Planning availability in stroke rehabilitation units

Stefano Paolucci[a]
Carlo Caltagirone[a]
Fabrizio Mastrilli[a]
Giorgio Sandrini[b]
Giuseppe Nappi[c]

[a] IRCCS S. Lucia Foundation, Rome
[b] Neurorehabilitation Unit, IRCCS C. Mondino Institute of Neurology, Pavia, University of Pavia
[c] Department of Neurology and Otolaryngology, University "La Sapienza", Rome and IRCCS C. Mondino Institute of Neurology, Pavia, Italy

Reprint requests to: Dr Stefano Paolucci,
Fondazione S. Lucia - IRCCS,
Via Ardeatina, 306 - 00179 Rome, Italy
E-mail: s.paolucci@hsantalucia.it

Summary

The sequelae of cerebrovascular diseases constitute, and in the coming years will increasingly constitute, a major health problem. Stroke is already the leading cause of permanent invalidity, the second leading cause of dementia, and the third (on course to become the second) leading cause of death, after cardiovascular diseases and cancer.

In view of the aging of the population and of the fact that stroke is strictly age-related, the incidence of stroke, in Italy, looks set to rise progressively over the coming years.

In recent years, units have been set up for the specialist inpatient treatment of stroke victims, both in the acute phase (known as stroke units) and in the subsequent rehabilitative phase (stroke rehabilitation units), the aim being to improve both the management of these patients and, as a result, their functional outcome.

Health policies and programming will have to take into account the need for more beds in both types of stroke unit.

KEY WORDS: functional outcome; stroke; stroke rehabilitation units; stroke unit.

Introduction

Cerebrovascular disorders account for around 10% of deaths in the western world and are one of the leading causes of disability in the elderly (1).
The Pan-European Consensus Meeting on Stroke Management (Helsinborg, 1995) set certain rehabilitation objectives to be reached by 2005: a reduction of mortality in the first month following stroke to under 20% and an increase (to over 70%) in the number of self-sufficient patients. The demand for rehabilitation is thus destined to rise in the coming years, as a consequence both of the aging of the population and of these new health policy-based targets.

Epidemiology

In Italy in 2001, cerebrovascular diseases, prompting 246,415 hospital admissions, accounted for 36.7% of admissions for CNS disorders and 2.7% of total hospitalizations. In particular, 118,730 admissions were classified in disease-related group (DRG) 14, a group that includes patients with stroke (Table I).
Stroke incidence declined until the 1970s, after which this trend disappeared (2,3). Post-stroke mortality also dropped markedly in the western world from the 1950s on, partly, although not entirely, as a result of greater control of hypertension (2).
In Italy, the mortality rate fell by around 30% between 1960-4 and 1985-9 (1), a declining trend that is still in progress. Indeed, recent reports have drawn attention to a greater-than-5% drop in the mortality rate between 1985 and 1994, some differences emerging between men and women (4).
The corrected incidence of stroke in Italy, as shown by 5 recent epidemiological studies conducted in different regions (Table II, see over), is around 2.0‰.
Furthermore, stroke incidence has been found to increase exponentially with age. In Italy (Abruzzo), a mean age at onset of 74.8±11.3 has been reported (8).
Data from the recently published Italian Longitudinal Study on Aging (ILSA) indicate that the incidence of first-ever stroke in the population aged 65-84 years is 9.5‰ and that overall incidence (including relapses) is 12.99‰ (10). The study calculates that 153,000 elderly people will suffer a stroke every year. On the other hand, fewer than 5% of Europe's under-45s are affected by strokes, the incidence of stroke in young adults in Italy being estimated at around 10 per 100,000 (11).

Table I - Hospital admissions for cerebrovascular diseases (Italy, 2001).

	DRG 14	DRG 15	DRG 16-17
Admissions	118,730	70,282	57,403
Mean length of stay (days)	11.3	7.3	9.4

Source SIS, Italian Health Ministry

The progressive aging of the population, together with the consideration that stroke incidence is strictly age-related, suggests that, in Italy, the incidence of stroke is destined to rise over the coming years: forecasts up to 2016 indicate that this increase will be in the order of 22.2% (12).

Indeed, as shown in figure 1, ISTAT records show that the ratio of elderly people (ratio of people aged 65 years to those aged <14 years x 100) in the Italian population will rise from the 2001 figure of 127.1 to 146.5 by 2010. Similarly, dependence, i.e., the ratio between the non active and the active section of the population, will also continue to rise, from the 48.4 recorded in 2001 to a predicted 53.1 in 2010.

These figures could rise in the coming years as a result of a combination of various factors: the increasing mean life expectancy, stability of the incidence rate, reduced mortality in the acute phase and thus an increase in the prevalence of and demand for rehabilitation.

Post-stroke rehabilitation: the role of rehabilitation stroke units

One central issue is the organisation of care in the rehabilitation stages. A rehabilitation programme should be undertaken as early as possible, providing the pa-

Table II - Studies of stroke incidence in Italy.

Region	Year (ref. n.)	Incidence	Corrected incidence	30-day mortality
Umbria	1991 (5)	2.54‰	1.55‰	20.3%
Valle D'Aosta	1992 (6)	2.23‰	2.15‰	31%
Veneto	1995 (7)	2.24‰	1.70‰	33% (23% at 7 days)
Abruzzo	1997 (8)	2.75‰	2.37‰	25.6%
Sicily	2002 (9)	1.65‰	2.45‰	38%

	1961	1971	1981	1991	1995	1997	1999	2001[a]	2010[b]
Ratio of elderly people[c]	38.9	46.1	61.7	96.6	108.4	116.1	122	127.1	146.5
Dependence[d]	51.6	55.5	53.1	45.3	6.2	46.9	47.5	48.4	53.1

[a] Estimated [b] Forecast
[c] Ratio of elderly (over-65s) to young people (0-14 years) multiplied by 100.
[d] Ratio between the non active (over-65s) and the active (15-64 years) section of the population multiplied by 100.
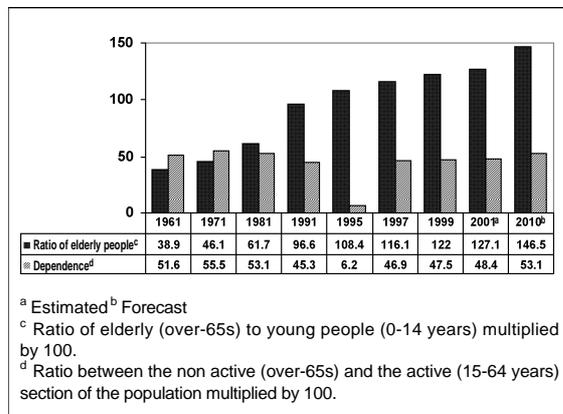
Figure 1 - Demographic indicators: surveys 1961-1991 and 1st January 1995-2010 (ISTAT data, mod.).

Table III - Percentages of disabled patients in population studies (Italy).

	Year (ref. n.)	Patients disabled at 30 days
Valle D'Aosta	1992 (6)	62%
Veneto	1995 (7)	54%
Abruzzo	1997 (8)	38.9% (at 1 year)
ILSA	2002 (10)	67.6%

Post-stroke disability

For every fatal stroke, three to four are not fatal, and a third of these normally result in permanent disability (13). According to American AHCPR (Agency for Health Care Policy and Research) guidelines, between 25 and 50% of stroke survivors are left dependent on others in their activities of daily living (ADL) and requiring rehabilitative treatment (14).

As shown in Table III, Italian epidemiological data confirm that over half of all stroke survivors present impairments in their ADL that could benefit from rehabilitative treatment.

tient's general medical conditions are compatible with this. Early rehabilitation is, indeed, associated with a better functional prognosis (15,16).

For several years now, partly as a result of the introduction of a performance-based system of funding, based on classification by DRGs, hospital stays in the acute phase have been becoming progressively shorter. However, this is not to say that patients are always transferred, when opportune, to properly equipped rehabilitation units. On the contrary, the lack of available beds in rehabilitation units often means that the first stages of rehabilitation treatment have to be carried out in units specialising in the acute stage, which, unlike

specialist rehabilitation units, are unable to guarantee patients the most appropriate kind of care – a situation that also results in inappropriate use of beds within the acute care sector. Conversely, early transfer to rehabilitation units is not always a guarantee of a more favourable rehabilitative outcome, and can often be responsible for an increased risk, as a result of failure to stabilize completely the patient's general clinical conditions (16), of negative end-points (death or transfer to another unit due to complications).

Indeed, while, in traditional rehabilitation departments, routine rehabilitation revolves essentially around the treatment of motor deficits and (although not always) of speech disorders, stroke patients often present other, rather complex difficulties (cognitive disorders, cardiological, angiological, speech, pneumological, urinary, psychological and social problems).

The management of patients presenting sequelae of a recent stroke is thus complicated, and it is for precisely this reason that new organisational models have been proposed. Defined stroke rehabilitation units, these are specialist centres where patients are cared for by a multidisciplinary team of doctors, nurses and rehabilitation therapists who, together, are able to provide an integrated approach to the various problems associated with cerebrovascular disease. A stroke rehabilitation unit should be able to guarantee exhaustive assessment of the patient's post-stroke disabilities and to carry out the rehabilitation interventions required; it should be equipped to manage comorbid conditions and treatment protocols, to respond appropriately should complications arise, to supply braces and supports and to plan, in conjunction with the patient's family, for his or her discharge (either home or to another centre). In particular, a stroke rehabilitation unit should have rooms set aside exclusively for the care of these patients, specialist physicians (neurologists, physiatrists), as well as neuropsychologists, psychologists, rehabilitation specialists, speech therapists, occupational therapists, orthoptists, social workers, dieticians and orthopaedic technicians. The hospital where the stroke rehabilitation unit is situated must also have consultant physicians who can be called upon (otolaryngologists, geriatrists, rheumatologists, angiologists, pulmonologists), as well as neuroradiology (with CT/MRI facilities), neurosonography, neurophysiology, neurourology, and cardiology services, and an adequate analysis laboratory equipped to monitor all laboratory data and in particular anticoagulant therapies.

Stroke rehabilitation units have proved able to improve the rehabilitative outcome even of the most severe stroke patients, reducing mortality rates, shortening hospital stays, and increasing the number of patients who are discharged home (17,18).

The Spread (Stroke Prevention and Awareness Diffusion) guidelines developed by 30 Italian scientific societies (19) recommend that intensive rehabilitation be carried out in the context of a specially organised network (recommendation 14.60, level C).

Even though no normative data on Italian stroke rehabilitation units are currently available, these units could be incorporated into units accredited as RAI (Riabilitazione in assistenza intensiva – rehabilitation in intensive care), but having a different remuneration (in the Lazio region specified as Lit. 800,000/day, delib. 434 of 27/3/2001). Still to be defined too are the requisites of the operators staffing these centres.

Activation of these units could thus contribute both to improved organisation of care and to more effective use of resources already available, and possibly also to cost savings. It is, indeed, important to appreciate that a valid and timely rehabilitative treatment programme can also be an investment, in that it can lead to a reduction of indirect costs, which are particularly onerous in the case of stroke patients of working age (20,21).

Post-stroke rehabilitation units: planning requirements

In order to estimate the bed requirements of a stroke rehabilitation unit, it is necessary to consider currently available epidemiological and literature data.

Taking as a starting point the figure of 118,730 admissions in the DRG 14 recorded in Italy in 2001, the percentage of disabled survivors who could benefit from rehabilitative treatment, calculated on the basis of AHCPR parameters (14), and considering from 25% to 50% of survivors, ranges from around 23,500 (23,746) to around 47,500 (47,492).

The number of survivors was calculated on the basis of a mortality rate of 20% (lower than current rates, 20% is, as mentioned earlier, the 2005 target set by the Pan-European Consensus Meeting On Stroke Management in Helsinborg).

The number of beds needed in intensive rehabilitation units (stroke rehabilitation units) can be calculated by dividing the number of the said patients (i.e., disabled survivors who could benefit from rehabilitative treatment) by the turnover rate per bed, minus 10% (thus considering a mean bed occupation rate of 90%). The turnover rate is obtained by dividing the number of days in the year by the mean duration, in days, of a hospital stay.

The mean stroke rehabilitation unit stay of patients assigned to stroke-related DRGs (i.e., DRG12 and DRG14), without differentiating between patients on the basis of severity of disability, was found to be around 40 days.

It should nevertheless be underlined that, for correct planning of care requirements, use of the DRGs as parameters does not, on its own, allow thorough exploration of the complex and varied clinical-care sequelae of cerebrovascular events.

In particular, patients should be evaluated for cognitive disorders, encountered in 50-75% of survivors (22), which result in a need for specific cognitive and/or speech therapy (in accordance, moreover, with the Spread guidelines) and which normally imply longer treatment times and hospital stays (23,24).

In a case series (over 1,100 patients) reported by the S. Lucia hospital (unpublished data), 35% presented aphasic disorders requiring speech therapy, and 21% hemi-inattention requiring cognitive treatment.

It would thus appear necessary to consider two groups of patients (those with moderate-mild disabilities and those with severe disabilities), given that they require different lengths of hospitalisation.

In the case of patients with moderate-mild disabilities, a mean hospital stay of 40 days can be calculated (based on data for 2001), and in the case of severely disabled

patients, a mean 60-day stay (calculated on the basis of Ministry of Health directives).

These data give rise to the following bed turnover rates:
– in severely disabled patients: 6.08 (365/60);
– in patients with moderate-mild disabilities: 9.12 (365/40).

Therefore, in Italy as a whole bed requirements in intensive stroke rehabilitation units, calculated as described above, both in relation to severely disabled patients (25% of survivors) and to severely+moderately-mildly disabled patients (50% of survivors), ranges from around 3,515 to 4,686.

Obviously, this calculation can also be done on a regional basis, replacing national epidemiological values with regional ones and also adjusting, according to assessments conducted locally, the mean hospital stay duration.

Finally, there is also a need for proper planning of territorial centres, in order to solve the various problems arising upon the discharge of patients, particularly elderly patients, who are destined to increase in number. Already, over 60% of beds in stroke rehabilitation units are filled by elderly patients, and over 25% by the very elderly (75-84 and 85 years), furthermore, the percentage of extremely aged patients (85 years) has recently increased almost fourfold in the space of just 5 years, rising from 2.5% in 1995 to 11.8% in 1999 (25). Efficient organisation of territorial services involving the implementation of valid post-discharge care protocols could reduce the duration of hospital stays and improve the turnover of patients, without jeopardising in any way their functional outcome. It can, indeed, be remarked that a shortening of hospital stays in compliance with economic-health policy-based regulations, in the absence of clear programming of post-discharge care protocols, has been shown to penalise functional recovery (26).

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