Original Article

Spinal cord lesion management in Italy: a 2-year survey

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Design: Prospective 2-year survey from 1 February 1997 to 31 January 1999.

Objectives: To compare the route from injury to rehabilitation, and the outcome of care in a large sample of traumatic (T) and nontraumatic (NT) spinal cord lesion (SCL) patients at their 'first admission'.

Setting: T and NT SCI patients consecutively admitted to 37 SCL centres in Italy.

Method: Data were recorded on simple, computerised, closed-question forms, which were Centrally collected and analysed. Descriptive and inferential analysis was conducted to define the characteristics and compare the T and NT populations, and to identify correlations among the variables examined: time from the event to admission (TEA); pressure sores (PS) on admission; length of stay (LoS) and destination on discharge.

Results: A total of 1014 SCL patients, 67.5% with a lesion of T and 32.5% of NT aetiology were analysed. The subjects in the T group were younger (median 34 versus 58 years), with higher probability of cervical involvement (OR 2.47, CI 1.8–3.4) and completeness of the lesion (OR 3.0, CI 2.3–4.0), shorter median TEA (37 versus 64 days, $P < 0.0001$) and less frequent admission from home (3.6 versus 17.4%) compared to the NT group. TEA and PS on admission were analysed as indicators of the efficacy of the courses from injury to rehabilitation. Longer TEA was reported for people with NT aetiology, admitted to rehabilitation centre (RC), not locally resident, transferred from certain wards and to a lesser degree female subjects and those with complications on admission. PS were associated to

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completeness of lesion, longer TEA, admission to RC, nonlocal residence and coming from general intensive care units, or general surgery wards. Median LoS was 99 days (mean 116 and range 0–672), and was statistically shorter in the NT group (122 versus 57 median, $P < 0.00001$). Upon discharge, bladder and bowel autonomy were, respectively, obtained in 68.1 and 64.5% of the whole population without significant difference between the T and NT groups. A total of 80.2% of patients were discharged home and the following factors: not living alone, being discharged after longer LoS, having sphincter autonomy and no PS, were all independent predictors of outcome.

Conclusion: There are important obstacles in the admission route to rehabilitation facilities, greater for NT, as longer TEA and more complications on admission testify. Moreover, the LoS is shorter for NT population. Our findings suggest that rehabilitation outcome could be improved through an early multidisciplinary approach and better continuity between acute and rehabilitation care, especially for the ‘neglected’ NT SCL patients.

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Introduction

Spinal cord lesion is a dramatic event mainly involving young people at the height of their social and working life. Spinal cord dysfunction has mixed causes of traumatic (T) and nontraumatic (NT) aetiology and some NT causes resemble T ones, because of their sudden onset.¹

In Italy, T and NT patients are referred to the same rehabilitation centres. The relative shortage of spinal units (seven with a total 200 beds) does not permit all patients with spinal cord lesion to be admitted immediately to model centres where acute and rehabilitative interventions are integrated.² The lack of a standardised course between care in acute wards and a rehabilitation programme, means that the population arriving at the rehabilitation centres is very heterogeneous: after a wide range of time from the acute event, in different clinical conditions depending on previous management,³ and possibly having undergone a selection connected to their aetiology.

Furthermore, there is poor conformity between the rehabilitation centres, concerning the focus of intervention on spinal cord lesion (SCL) and the kind of facilities provided. Little, retrospective or local data are available to draw a picture of SCL management problems and outcomes in Italy^{4–6} and international literature mainly focuses on traumatic lesions.⁷

The aim of this survey is to investigate the course from injury to rehabilitation in a large sample of SCL patients and to shed light on T and NT SCL management. The burden of care and short-term (in-patient) outcome was examined in both of the populations.

Patients and methods

A scientific collaborative group (GISEM) carried out a prospective 2-year survey involving 37 spinal injury centres, including all the Italian Spinal Cord Units and most of the major post-acute rehabilitation centres.

Patient inclusion started on 1 February 1997 and ended on 31 January 1999. T and NT SCL patients consecutively admitted during the study period were included after their consent had been obtained; patients with SCL due to multiple sclerosis, spinal cord metastasis, degenerative central nervous system diseases and hereditary or congenital diseases were excluded from recruitment. Patients were classified as ‘first admissions’ when they entered an SCL centre either for the first time after the event or at any other time during their first rehabilitation period, and as ‘readmissions’ when admitted for any reason after having completed their rehabilitation.

A form was drawn up to collect data in a simple, computerised, closed-question format using the software EPIINFO. Meetings with centre operators were held before beginning the study to homogenise the method of form completion. Every 3 months the data collected in each centre were sent to the coordinating office, which also worked as the data management group, pooling data into a single data-file, periodically verifying data quality and carrying out data analysis. A guiding committee met every 6 months to supervise the aims of the study and plan scientific aims. The form consisted of 80 items divided into five sections: the first comprised 16 questions on patients’ demographic and social status; the second 22 questions on aetiology and characteristics of the T or NT event and medical and/or surgical care during the acute phase; the third 18 questions on geographical anamnesis and clinical status on admission, detectable complications, neurological level indicated by ASIA criteria and completeness of lesion using the ASIA impairment scale, and the management between the event to admission; the fourth comprised seven questions concerning complications that occurred during hospitalisation (pressure sores (PS), respiratory, and neurological complications, deep venous thrombosis, pulmonary embolism, heterotopic ossification); and the last section 16 questions on patients’ survival, status on

discharge, neurological impairment, PS, autonomy defined by bladder/bowel management (patient able to perform bladder/bowel evacuation by him/her-self), discharge destination and self-perceived level of dependence on a 0–10 scale (from the best to the worst condition).

Three main categories of centres were identified according to the type and length of time of care provided, through a semistructured questionnaire filled in by the participating centres. Spinal cord units (SCU) were centres providing comprehensive management of spinal injury in the same place, from immediate postinjury to the completion of the rehabilitation programme. Rehabilitation centres (RC) included all those centres that do not provide immediate postinjury care and may or may not offer, either in full or in part, the same rehabilitation facilities as the first model as well as the management of principal complications. Rehabilitation services (RS) included Centres where SCL patients are admitted to an acute care ward and receive rehabilitative care during the acute phase before being transferred to an RC.

Statistical analysis of the outcomes was performed on the first admission population as the problems in the readmission population are quite specific and will be discussed elsewhere. The low percentage recorded by RS, was analysed separately to avoid bias on the outcome analysis due to the short length of stay and different objectives of management in an acute care setting.

The analysis was conducted in two phases, descriptive and inferential, respectively, to define the characteristics and compare the T and NT populations. Tests used to identify the univariate correlations among the vari-

ables examined were odds ratio (OR) and their 95% confidence interval (CI) and statistical significance with $P < 0.05$ (χ^2 , Kolmogorov–Smirnov) in discrete variables and parametric (Student's t , Fisher's F analysis of variance, ANOVA and correlation indexes) and non-parametric tests (Kruskal–Wallis, median test and U test of Mann–Whitney) in continuous variables. Multivariate analysis by ANOVA for continuous and stepwise logistic regression for dichotomic variables, allowed intercorrelation of variables excluding confounding effects. For every model adjusted R^2 and McFadden R^2 were calculated. We analysed the following variables: time from the event to admission (TEA); pressure sores (PS) on admission; length of stay (LoS) and destination on discharge. Statistical analysis was performed with the SPSS.6.1.3, EPIINFO 6.0 and CIA 2.0 packages.

Results

We included 1074 SCL patients at their first admission to the 37 participating centres, classified as SCU (7), RC (25) or RS (5) according to the three preset categories established by the form filled in by the centres themselves. In total, 60 patients admitted to acute wards and recorded in RS were excluded from the analysis. So we analysed 1014 first admission patients, 67.5% with a lesion of T and 32.5% of NT aetiology. Of the whole traumatic population 42.5% were admitted to the seven SCU, but only 25.2% of the NT population, giving a ratio of 4:1 (T:NT). In the RC, the T:NT ratio decreased to 1.6:1. The aetiology of SCL was analysed in both the T and NT populations (Figure 1).

Figure 1 Aetiologiical causes of (a) NT and (b) T SCL

Table 1 Time from the event to admission (TEA): univariate analysis

Variables		Mean, corr. coeff.	Significance
Gender	Male	42.2	$P < 0.002$
	Female	53.6	
Aetiology	Traumatic	36.8	$P < 0.00001$
	Nontraumatic	64.0	
Neurological involvement	Paraplegia	47.8	NS
	Tetraplegia	41.3	
Completeness	Yes	43.7	NS
	No	47.1	
Local residence	Yes	42.7	$P < 0.002$
	No	54.8	
Previous management	Home	97.9	$P < 0.00001$
	Neurosurgical ward	37.4	
	Orthopaedic ward	42.5	
	General intensive care unit	43.9	
	Neurological ward	65.7	
	Medical ward	54.1	
	General surgery ward	44.5	
	Urological ward	104.6	
	Emergency room	1.4	
	Other	70.8	
Pressure sores	Yes	58.2	$P < 0.00001$
	No	40.8	
Heterotopic ossification	Yes	68.2	$P < 0.004$
	No	44.9	
Respiratory complication	Yes	48.2	NS
	No	45.7	
Urological complication	Yes	73.4	$P < 0.00001$
	No	43.2	
Pulmonary embolism	Yes	55.8	NS
	No	45.6	
DVT	Yes	73.5	$P < 0.0004$
	No	44.4	
At least one complication	Yes	58.3	$P < 0.00001$
	No	38.3	
Traumatic causes	Road accident	32.3	NS
	Sport	39.9	
	Gunshot	37.8	
	Fall	34.0	
	Attempted suicide	48.4	
	Other	37.6	
Nontraumatic causes	Inflammatory	167.7	$P < 0.0007$
	Vascular	62.2	
	Neoplastic	89.1	
	Degenerative	121.6	
	Other	62.6	
Age		Corr. $r = 0.09$	$P < 0.009$
LoS		Corr. $r = 0.01$	NS

NS = nonsignificant; DVT = deep venous thrombosis; LoS = length of stay

The mean age was 43.9 years (median 42.6, range 1–93.6). There was a statistically significant difference in age between the T and NT groups 38.5 mean (33.7 median) versus 55.2 mean (58 median) ($P < 0.00001$).

There was a general prevalence of males (1:3, female:male), which was more evident in the T group (1:4) while, in the NT group, it was 1:1.6. There was a prevalence of paraplegic patients among admissions in both groups (T 56.7% and NT 76.4%), with a

statistically significant higher probability of cervical involvement (OR 2.47, CI 1.8–3.4) and, to a greater extent, of completeness of the lesion in the T group (A grade in T = 51.5%, NT = 24.2%; OR 3.0, CI 2.3–4.0). The previous place of management was mainly represented by a neurosurgery ward for both groups (49.2% T and 37.9% NT). A worrying percentage of patients came from home. The higher probability of this population being NT (17.4 versus 3.6%; OR 5.7,

Table 2 Time from the event to admission (TEA): multivariate analysis

Longer TEA	Adjusted $R^2 = 0.27$	
	<i>F test</i>	<i>Significance</i>
Nontraumatic aetiology	53.60	$P < 0.00001$
Female gender	10.4	$P < 0.001$
RC category	26.10	$P < 0.00001$
Pressure sores on admission	17.10	$P < 0.00001$
Nonlocal residence	17.00	$P < 0.00001$
Previous management	14.60	$P < 0.00001$
Urological complications	14.3	$P < 0.00001$
Heterotopic ossifications	14.2	$P < 0.00001$
DVT	7.1	$P < 0.008$

RC = rehabilitation centre; DVT = deep venous thrombosis

CI 4.4–9.7), older (mean age 50.4 versus 43.9 years, $P < 0.0012$), paraplegic (9.7 versus 5.2%; OR 1.95, CI 1.1–3.5) and with incomplete lesion (10.6 versus 6%; OR 1.85, CI 1.14–3) revealed the difficulty to access rehabilitation facilities. No significant advantage was given by residence in the same geographic area as the centre.

The median time from the event to admission, calculated for patients included in the first year (94.6%), was 45 days (median 31) and varied greatly between the two groups (37 versus 64 days T/NT, $P < 0.0001$). Approximately 80% of T patients were included in a rehabilitation programme within the first 2 months following the event, while only 57% of the NT patients were admitted within the same period. In the univariate analysis of TEA, there was no association between time from the event to admission and level or completeness of the lesion. We found a significantly greater delay when patients were admitted to RC (52 versus 33 mean days, $P < 0.00001$), not locally resident, coming from certain wards or from home, or female. While no significant difference is found for T aetiological subgroups, there is a significant difference between NT subgroups ($P < 0.0007$) with vascular aetiology as the lowest specified value (Table 1). In the multivariate analysis (Table 2) NT aetiology, RC category of admission, nonlocal residence, previous place of management and, to a lesser degree, female gender are independent predictors of longer TEA, as are complications on admission.

In general, there is a significantly greater prevalence of main complications on admission in T subjects compared to NT subjects (Table 3), while no significant difference is reported for new complications with onset during stay, except for respiratory complications that are more frequent in traumatic patients. PS are the most frequent complication recorded on admission with a significantly higher probability of occurrence in patients with traumatic, complete lesion, not locally resident, longer TEA, coming from general intensive care units or general surgery wards and in younger people (Table 4). In the multivariate analysis, the

aetiology was not significant, while the variables that independently predict PS on admission are severity of the lesion, longer TEA, admission to RC, nonlocal residence and coming from general intensive care units or general surgery (Table 5).

On discharge, there is a noteworthy percentage of PS (about 9%) without significant difference between T and NT groups (OR 0.99, CI 0.61–1.62). Median LoS was 99 days (mean 116 and range 1–672). There was a statistically significant difference in LoS between T and NT SCL (mean 135 versus 73, median 122 versus 57), $P < 0.00001$. Analysing the LoS by centre we found that the mean was 135 days in SCU (144 median) versus 104 days (100 median) in RC ($P < 0.0001$). Patients with PS or at least one complication on admission have a significantly longer stay (148 versus 104 days for PS, 144 versus 96 for at least one complication, $P < 0.00001$), as do patients with complete lesion (148 versus 77 days, $P < 0.00001$) and tetraplegia (136 versus 105 days, $P < 0.00001$).

Upon discharge, there is no difference between the T and NT group as far as bladder and bowel autonomy is concerned, being obtained, respectively, in 68.1 and 64.5%.

A total of 80.2% of patients were discharged directly to their homes, whether it was their previous or a new house. In the univariate analysis, NT aetiology was significant in predicting failure in home discharge, as well as older age, cervical involvement, shorter LoS, PS on discharge, living alone and not obtaining bowel and bladder autonomy (Table 6). In the multivariate analysis the aetiology, age, completeness and cervical neurological involvement lost statistical significance (Table 7).

Discussion

In this large survey, we considered both T and NT SCLs as representative of the whole SCL rehabilitation activity we intended to study. One-third of the rehabilitation activity provided by the centres participating in this survey is addressed to NT patients. The relative frequency between NT and T SCL is allocated in the middle of the wide range of variation reported in the literature (20–52%).^{8–11} The size of the NT population in our sample is probably underestimated depending on the recruitment source since the centres for SCL rehabilitation do not always receive certain NT patients such as older patients with several comorbidities or those requiring a longer time for diagnosis. The difference in the two groups concerning age and gender ratio are similar to those reported in the literature,^{12,8} while concerning the aetiology it reflects the social context with similar causes for traumatic SCL as for other Western countries apart from violence.^{7,13} The NT group, although with possible selection bias from the recruitment sources, also shows similar aetiologies to those found in other papers.^{10,8,7}

The prevalence of cervical lesions (34%) is in the lower bracket of the range of findings reported in the literature (38–51%)^{14,11,9} with a higher probability

Table 3 Complications: total frequency distribution and difference between traumatic and nontraumatic subjects

		<i>Total Number (%)</i>	<i>Traumatic group (684 cases)</i>	<i>Nontraumatic group (330 cases)</i>	<i>Significance</i>
<i>On admission</i>					
Pressure sores	Yes	249 (24.6%)	184 (26.9%)	65 (19.7%)	OR = 1.51 CI (1.08–2.11)
	No	762 (75.1%)	497 (72.7%)	265 (80.3%)	
	NK	3 (0.3%)	3 (0.4%)	—	
Heterotopic ossifications	Yes	45 (4.4%)	41 (6%)	4 (1.2%)	OR = 5.46 CI (1.95–21.16)
	No	849 (83.7%)	554 (81%)	295 (89.4%)	
	NK	120 (11.8%)	89 (13%)	31 (9.4%)	
Respiratory complications	Yes	102 (10.1%)	84 (12.3%)	18 (5.5%)	OR = 2.57 CI (1.47–4.52)
	No	792 (78.1%)	511 (74.7%)	281 (85.2%)	
	NK	120 (11.8%)	89 (13%)	31 (9.4%)	
Urological complications	Yes	93 (9.2%)	67 (9.8%)	26 (7.9%)	OR = 1.32 CI (0.8–2.2)
	No	800 (78.9%)	529 (77.3%)	271 (82.1%)	
	NK	121 (11.9%)	88 (12.9%)	33 (10%)	
Pulmonary embolism	Yes	11 (1.1%)	9 (1.3%)	2 (0.6%)	Not calculated
	No	881 (86.9%)	586 (85.7%)	295 (89.4%)	
	NK	122 (12.0%)	89 (13%)	33 (10%)	
DVT	Yes	40 (3.9%)	29 (5%)	11 (3.3%)	OR = 1.33 CI (0.63–2.88)
	No	852 (84.0%)	566 (82%)	286 (86.7%)	
	NK	122 (12.0%)	89 (13%)	33 (10%)	
At least one complication	Yes	369 (39.9%)	275 (44.3%)	94 (30.9%)	OR = 1.78 CI (1.3–2.4)
	No	556 (60.1)	346 (55.7%)	210 (69.1%)	
	NK	89	63	26	
<i>During stay</i>					
Pressure sores	Yes	63 (6.2%)	49 (7.2%)	14 (4.2%)	OR = 1.77 CI (0.95–3.41)
	No	938 (92.5%)	623 (91.1%)	315 (95.5%)	
	NK	13 (1.3%)	12 (1.8%)	1 (0.3%)	
Heterotopic ossifications	Yes	31 (3.1%)	30 (4.4%)	1 (0.3%)	Not calculated
	No	971 (95.8%)	643 (94.0%)	328 (99.4%)	
	NK	12 (1.2%)	11 (1.6%)	1 (0.3%)	
Respiratory complications	Yes	81 (8.0%)	66 (9.6%)	15 (4.5%)	OR = 2.26 CI (1.23–4.2)
	No	929 (91.6%)	614 (89.8%)	315 (95.5%)	
	NK	4 (0.4%)	4 (0.6%%)	—	
Urological complications	Yes	95 (9.4%)	70 (10.2%)	25 (7.6%)	OR = 2.26 CI (1.23–4.2)
	No	901 (88.9%)	600 (87.7%)	301 (91.2%)	
	NK	18 (1.8%)	14 (2.0%)	4 (1.2%)	
Pulmonary embolism	Yes	14 (1.4%)	13 (1.9%)	1 (0.3%)	Not calculated
	No	877 (86.5%)	582 (85.1%)	295 (89.4%)	
	NK	123 (12.1%)	89 (13.0%)	34 (10.3%)	
DVT	Yes	48 (4.7%)	35 (5.1%)	13 (3.9%)	OR = 1.33 CI (0.67–2.69)
	No	943 (93.0%)	631 (92.5%)	312 (94.6%)	
	NK	23 (2.3%)	18 (2.4%)	5 (1.5%)	
At least one complication	Yes	250 (27.1%)	191 (30.7%)	59 (19.7%)	OR = 1.81 CI (1.28–2.56)
	No	672 (72.9)	431 (69.3%)	241 (80.3%)	
	NK	92	62	30	

OR = odds ratio, CI = confidence interval 95%; NK = not known; DVT = deep venous thrombosis

Table 4 Pressure sores on admission: univariate analysis

<i>Variable</i>		<i>Median (%)</i>	<i>Test</i>
Gender	Male	(25.6)	OR = 1.23 CI (0.87–1.75)
	Female	(21.8)	
Aetiology	Traumatic	(27.0)	OR = 1.51 CI (1.08–2.11)
	Nontraumatic	(19.7)	
Neurological involvement	Paraplegia	(24.0)	OR = 0.88 CI (0.64–1.2)
	Tetraplegia	(26.4)	
Completeness	Yes	(35.7)	OR = 4.09 CI (2.91–5.77)
	No	(11.9)	
Local residence	No	(37.4)	OR = 2.2 CI (1.56–3.1)
	Yes	(21.4)	
Previous management	Home	(16.0)	$P > 0.012$
	Neurosurgical ward	(22.4)	
	Orthopaedic ward	(30.6)	
	General intensive care unit	(38.6)	
	Neurological ward	(33.3)	
	Medical ward	(28.3)	
	General surgery ward	(57.1)	
	Urological ward	(6.3)	
	Emergency room	(0.0)	
	Other	(30.4)	
Centre category	RC	28.0	OR = 1.7 CI (1.2–2.3)
	SCU	18.9	
Age		40.5 versus 45.1	$P < 0.001$
TEA		58.2 versus 40.8	$P < 0.00001$

OR = odds ratio; CI = confidence interval 95%; RC = rehabilitation centre; SCU = spinal cord unit; TEA = time from the event to admission

Table 5 Pressure sores on admission: multivariate analysis

<i>Pressure sores</i>	<i>McFadden $R^2 = 0.13$</i>				
	<i>Beta</i>	<i>Significance</i>	<i>OR</i>	<i>Lower CI</i>	<i>Higher CI</i>
Completeness	1.3985	$P < 0.0001$	4.05	2.83	5.79
RC category	0.7591	$P < 0.0001$	2.14	1.49	3.07
Nonlocal residence	−0.646	$P < 0.0006$	0.52	0.36	0.76
Previous management: surgery ward	1.3722	$P < 0.0014$	3.94	1.70	9.14
Previous management: general intensive care unit	0.6572	$P < 0.013$	1.93	1.15	3.23
Longer TEA	0.0066	$P < 0.0001$			

OR = odds ratio; CI = confidence interval 95%; RC = rehabilitation centre; TEA = time from the event to admission

of risk for cervical injury being of T than NT aetiology, as already reported.⁹ Complete lesions were more frequent in the T group (OR 3) as has been described elsewhere.^{11,10} Observing the entire population, the TEA is longer compared to other studies.^{15,16}

In the global delay in being admitted to a rehabilitation programme particular difficulty exists for NT

patients, probably due to a selection in favour of T and, in some cases, of NT vascular aetiology, having a similarly dramatic onset of clinical symptoms. A more conspicuous percentage of NT patients comes from home, and they are more rarely admitted to SCU, suggesting a difficulty in access to specific rehabilitation programmes. This may only in part be justified by

Table 6 Success in discharging the patient to home: univariate analysis

Variables		Median (%)	
Gender	Male	(80.7)	OR = 1.13 CI (0.78–1.62)
	Female	(78.8)	
Aetiology	T	(83.1)	OR = 1.71 CI (1.23–2.39)
	NT	(74.2)	
Age		42.6 versus 48.4	$P < 0.0001$
LoS		125.8 versus 75.7	$P < 0.0001$
Marital status	Single	(80.2)	$P < 0.00001$
	Widow/er	(56.9)	
	Married	(84.3)	
	Cohabiting	(75.0)	
	Divorced/separated	(66.7)	
Neurological involvement	Paraplegia	(82.5)	OR = 1.54 CI (1.1–2.15)
	Tetraplegia	(75.4)	
Completeness	No	(82.6)	OR = 1.33 CI (0.96–1.84)
	Yes	(78.1)	
Pressure sores on discharge	No	(84.4)	OR = 9.74 CI (5.9–16.1)
	Yes	(35.6)	
Neurological improvement	Yes	(87.1)	OR = 1.94 CI (1.29–2.92)
	No	(77.6)	
Bladder autonomy	Yes	(91.0)	OR = 7.17 CI (5–10.3)
	No	(58.5)	
Bowel autonomy	Yes	(91.4)	OR = 6.86 CI (4.75–9.9)
	No	(60.9)	

OR = odds ratio; CI = confidence interval 95%; T = traumatic; NT = nontraumatic; LoS = length of stay

Table 7 Discharge to home: multivariate analysis

Home discharge	McFadden $R^2 = 0.33$				
	Beta	Significance	OR	Lower CI	Higher CI
Bladder autonomy	1.2042	$P < 0.0001$	3.33	2.06	5.40
No pressure sores on discharge	–1.8832	$P < 0.0001$	0.15	0.08	0.28
Longer LoS	0.0116	$P < 0.0001$			
Bowel autonomy	1.5854	$P < 0.0001$	4.88	2.97	8.01
Marital status	0.9405	$P < 0.0001$	2.56	1.69	3.88

OR = odds ratio; CI = confidence interval 95%; LoS = length of stay

the longer time necessary for diagnosis and/or the need for specific therapy. In fact, the elements that characterise this ‘stand-by’ population, and on the other hand the characteristics of people with shorter waiting time (TEA), suggest a selection that aims to guarantee people with more severe clinical conditions, in a context in which demand for in-patient rehabilitation exceeds the availability of beds. The inefficacy of the system is, however, obvious, as we find more complications on admission after longer TEA, with considerable

consequences on costs and outcome. So once a patient has fallen in the group affected by the problems deriving from this disadvantageous course, it is possible that further selection definitively hampers access to rehabilitation, with lower priority given to NT aetiology, older age and less severe clinical status.

The problems encountered during the course between acute care and rehabilitation are correlated with the high incidence of complications on admission, particularly PS. In this case, the aetiology is not significant in

predicting worst outcome, and it is statistically overwhelmed by the length of waiting (TEA >28 days) and severity of the lesion.

The LoS in this study is longer if compared to those reported in the US, but more similar to other European countries.^{9,17,18,12}

Once again we observe a difference between T and NT cases, the latter being discharged earlier, similar to other European experiences. In our situation, this depends also on the kind of centre (longer LoS in SCU both for T and NT subjects). The outcome of a rehabilitation programme seems to be reached independently of the aetiology, as seen for bladder and bowel autonomy, parameters that are also considered important for the definition of the quality of life.¹⁹

Destination on discharge as a marker of the efficacy of a rehabilitation programme shows differences between the two groups, although being T is not an independent factor predicting the success of discharging a patient home, certain variables related to rehabilitation are, such as length of rehabilitation programme (LoS), obtained autonomy (bowel and bladder autonomy), social-family situation (not living alone) and absence of PS.

Our survey considers data collected over a 2-year period, and from this large sample describes SCL rehabilitation in Italy, thus helping us to understand the main problems and contributing to overcome them mainly by improvement of organisation. So the planning of new SCU on Italian territory should aim to provide care that is less heterogeneous with more evident continuity between acute and rehabilitation care. The structure of the survey may also help to record in the course of time the effect of better organisation on improving SCL rehabilitation outcome. Our data also focus on the less considered NT population, officially accessing the same rehabilitation facilities, but actually with even more problems than T subjects in the transition between the acute (diagnostic phase) and the rehabilitation phase. The problems of such an approach that do not consider the need for early multidisciplinary rehabilitation in these patients, as already claimed for the T patients, are evident in long waiting time, which is detrimental as suggested by the higher incidence of complications and the greater difficulty in obtaining the expected maximal rehabilitation results.

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