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Stroke units and general wards in seven Italian regions: the PROSIT Study

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Abstract PROSIT (research PROject on Stroke services in ITaly) is a study performed to evaluate number and work organisation of acute in-hospital services (stroke units, SU) and general wards (GW), in seven Italian regions (Liguria, Lombardia, Lazio, Veneto, Friuli-Venezia-Giulia, Emilia Romagna, Toscana), which have a population of 29 169 811 inhabitants and a relative ratio of 225/100 000 hospitalisations for acute stroke. The registers of hospital discharges from January to December 1999 were looked at identify to services recording at least 50 acute stroke discharges (DRG14) per year. A structured questionnaire investigating stroke service characteristics was submitted to the doctors in charge of the identified units and completed in the presence of an external observer between October 2000 and February 2001. SUs were identified as units with dedicated beds (at least 80%) and team (at least 1 physician and 1 nurse) for acute stroke patients. SUs are still uncommon in many Italian regions because only, as 7% of the wards evaluated were found to be a SU and less than 10% of acute stroke patients resulted to be admitted to a SU. Great heterogeneity was found between the different regions surveyed. The most striking differences between SUs and GW were related to the staffing and care organisation, with higher number/patients ratio in SUs as far as physicians and nurses, speech therapists and social workers were concerned.

Key Words Stroke unit • General ward • Diagnosis related groups (DRGs) • Italian regions

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Introduction

Stroke is a major national public health concern in Italy where its incidence is approximately 155 000 new strokes (and 39 000 recurrences) per year. It represents the third cause of death after the cardiovascular and neoplastic diseases, being the cause of 10–12% of all deaths/year. Acute (30 days) mortality for stroke has been evaluated to be equal to 20% of all cases in Italy, while during the first year it is quantifiable as 30%. One year after stroke, one third of the surviving subjects show an elevated degree of disability, sufficient to define them as totally dependent [1, 2].

A major objective in the treatment of stroke is represented by the organisation of care for acute patients and the access to so called stroke units (SUs) has been recom-

mended by Helsinborg Declaration (1995) for all patients with stroke in Europe [3].

The first dedicated units for stroke patients were organised in Europe and the USA in the beginning of the 1960s; they had an experimental character and resembled the organisation of coronary units for acute myocardial infarction. In the 1970s and 80s, SUs were developed in northern Europe and had mainly a rehabilitative character, while in the 1990s some intensive units for stroke care were organised, with controversial efficacy results [4].

The results of controlled randomised clinical trials conducted in other countries indicate that stroke patients benefit from access to organised in-patient care in specialist units [5]. The object of this debate is the characteristics of SU organisation, the criteria of admission (if any), the presence (or not) of vital function monitoring in the first hours after the stroke, the time to start a rehabilitative approach, and the modalities (and time) of discharge (this item being crucial for the length of stay in the SU and therefore the cost of the SU itself [6–9].

Until now, data on distribution and organisation of SUs in Italy have been lacking.

Aims

The present paper aims to illustrate the results of a study conducted in seven Italian regions in order to verify the characteristics of the wards where patients with stroke were usually accepted, to determine if that ward could be considered a SU or not, and describe the main characteristics of SUs when compared to "general" (not specific) wards detected.

Methods

PROSIT (research PROject on acute Stroke patient care in ITaly) is a study performed to evaluate number and work organisation of acute stroke in-hospital services (SUs) and general wards (GWs) in seven Italian regions (Friuli-Venezia Giulia, Lombardia, Veneto, Liguria, Emilia Romagna, Toscana, Lazio) which have a population of 29 169 811 inhabitants and a relative ratio of 224.7/100 000 hospitalisation for acute stroke. The project has been developed with two different phases. The first phase was devoted to the identification and description of care services for acute stroke patients in the seven Italian regions mentioned above. Here we will present the results of this part of the study. In the second phase, the efficacy of SU if GW will be evaluated in a case-control study conducted on 12 000 patients hospitalised in the services identified in phase one.

For this study, SUs were defined as units with dedicated beds (at least 80% of its total) and team (at least 1 physician and 1 nurse) for acute stroke patients, while the definition of general ward was that of a unit (neurology, internal medicine, cardiology or other) admitting stroke patients together with non-stroke cases and without SU organisation. Regional hospital registers were consulted in order to identify the services recording at least 50 acute stroke discharges (DRG14) from January to December 1999.

A structured questionnaire investigating stroke service characteristics was submitted to the doctors in charge (directors) of the identified units and completed in the presence of an external trained observer between October 2000 and February 2001. Each interview was performed at the local hospital unit sites. At the end of the interview both the doctor in charge and the external interviewer had to agree on defining the local services as an SU or not on the basis of our standard definition. The other main issues of the questionnaire administered were: hospital setting (emergency department, cardiology, intensive care, vascular surgery, rehabilitation etc.), SU/GW facilities (beds, monitors, elevators, etc.), SU/GW diagnostics (CT/NMR, ultrasounds, echocardiography, etc.), SU/GW staffing (physician, nurses, physiotherapists, etc.), SU/GW diagnosis and care organisation (admission policy, early physiotherapy, use of management or care protocols, multidisciplinary meetings, quality of care, etc.)

All the questionnaires, sent to the Coordinating Center in Milan (IRCCS Ospedale Maggiore Policlinico) evaluated in order to verify their consistency and completeness. Data collected by means of these questionnaires allowed evaluation and analysis of the similarities and differences between SUs and GWs in the different Italian regions considered. The following dichotomised variables were evaluated (stroke unit, neurology discipline, public hospital, academic hospital, emergency department, cardiology department, rehabilitation department, neurosurgery department, shortage of beds, early rehabilitation, diagnostic/treatment protocol, nursing protocol, multi-professionals meeting, brain CT scan 24 hours/7 days, brain MRI scan 24 hours/7 days, cerebral angiography 24 hours/7 days, ultrasound 24 hours/7 days, echocardiography 24 hours/7 days). For variables describing staff and equipment availability, the mean of the number of full-time staff/bed ratio was compared between the two groups. The analysis was performed using STATA 7.0.

Results

During the year 1999 the number of DRG14 in the seven Italian regions considered was 67 925, with a relative ratio adjusted by age of 225 cases/100 000 inhabitants. There was no interregional variability after adjustment by age regional distribution (Fig. 1). A discharge with DRG14 was observed in 1735 hospital units. As a mean, the 104 units detected in Friuli Venezia Giulia discharged 30.3 patients/year with DRG14, while the 549 units of Lombardia discharged 35.4 patients, the 122 of Liguria 34.4, the 222 of Emilia Romagna 57.5, the 397 of Lazio 23.1, the 279 of Toscana 38.3 and the 62 of Veneto 110.7. Mean length of stay was 13.5 days in Friuli VG , 13.4 in Lombardia, 17.3 in Veneto, 14.1 in Liguria, 14.4 in Emilia Romagna, 11.9 in Toscana, and 11.4 days in Lazio (Fig. 1). This variability could be attributed to different (less or

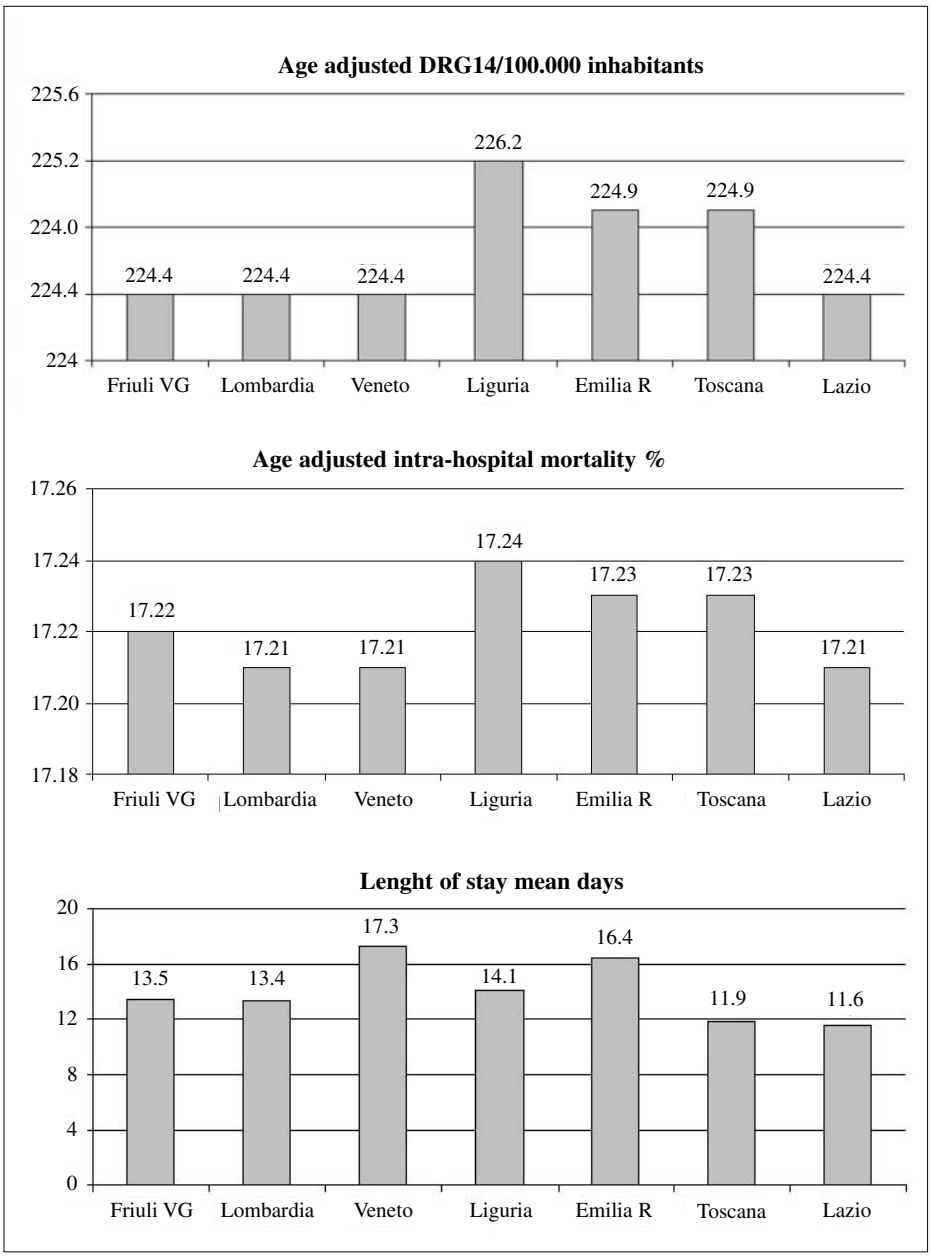

Fig. 1 DRG14, intra-hospital mortality rate and length of stay distribution in seven Italian regions (1999)

more easy) processes of "allocation" of patients at discharge in the post-acute phase of stroke in different rehabilitation centres in the various geographical areas. Among the cases classified as DRG14 at discharge, intra-hospital mortality adjusted by age was 17%. Also for this parameter some small differences were observed between one region and another (Fig. 1). These data probably do not reflect the real efficacy of care in the different regions, but only different case-mixes and organisation of care. Therefore these data can only be considered in order to suggest a more homogeneous approach to the care of stroke patients in our country.

Four-hundred and forty-seven hospital units discharging at least 50 patients with a possible diagnosis of stroke (DRG14) per year were identified. This number was chosen by considering that there was a high probability that a unit discharging less than 50 stroke patients per year cannot be considered as a unit usually caring for patients with acute stroke and therefore as having organised care for this pathology in the acute stage. The 447 units detected cared, in 1999, 55 052 patients discharged with a DRG14, corresponding to the 85% (i.e., the great majority) of all the DRG 14s of those regions. Four-hundred and twenty-four doctors in charge out of 447 units were interviewed during a programmed site-visit (95%), while 23 interviews (5%) could not be carried out for various reasons (refusals, closed units etc). Fifty-two (12%) units with dedicated beds (at least 80% of the total) and 35 (8%) with dedicated teams (at least 1 physician and 1 nurse) for acute stroke patients were detected.

Table 1 Stroke unit distribution in seven Italian regions (2000/01)

	FV (20)	LO (122)	VE (57)	LI (19)	ER (76)	TO (63)	LZ (67)	Total (424)
Stroke unit	2	10	5	6	4	2	2	31
Neurology	2	8	3	6	4	2	2	27
General ward	18	112	52	19	72	61	65	393
Neurology	3	31	20	6	6	8	5	79

FV, Friuli Venezia Giulia; *LO*, Lombardia; *VE*, Veneto; *LI*, Liguria; *ER*, Emilia Romagna; *TO*, Toscana; *LZ*, Lazio

Only 31 (7%) out of 424 units detected fulfilled the defined criteria and could be classified as SUs having both dedicated beds and teams, while the remaining 393 services (93%) did not fulfil the criteria for the SU definition and were allocated to the GW group. Table 1 presents the distribution of SUs by regions. The 31 SUs discharged 6 729 stroke patients per year, 10% of all acute stroke patients requiring hospitalisation in the seven Italian regions. The mean number of beds in each SU was 7 (3–15), 13 SUs had ≥ 8 beds and the mean length of stay was 14 days. About 50% of stroke patients could not be admitted to an SU because of bed shortages. As for the clinical characterization of these units, there were some differences from one region to another. A neurologist was the most represented head of the unit discipline (90%) and neurological was the most frequent type of unit (87%) in the SU group; on the contrary in the GW group other disciplines were observed (internal medicine, cardiology, neurosurgery etc.). Neurology was the leading medical discipline of units treating the largest number of DRG14 patients in Liguria, Lombardia and Veneto. Other regions showed a higher prevalence of patients treated in general medicine or other types of units in the hospital. As a total, neurology units (n=106) admitted 19 721 patients with presumably acute stroke, while general medicine units (n=255) admitted 24 904 acute stroke subjects; 'other' units (n=65) 5815 patients.

Table 2 Characteristics of stroke units and general wards in seven Italian regions (2000/01)

	SUs (31)	GWs (393)	OR	95% CI
Public hospital % (95% CI)	84% (66–94)	88% (83–90)	0.77	0.28–2.11
Accademic hospital % (95% CI)	26% (12–45)	11% (8–15)	2.67	1.12–6.31
Emergency department in the hospital % (95% CI)	97% (83–99)	95% (92–97)	1.61	0.21–12.40
Cardiology department in the hospital % (95% CI)	93% (78–99)	78% (74–82)	4.00	0.93–17.10
Rehabilitation department in the hospital % (95% CI)	81% (62–92)	59% (54–64)	2.83	1.13–7.06
Neurosurgery department in the hospital % (95% CI)	45% (27–64)	29% (25–34)	1.99	0.95–4.17
Early rehabilitation in the unit % (95% CI)	93% (78–99)	56% (51–62)	11.32	2.66–48.11
Diagnostic/treatment protocol in the unit % (95% CI)	100% (88–100)	65% (59–69)	–	–
Nursing protocols in the unit % (95% CI)	93% (78–99)	59% (53-63)	10.19	2.40–43.32
Multi-professional meeting in the unit % (95% CI)	77% (59–90)	38% (33–43)	4.06	1.35–12.23
Brain CT scan 24h/7d % (95% CI)	97% (84–99)	92% (88–94)	2.5	0.33–18.97
Brain MRI 24h/7d % (95% CI)	48% (30–67)	36% (31–41)	1.64	0.78–3.41
Cerebral angiography 24h/7d % (95% CI)	55% (36–73)	40% (35–47)	1.82	0.87–3.80
Ultrasound 24h/d % (95% CI)	39% (22–58)	34% (29–39)	1.20	0.57–2.56
EchoCG 24h/7d % (95% CI)	58% (39–75)	55% (50–60)	1.13	0.54–2.36
Holter dynamic ECG % (95% CI)	42% (24–61)	33% (28–38)	1.44	0.68–3.04

Table 3 Staffing and equipment availability for Stroke Units and General Wards in seven Italian regions (2000/01)

	SUs (31)	GWs (393)
Physician 24h/7d, n/bed (mean and SD)*	0.45 (0.33)	0.23 (0.17)
Nurse 24h/7d, n/bed (mean and SD)*	1.05 (0.73)	0.54 (0.26)
Physiotherapist, n/bed (mean and SD)*	0.06 (0.04)	0.03 (0.07)
Speech therapist, n/bed (mean and SD)*	0.06 (0.08)	0.01 (0.01)
Number of beds (mean and SD)	37 (16.9)	47 (19.1)
ECG monitoring, n/bed (mean and SD)*	0.68 (0.41)	0.05 (0.06)
BP monitoring, n/bed (mean and SD)*	0.63 (0.41)	0.03 (0.05)
Digital oxymeters, n/bed (mean and SD)*	0.46 (0.40)	0.03 (0.05)
Temperature monitoring, n/bed (mean and SD)*	0.53 (0.45)	0.08 (0.26)
Mechanical ventilation, n/bed (mean and SD)*	0.05 (0.09)	0.01 (0.03)

* $p<0.001$

Hospital and ward organisation features of SUs and GWs and their variability are reported in Tables 2 and 3. Semiintensive care was provided by 87% of SUs detected, but only 32% had vital function monitoring systems available for all beds. SUs were more often equipped with complete vital sign monitoring system: ECG monitoring number per beds was 0.68 in SUs and 0.05 in GWs and analogous differences were detected regarding BP, oxygen and temperature monitoring as shown in Table 3. Respirators for mechanical ventilation were rarely present either in SUs or in GWs, suggesting that stroke patients usually receive subintensive care. Both SUs and GWs were more frequently located in public (SUs 84%, GWs 88%) hospitals with cardiology (SUs 93%, GWs 78%) and emergency department (SUs 97%, GWs 95%); on the contrary, some differences were present regarding the availability, in the same hospital, of a rehabilitation (SUs 81%, GWs 59%) and a neurosurgery (SUs 45%, GWs 29%) ward, although the latter does reach a statistically significant difference. Fifty-two percent of SUs and 37% of GWs detected were located in hospitals with more than 500 beds, but some differences were observed between one region and another: only 30% of SUs were located in such hospitals in Lombardia as opposed to 100% in Lazio and Toscana where only 2 SU's were present. The availability of dedicated staff was found to be the SU's distinctive carachteristic: SUs have a significantly higher number of full-time physicians (SUs 0.45, GWs 0.23) and nurses (SUs 1.05, GWs 0.54) per bed than GWs. The number of physiotherapists per bed was 0.06 in SUs and 0.03 in GWs (Table 3). Stroke patient care was also differently organised in SUs and GWs: early rehabilitation was carried out in 93% of SUs but only 56% of GWs; diagnostic/treatment protocols were followed in all SUs but only 65% of GWs; nursing protocols were applied in 93% of SUs and in 59% of GWs; outcome protocols were available in 63% of SUs and 23% of GWs; multidisciplinary meetings were held in 77% of SUs but only 38% of GWs (weekly meetings in 23% of SUs and in 10% of GWs).

Access to diagnostic evaluations (brain CT and MRI scan, angiography, echoCG, ultrasound,) 24 hours a day, seven days a week, was similar in the two types of unit (Table 2).

Conclusions

The data collected allow to make some important considerations: first of all it is evident that SUs are still uncommon in many Italian regions, where only 7% of the hospitals evaluated were found to have a SU. Moreover less than 10% of acute stroke patients were admitted to such a hospital service, whereas about 50% of acute stroke patients could not be admitted to a SU because of bed shortages. It is evident that the number of existing SUs is inadequate with respect to the total number of acute stroke cases.

Analysis of characteristics of SUs and GWs evidences that hospitals with an SU have more facilities in terms of type of monitoring and some diagnostic tools for the acute phase of stroke. The most striking differences between the two types of unit was found to be related to the staffing and care organisation, with higher number/bed ratios in SUs as far as physicians and nurses, speech therapists and social workers were concerned. As far as care organisation is concerned, the use of standard protocols and multi-professional meetings and the practice of early rehabilitation demonstrate that most of the Italian stroke units' work is organised according to the main indications for SU deriving from RCTs and meta-analysis. The mean length of stay of about two weeks demonstrates also that the Italian SUs were mostly of the compre-

hensive type, including the acute care and post-acute rehabilitation phases. Again, this model of SU, which has been spontaneously developing in Italy, is in agreement with the results of RCTs. We can thus expect that it will be able to give the same positive results on patients' outcome.

This was, to our knowledge, the first standard survey of stroke care services in Italy. The use of DRG14 for the selection and identification of acute stroke services presents a limitation due to the possible misuse of ICD classification [10]. Nevertheless our national and regional data on the distributions of DRG14 are in line with recent epidemiological studies on the incidence of stroke in Italy [11–14]. The methods of data collection by direct local interview with the head of each service and the accuracy and consistency of the results support the validity of our methodological approach. It could be used for a further national survey of all Italian regions.

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