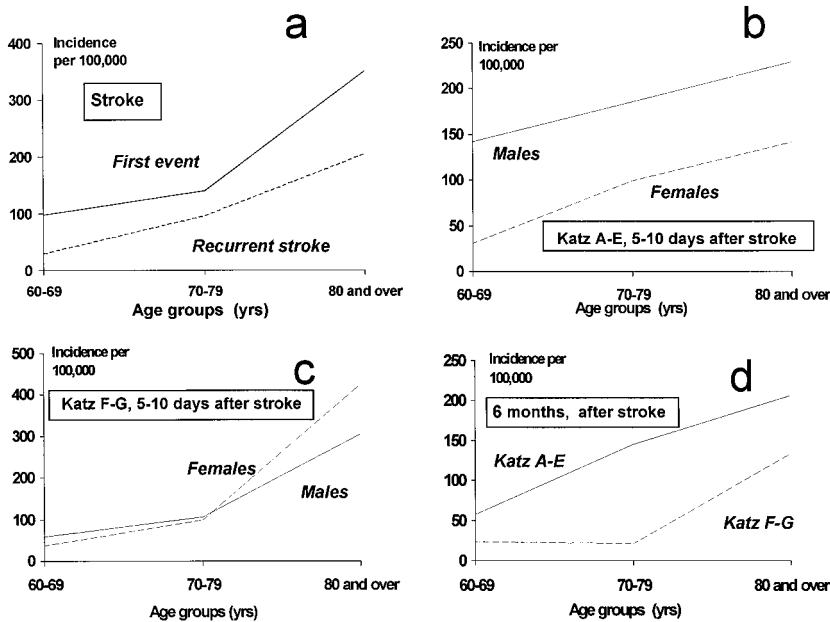


Figure 1. Age- and sex-specific incidences of first-ever and recurrent stroke (a), corresponding to mild-to-moderate and severe stroke (a-d), as seen in different ADL categories when measured 5 to 10 days after onset (a-c) or 6 months after stroke (d).

Discussion

Despite limitations due to the predominantly hospital-based nature of the study, the results provide a view of stroke in SM from a clinical and epidemiological perspective. Each year, 5 of 10 000 individuals aged >59 years in the SM population, ≈ 75 persons, present with stroke characterized by severe residual disability after 6 months. Other remarkable results are the low stroke incidence, limited linear increase in incidence of mild-to-moderate stroke with age, and lower incidence of mild-to-moderate stroke in aged women versus men. The proportion of stroke survivors at 6 months with high residual disability is high (20%). In contrast, the use of health care resources, including rehabilitation, by population unit and stroke-population survivors, is low. High proportions of patients used bladder and nasal catheters and presented with shoulder pain. Access to technical aids was limited, and access to home adaptations was exceptional. Despite limitations, the study suggests that there is an insufficiently covered need for stroke patient care in SM.

When patients who were not examined at 5 to 10 days after the stroke were excluded, the age-specific incidence in the present study was considerably lower than that reported in 4 well-designed studies²⁴ (Figure 2). Stroke mortality incidence during a 129-day period among the general SM population in our cohort was 25.1 per 100 000 person-years when 37 patients who died and were not examined were included (ie, low compared with the MAR data). Although the failure to identify prior stroke events by clinicians cannot be excluded, thus leading to a proportion of recurrent events being misclassified as first stroke, we believe that our figures for incidence and mortality constitute underestimates because (1) 10% to 40% of all patients die before hospital admission,²⁴ (2) the increase of first-ever stroke incidence with age in our results is linear (ie, low), (3) some stroke patients seen at primary care centers had not been referred to the 12 de Octubre Hospital, and (4) seasonality is a factor.²⁵ The epidemiological view that emerges from the present study is

that stroke frequency in SM, and therefore the need for care, may be higher than that reported in the present study. Our primary care sample of 5 patients is too low for an accurate estimation of the proportion of stroke patients who were not hospitalized. We believe that stroke underdiagnosis and home care of patients with mild stroke are reasons for a lack of hospital registration that is more frequent than in our primary care sample and we therefore believe that such a proportion may reach 30% of incident stroke at SM.

The 210 admissions, which included noncollaborated and nonresident patients, translated as a hospital stroke admission rate of 95.6 per 100 000 inhabitants, which was much lower than comparable figures reported in Brisbane, Australia, in the early 1990s ($n=284$)²⁶ or in Southwest Stockholm in 1988 ($n=350$ including TIAs).²⁷ The average initial hospital stay during the first 6 months for 147 stroke survivors was 26 days, which means that annual hospital use per 100 000 inhabitants due to stroke was 1626 patient-days, which is considerably lower than the 67 days reported for patients with stroke who were discharged from hospitals in Stockholm County in 1989.²⁸

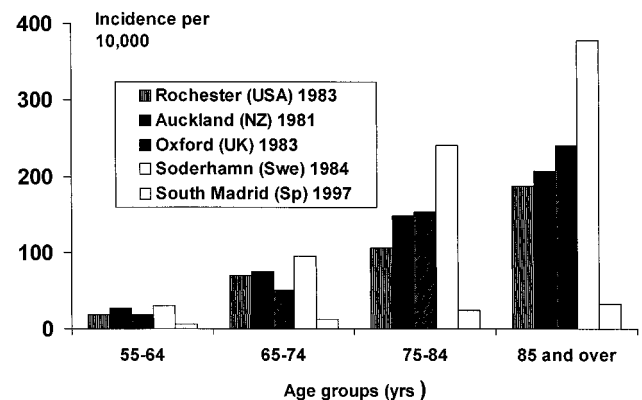


Figure 2. Age-specific incidences of first-ever stroke from selected reported surveys and as seen in survivors 5 to 10 days after stroke onset in SM.

The frequent transfer of stroke patients to private long-term care institutions and discharge to home might also explain the low initial hospital care use by stroke patients per population unit in SM. Informal care at home appears to be the most important resource for service and help for stroke patients in the SM population.

The stroke population followed up in this study was strongly characterized by a large proportion of patients with poor housing facilities, low income, and low educational level. Despite the use of an MMSE version standardized for education, the low educational level might explain the very low MMSE score seen in our study. The proportions of Katz ADL grade A to E observed in Scandinavian hospital-based stroke studies²⁹ were similar to that in SM (51%). However, the low proportion of Katz ADL grade A in SM (12% versus a corresponding 23%²⁹) may suggest that a considerable proportion of mild stroke patients in SM never reach the hospital and reinforces the above-mentioned notion of low resource use with regard to hospital care and outpatient rehabilitation. As far as complications of stroke are concerned, the increase in joint pain over time might be explained by the unattended need for rehabilitation and the delay in starting therapy, because this was greater than in other studies.³⁰ The proportion of falls was similar to that observed elsewhere.³¹

Social activities were considerably low before stroke and decreased at 6 months after stroke, but the low validity of the instruments used may have induced cultural bias. The impact of stroke on quality of life appears to be modest¹² determined perhaps by the low activity level before stroke. The quality of life of main caregivers was markedly affected by their relatives' stroke.

The median hospital stay in SM was similar to those observed in other European studies,^{30,32-34} where a wide variation was reported. The proportion of patients receiving physical therapy was considerably lower than that observed elsewhere.^{32,33} With the high proportion of patients with low ADL F to G grades at 5 to 10 days (49%) taken into account, the use of such resources in our series appears to be low. However, the mean number of physical, occupational, and speech therapy sessions during the 6-month period, which was not reported in other studies,^{32,33} appears to be high. Furthermore, the proportion of patients, delay of onset, and time span on treatment indicated that as opposed to physical therapy, the use of occupational and speech therapy was lower. Hence, it appears that in the context of hospital-based stroke therapy in SM, priority is given to physical therapy. Despite the dearth of reported data, the use of aids and home adaptations is infrequent, with the latter lacking support. The burden of being the main caregiver falls on women, mainly spouses, daughters, and daughters-in-law. It is the family rather than society who cares for long-term stroke patients in SM.

This study, which set out to describe the patterns of stroke care for patients in SM, shows that from a population-based perspective, a low use of health care resources with a comparatively low, although probably underestimated, stroke incidence is evident. Our stroke patient series were characterized by (1) low Katz ADL

grades, (2) low level of educational and social activities, (3) comparatively small impact on quality of life, and (4) high frequency of complications secondary to stroke. The use of resources in relation to need appears to be low with regard to PT, and particularly so in the case of occupational and speech therapy. Technical aids and support for home adaptations and services proved to be the exception rather than the rule.

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