

# Care for patients after stroke. Results of a two-year prospective observational study from Mazowieckie province in Poland

## *Opieka nad pacjentem po udarze mózgu. Wyniki dwuletniego prospektywnego badania obserwacyjnego przeprowadzonego w województwie mazowieckim w Polsce*

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### Abstract

**Background and purpose:** Little has been published about different elements of the health services in long-term follow-up in the countries of Central and Eastern Europe. The aim of this study was to explore the health services for stroke patients in Poland.

**Material and methods:** Patients from 3 centres representing different levels of stroke care organization from Mazowieckie province were included. Data on first-ever stroke patients with “onset-to-door” time no longer than 7 days, consecutively admitted to participating centres between March 1 and June 30, 2002 were collected prospectively. Patients were assessed on admission, on discharge and 3, 6, 12, 18, and 24 months after discharge. Type of care, rehabilitation, readmissions, consultations and diagnostic procedures were evaluated.

**Results:** One hundred and sixty-four patients with first-ever stroke were included. Twenty-one patients died during hospitalization, and 36 during the two-year follow-up. Most patients were discharged home, under family care. The total rate of readmission decreased over time, from 58% to 11%, and so did the rate of rehabilitation, from 41.5% to 15%. All patients had been seen by their general practitioners and neurologists.

**Conclusions:** Post-stroke care is provided mostly by family members. Access to rehabilitation is limited and decreases

### Streszczenie

**Wstęp i cel pracy:** Dotychczas opublikowano niewiele danych dotyczących różnych aspektów długoterminowej opieki nad pacjentem po udarze mózgu w krajach Europy Środkowo-Wschodniej. Celem prezentowanej pracy było zebranie danych o opiece poudarowej w Polsce.

**Materiał i metody:** W badaniu wzięły udział 3 ośrodki o różnym stopniu referencyjności z województwa mazowieckiego. Dane dotyczące pacjentów z pierwszym w życiu udarem mózgu przyjmowanych do ośrodków biorących udział w badaniu były gromadzone prospektywnie od marca do czerwca 2002 r. Do badania włączono pacjentów do 7 dni od wystąpienia udaru. Pacjenci byli oceniani przy przyjęciu, przy wypisie oraz 3, 6, 12, 18 i 24 miesiące po wypisie. Zbierano dane dotyczące: rodzaju opieki, rehabilitacji, kolejnych hospitalizacji, konsultacji oraz wykonywanych badań dodatkowych.

**Wyniki:** Do badania włączono 164 pacjentów z pierwszym w życiu udarem mózgu. W trakcie hospitalizacji zmarło 21 pacjentów, w trakcie okresu obserwacji kolejnych 36 pacjentów. Większość pacjentów została wypisana do domu, gdzie pozostawali pod opieką rodziny. Odsetek pacjentów wymagających kolejnych hospitalizacji zmniejszał się w miarę upływu czasu, z 58% do 11%, podobnie zmniejszył się odsetek pacjentów rehabilitowanych, z 41,5% do 15%. Wszyscy pacjenci byli przynajmniej raz badani przez lekarza rodzinnego i neurologa.

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over time. This study could help the authorities in healthcare budget allocation in Poland.

**Key words:** stroke, post-stroke care, rehabilitation.

**Wnioski:** W większości przypadków opiekę pacjentowi po udarze mózgu zapewniają członkowie rodziny. Dostęp do rehabilitacji jest ograniczony i maleje w miarę upływu czasu. Powyższe badanie może być pomocne w planowaniu nakładów finansowych na opiekę zdrowotną w Polsce.

**Słowa kluczowe:** udar mózgu, opieka poudarowa, rehabilitacja.

## Introduction

Long-term health care for stroke victims has been analysed in many studies, exploring e.g. institutionalization and caregivers' work, rehabilitation, readmission, and outpatient specialists' visits [1-15]. Most of those studies were confined to high-income countries of Western Europe and evaluated only some aspects of health services, and little has been published about different elements of the health services in long-term follow-up in the countries of Central and Eastern Europe. Central and Eastern Europe is a term for countries that shared a political and economic background for the second half of the previous century, different from Western Europe.

The aim of this study was to investigate health care services used by patients after stroke in two-year follow-up in Poland.

## Material and methods

This is a prospective study of all eligible stroke patients admitted to the participating centres between March 1 and June 30, 2002. The study was conducted in 3 centres from Mazowieckie province representing different levels of organized stroke care: university

department with stroke unit, neurological department with stroke unit and general medicine ward without stroke unit. Stroke, according to WHO, is defined as rapidly developing clinical signs of focal or global disturbance or cerebral function, with symptoms lasting 24 hours or longer or leading to death, with no apparent cause other than of vascular origin. Consecutive patients with first-ever stroke, with "onset-to-door" time no longer than 7 days, were included in the study.

All the patients were assessed on admission and on discharge. Thereafter, patients (and their caregivers) were followed up at 3, 6, 12, 18, and 24 months. At each of those time-point assessments, patients underwent a face-to-face standardized interview with researchers. A special questionnaire was developed for this study. Data on the following health services received by patients after stroke were collected: place of residence, type of home care (family member or other), place of rehabilitation, hospital readmission, consultations and diagnostic procedures. Additional data on age, gender, stroke type (according to ICD-10 classification), and the level of handicap before stroke were collected on admission. The level of handicap and place of residence were also reported on discharge and during each follow-up visit. Data regarding health services were collected at each time point during follow-up.

**Table 1.** Level of handicap – percentage of patients with particular score on modified Rankin scale (mRS)

mRS score	Before stroke n = 164	On discharge n = 143	After 3 months n = 130	After 6 months n = 126	After 12 months n = 118	After 18 months n = 114	After 24 months n = 107
0	72.1%	9.5%	18.2%	32.3%	37.3%	39.0%	43.8%
1	5.0%	20.3%	22.4%	19.2%	19.1%	17.0%	14.3%
2	5.6%	13.5%	14.0%	10.0%	7.9%	9.3%	8.9%
3	7.5%	13.5%	10.5%	11.5%	11.1%	11.9%	10.7%
4	6.2%	18.2%	10.5%	14.6%	11.1%	11.0%	11.6%
5	3.7%	11.5%	15.4%	9.2%	7.1%	8.5%	6.3%
6 (death)	0	12.8%	9.1%	3.1%	6.4%	3.4%	4.5%

For the assessment of handicap a standardized scale – the modified Rankin Scale (mRS) – was used.

Signed consent was collected from all participants.

## Results

### General patient characteristics

One hundred and sixty-four patients with first-ever stroke were admitted during the study period (56, 58 and 50 patients to respective centres). Mean age was 70.5 years. Nearly 41% of patients were men. Ischaemic strokes were diagnosed in 86% of cases, hemorrhagic in 8.5% and unidentified strokes in 5.5%. Twenty-one patients died during hospitalization and 143 were discharged. Thirty-six patients died during the 24-month follow-up following initial hospitalization.

One hundred and thirty patients were followed up after 3 months, 126 after 6 months, 118 after 12 months, 114 after 18 months and 107 patients after 24 months from discharge. The level of handicap is presented in Table 1. Seventy-two percent of patients before stroke, 9.5% of patients on discharge and 44% of patients at the follow-up visit after 24 months were completely independent and assessed as 0 points on mRS. None of the patients was lost to follow-up.

### Health care services

#### *Place of residence and type of care*

Most patients were discharged home, to live with their family; this was the largest group over the whole follow-up period. The proportion of patients living alone incre-

**Table 2.** Place of residence after stroke

Place of residence	On discharge n = 143	After 3 months n = 130	After 6 months n = 126	After 12 months n = 118	After 18 months n = 114	After 24 months n = 107
Home – with the family	62.6%	80.0%	79.4%	79.6%	80.7%	77.6%
Home – alone	7.2%	14.6%	16.7%	16.6%	14.9%	16.8%
Nursing home	2.9%	1.5%	2.4%	3.4%	4.4%	5.6%
Hospital	26.6%	3.1%	1.6%	0	0	0
Hospice	0.7%	0.8%	0	0	0	0

**Table 3.** Care for home-living patients

	After 3 months n = 123		After 6 months n = 121		After 12 months n = 113		After 18 months n = 109		After 24 months n = 101	
	Patients under care	Time (h/day) spent on care	Patients under care	Time (h/day) spent on care	Patients under care	Time (h/day) spent on care	Patients under care	Time (h/day) spent on care	Patients under care	Time (h/day) spent on care
Total (%)	73 (59.3%)		63 (52.1%)		56 (49.6%)		44 (40.4%)		43 (42.6%)	
Family care	65 (89.0%)	9.38	55 (87.3%)	8.15	47 (83.9%)	5.48	37 (84.1%)	5.66	35 (81.4%)	4.54
Social nurse	7 (9.6%)	1.57	7 (11.1%)	1.71	5 (8.9%)	0.19	5 (11.4%)	0.1	3 (7.0%)	0.5
Informal caregiver	6 (8.2%)	5.5	6 (9.5%)	5.83	4 (7.15%)	0.25	3 (6.8%)	0.52	3 (7.0%)	7.67
Nurse	1 (1.4%)	8.0	1 (1.6%)	8.0	2 (3.6%)	4.25	1 (2.3%)	8.0	1 (2.3%)	8.0

ased from 7% at discharge to 17% at 24 months. Nearly 27% were directly transferred to another hospital (or unit), most of them to a rehabilitation facility. The rate of long-term institutionalization increased from 3% at discharge to nearly 6% at 24 months (Table 2).

Data regarding home care details are shown in Table 3. In most cases care was provided by family members, and the rates did not change much over time – from 89% at 3 months to 81% at 24 months. At 3 and 6 months, family members spent more time on caring than any other group (9.4 and 8.2 hours daily, respectively).

### Hospital readmission

The total rate of readmission decreased over time, from 28% at 3 months to 9% at 24 months of follow-up (Table 4). Ten percent of patients were treated in neurological departments, 4.5% of patients in internal medicine departments and 1.5% in cardiology departments.

The rates of admission to internal and cardiology departments increased over time up to 9% readmitted to internal departments 18 months after index discharge and to 4% to cardiology departments 12 months after index discharge. In contrast, the rate of neurological readmissions decreased to 1% at 24-month follow-up.

### Rehabilitation

The number of patients receiving post-stroke rehabilitation decreased over time, from 42% at 3 months to 15% at 24 months. During the first 3 months rehabilitation was mostly provided in specialized rehabilitation wards (up to 80%), while later the admission rates decreased. Up to 50% of patients underwent rehabilitation in outpatient clinics: half of them private, half paid by public insurance. Some of those patients continued rehabilitation at home, so the rates of private home rehabilitation service increased over time (Table 5).

Table 4. Rate of readmission

	After 3 months n = 130	After 6 months n = 126	After 12 months n = 118	After 18 months n = 114	After 24 months n = 107
Neurological	10.0%	2.4%	2.5%	2.6%	0.9%
Internal	4.6%	7.1%	6.8%	8.8%	1.9%
Cardiology	1.5%	1.6%	4.2%	3.5%	5.6%
Palliative care	1.5%	0.8%	0	0	0
Other	10.2%	9.5%	6.8%	4.4%	0.9%
All	27.8%	21.4%	20.3%	19.3%	9.3%

Table 5. Characteristics of rehabilitation use

	After 3 months n = 130	After 6 months n = 126	After 12 months n = 118	After 18 months n = 114	After 24 months n = 107
Number of patients in rehabilitation program (%)	54 (41.5%)	31 (24.6%)	22 (18.6%)	22 (19.3%)	16 (15.0%)
Place of rehabilitation, n (%)*					
Neurological unit	3 (5.6%)	1 (3.2%)	0	0	0
Rehabilitation facility (public)	42 (77.8%)	13 (42.0%)	10 (45.5%)	9 (41.0%)	2 (12.5%)
Rehabilitation in nursing home	1 (1.9%)	1 (3.2%)	1 (4.5%)	3 (13.6%)	3 (18.8%)
Outpatient rehabilitation (private)	14 (25.9%)	11 (35.5%)	6 (27.3%)	7 (31.8%)	7 (43.8%)
Outpatient rehabilitation (public)	12 (22.2%)	5 (16.1%)	5 (22.7%)	3 (13.6%)	4 (25.0%)

\*Some patients received more than one type of rehabilitation

**Table 6.** The number (percentage) of consultations and diagnostic procedures

	After 3 months n = 130	After 6 months n = 126	After 12 months n = 118	After 18 months n = 114	After 24 months n = 107
<b>Specialist</b> Number (percentage) of consultations					
General practitioner	77 (59.2%)	86 (68.3%)	89 (75.4%)	85 (74.6%)	75 (70.1%)
Neurologist	45 (34.6%)	38 (30.2%)	50 (42.4%)	43 (37.7%)	36 (33.6%)
Cardiologist	10 (7.7%)	9 (7.1%)	13 (11.0%)	10 (8.8%)	16 (15.0%)
Internist	11 (8.5%)	8 (6.3%)	3 (2.5%)	2 (1.8%)	3 (2.8%)
Physiotherapist	3 (2.3%)	1 (0.8%)	0	0	0
Vascular surgeon	1 (0.77%)	1 (0.8%)	1 (0.85%)	2 (1.8%)	0
Psychiatrist	0	0	1 (0.85%)	1 (0.88%)	1 (0.93%)
<b>Procedure</b>					
Laboratory tests	10 (7.7%)	16 (12.7%)	20 (16.9%)	34 (29.8%)	42 (39.3%)
INR ratio	14 (10.8%)	14 (11.1%)	16 (13.6%)	15 (13.2%)	13 (12.1%)
Brain CT	5 (3.8%)	2 (1.6%)	2 (1.7%)	3 (2.6%)	0
ECHO	4 (3.1%)	0	2 (1.7%)	2 (1.8%)	0
Carotid Doppler	5 (3.8%)	0	4 (3.4%)	1 (0.88%)	3 (2.8%)
EEG	1 (0.77%)	0	0	1 (0.88%)	1 (0.9%)
ECG	1 (0.77%)	0	2 (1.7%)	2 (1.8%)	4 (3.7%)
24-hour ECG	2 (1.5%)	0	2 (1.7%)	0	0
MRI	1 (0.77%)	0	1 (0.85%)	1 (0.88%)	0
Chest X-ray	1 (0.77%)	1 (0.8%)	0	1 (0.88%)	0
Arteriography	2 (1.5%)	0	0	1 (0.88%)	0

### Diagnostic procedures and consultations

All patients had been seen by their general practitioners and neurologists during the follow-up. Fifty-nine percent of patients had been seen by general practitioner at 3 months, and 70% had been seen by the general practitioners at 24 months. At the same time points, 35% and 34% of patients, respectively, had been seen by a neurologist. Other consultations were less common (Table 6).

The most common diagnostic procedures performed in the follow-up period were laboratory tests, and particularly the international normalized ratio (INR) test. The rates of laboratory tests were 8% at 3 months after stroke and almost 40% two years after stroke, while rates of INR ratio verification were 11% and 12% 3 months after stroke and 2 years after stroke, respectively (Table 6).

### Discussion

Patients assessed in this study represent stroke victims from different regions of Mazowieckie province and different levels of stroke care organization. For those patients we have assessed the use of health services: place of residence (home or institutional), type of care for patients living at home, rate of readmission, rehabilitation facility, number and type of specialists' visits and diagnostic procedures performed.

Most patients in our study were discharged home to live either with their family or alone. This is similar to the findings from other studies. The proportion of Swedish stroke patients living at home after discharge was 94%, 92% and 88% at 3, 6 and 12 months, respectively [3], while in the English study by Wilkinson *et al.* 89% were living in private accommodations 5 years after

stroke [4], so the rates of institutionalization were not high.

Nearly 60% of home-living patients were under care, most of them under family care. It has been proven that it is the care provided by informal caregivers, mostly family members, that allows the stroke survivor to continue living in the community rather than in a nursing home or other care facility [16,17] and allows early discharge from the stroke unit [5,6]. The amount of time the caregivers spent with the patient was associated with the level of strain they experienced [7]. We found that Polish caregivers spent with the patient from 8.2 to 9.4 hours per day compared to 5.5-6.4 hours per day and 18.6 hours per week in other studies [5,8].

In our study about 30% of patients were readmitted to another medical facility within 3 months. Three months after primary discharge 4.5% and 1.5% were treated in internal and cardiology units, respectively. The rates of readmission observed in our study seem to be lower than in other studies, where 3.2% of patients were admitted to cardiology and 3.5% to internal wards 3 months after stroke [9]. Up to 50% are readmitted within 6 months after stroke, mainly attributable to falls and comorbidities [10]. Although vascular events (such as myocardial infarction) remain an important cause of readmissions, non-vascular events such as pneumonia also account for a large number of readmissions [7].

In our study, almost 27% of patients were directly discharged to other medical facilities, most of them to different rehabilitation facilities. During the first 3 months of follow-up, 42% of patients were in rehabilitation, most of them in inpatient, public facilities. Rehabilitation after stroke can be provided as an outpatient and inpatient rehabilitation algorithm. Although early supported discharge with rehabilitation provided at home or in outpatient facilities seems to be cost-effective and beneficial [11-13], there are also studies suggesting that patients benefit most from inpatient multidisciplinary rehabilitation [11,14]. Rehabilitation in Poland is provided in the inpatient algorithm: stroke units provide the early post-stroke rehabilitation and later patients are usually admitted to dedicated rehabilitation units. In our study almost 80% of patients in rehabilitation program were admitted to inpatient rehabilitation facilities. Outpatient rehabilitation, provided in daily rehabilitation clinics, is less available. Home rehabilitation is provided as a private service. Accessibility of early post-stroke complex rehabilitation in Poland should be improved. Recently published data showed that in Poland only 10% of rehabilitation units provided multidisciplinary rehabilitation and they covered about 21% of actual needs [18].

Post-acute medical care was the most common health service. During the two-year follow-up all patients visited their general practitioners and neurologists. Three months after discharge 59% had been seen by general practitioners and 35% by neurologists. Our data are consistent with other studies, where 3-month follow-up rates of general practitioner visits were the same, and neurologists a little higher [2,15].

The most common diagnostic procedures performed in the follow-up period were laboratory tests, and particularly verification of INR ratio. As the total number of lab tests performed increased over time, the number of patients having INR ratio verification remained unchanged.

As to the limitations of our study: the study population is small and all the patients are from one region (Mazowieckie province). In-hospital mortality was rather low, 12.8%. It was lower than the mortality in a large Polish multicentre study, the Polish National Stroke Prevention and Treatment Registry, where mortality was 15.2% [19]. This difference could be explained by the fact that in our study we enrolled only first-ever stroke patients and the data were collected only for 4 months.

## Conclusions

1. Post-stroke care is provided mostly by family members.
2. Access to rehabilitation is limited and decreases over time.
3. Despite the above-mentioned limitations, this is the first study exploring different elements of the health services used by stroke patients. This could be a pilot study for a large trial identifying health service needs.

## Disclosure

Authors report no conflict of interest.

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