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The Effect of Early Intensive Neurological Treatment on the Prognosis of Patients' Return to Full Functional Capacity after Stroke

Wpływ wczesnego intensywnego leczenia neurologicznego na rokowania powrotu do pełnej wydolności funkcjonalnej pacjentów po udarze mózgu

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Abstract

Introduction. Recent decades have brought a dramatic change in the approach to the assessment of treatment results and the prognosis regarding future health condition in diseases of neurological background. It is getting an increasingly more common practice in research on chronic neurological diseases effects to depart from the principle of an exclusively biological assessment of human health, instead a more holistic approach has been adopted where particular attention is drawn to patient's emotional experience, his well-being as well as to the ability to function in everyday life.

Aim. The analysis of the effect of early intensive neurological treatment on the prognosis of patients' return to full functional capacity after stroke.

Material and Methods. The research was carried out in the Neurological Department Independent Public Hospital no. 4 (IPH 4) in Lublin on a randomly selected group of one hundred patients, who were characterised by the type of stroke, socio-demographic characteristics (gender, age, place of residence, marital status, education) as well as by coexisting diseases. The level of patients' functional capacity after completion of intensive neurological treatment was assessed by means of the FIM Scale. Progression of functional capacity during the period of the patients' stay in a stroke unit was measured based on the Scandinavian Stroke Scale (SSS).

Results. The research results indicate the high efficiency of a professional medical approach in the acute period of vascular disease of the brain. Patients leaving the stroke unit were on the right path to return to active life from the period preceding the illness. Less than half of respondents (42%) after the first stage of treatment regained full functional capacity. The least certain prognosis of the first stage of treatment occurs in the case of ischemic stroke. In all patients there was observed a visible increase in functional capacity in the course of treatment.

Conclusions.

1. After a transient ischemic attack (TIA) patients almost always (91.67%) recover the full functional capability after the first stage of treatment.
2. There was a very large improvement in the long term capacity index in the group of patients after hemorrhagic stroke.
3. In all patients, the neurological intensive treatment contributed to a clear improvement in the prognosis of the forecast regarding further improvement of functional capacity. (JNNS 2015;4(1):13–18)

Key Words: stroke, functional capacity, prognosis regarding patients

Streszczenie

Wstęp. Ostatnie dekady przyniosły diametralną zmianę podejścia do oceny wyników leczenia oraz rokowań dotyczących przyszłego stanu zdrowia w chorobach o podłożu neurologicznym. Coraz częściej w badaniach dotyczących konsekwencji przewlekłych chorób neurologicznych odchodzi się od zasady wyłącznie biologicznego oceniania zdrowia człowieka, a przyjmuje się bardziej holistyczny punkt widzenia, w którym szczególną uwagę zwraca się na emocjonalne doznania pacjenta, jego samopoczucie i możliwości funkcjonowania w codziennym życiu.

Cel. Analiza wpływu wczesnego intensywnego leczenia neurologicznego na rokowania powrotu do pełnej wydolności funkcjonalnej pacjentów po udarze mózgu.

Materiał i metody. Badania przeprowadzono w Oddziale Neurologii Samodzielnego Publicznego Szpitala Klinicznego 4 (SPSK 4) w Lublinie na losowo wybranej grupie stu pacjentów, których scharakteryzowano pod kątem rodzaju udaru, cech socjodemograficznych (płeć, wiek, miejsce zamieszkania, stan cywilny, wykształcenie) oraz chorób współistniejących. Poziomą wydolność funkcjonalną pacjentów po zakończeniu intensywnego leczenia neurologicznego oceniono przy pomocy skali FIM. Progresję wydolności funkcjonalnej podczas pobytu chorych na oddziale udarowym zmierzono w oparciu o Skandynawską Skalę Udarów (SSS).

Wyniki. Wyniki badań wskazują na dużą skuteczność profesjonalnego postępowania medycznego w ostrym okresie choroby naczyniowej mózgu. Chorzy opuszczający oddział udarowy byli na dobrej drodze do powrotu do aktywnego życia sprzed choroby. Niespełna połowa badanych (42%) już po pierwszym etapie leczenia wróciła do pełnej wydolności funkcjonalnej. Najmniej pewne rokowania pierwszego etapu leczenia są w przypadku udaru niedokrwiennego mózgu. U wszystkich badanych zaobserwowano wyraźny wzrost wydolności funkcjonalnej w trakcie leczenia.

Wnioski.

1. Po przemijającym ataku niedokrwiennym (TIA) pacjenci niemal zawsze (91,67%) odzyskują pełną sprawność funkcjonalną już po pierwszym etapie leczenia.
2. Stwierdzono bardzo dużą poprawę w zakresie wskaźnika wydolności długoterminowej w grupie pacjentów po udarze krwotocznym.
3. U wszystkich badanych intensywne leczenie neurologiczne przyczyniło się do wyraźnej poprawy rokowań dotyczących prognozy dalszej poprawy wydolności funkcjonalnej. (PNN 2015;4(1):13–18)

Słowa kluczowe: udar mózgu, wydolność funkcjonalna, rokowania pacjentów

Introduction

Recent decades have brought a dramatic change in the approach to the assessment of treatment outcome as well as to the prognosis regarding future health condition in diseases of the neurological background [1]. More and more frequently in the research on the consequences of chronic neurological diseases there has been a departure from the principle of exclusively biological evaluation of patient's health condition and a more holistic point of view has been adopted, in which particular attention is paid to the emotional experience of the patient, his well-being and the ability to function in everyday life. The assessments of treatment results based on biological criterion have become insufficient. The scope of interest in medical sciences has moved beyond the traditional, purely medical area of operating, focusing on patients' activity in various areas of life [2].

Functional capacity is defined as the performance or functional activity. This concept can be associated with the ability to be independent of others in satisfying basic activities of daily living, which consist of movement, nutrition, personal hygiene or controlling physiological needs [3].

Cerebrovascular diseases constitute the largest part of neurology. The most common effect caused by this group of diseases being a long-term reduction in functional capacity [4]. Strokes are one of the leading causes of disability in modern society, and the costs of treatment of this disease belong the largest ones [5].

Two thirds of the patients were over 65 years of age. The severity of disability in these patients ranges from very severe neurological deficits and total dependence on the help from others to the complete lack of symptoms. In

half of the patients there are huge neurological deficits which limit independent functioning both at home as well as in the society. One fifth of the patients are totally dependent on the assistance from others [6].

In Poland, severe cerebral circulation occurs in more than 60 thousand patients a year, whereas the risk of stroke recurrence is 40–50% within 5 years. The recurrence of stroke frequently contributes to the advancement of disability and to reduction of functional capacity, often it entails a direct threat to life [7].

Vascular disorders of the brain are considered to be the least promising disease units in neurology. Therefore, more and more attention is paid to risk factors for stroke, and the implementation of preventive measures. Most of these factors are generated by lifestyle. Forwarding information on the disease, risk factors as well as on the ways how to eliminate them is the basis of effective prevention, as well as the formation of responsibility for their own health [8].

In dealing with patients after stroke one aims at decreasing mortality as well as at improving functional capacity and the quality of life. Appropriate treatment, rehabilitation and nursing can significantly reduce the number of complications and the severity of functional deficits [9].

The aim of this study was to analyse the impact of early intensive neurological treatment on the prognosis of a return to complete functional capacity of patients after stroke.

Material and Methods

The research was carried out in the Department of Neurology IPH no. 4 in Lublin on randomly selected group of one hundred patients who were characterized in terms of the type of stroke, socio-demographical characteristics (gender, age, place of residence, marital status, education), and coexisting diseases.

The vast majority of respondents were patients after ischemic stroke (77%). The remaining respondents underwent brain transient ischemic attack (12%) and cerebral hemorrhagic stroke (11%). The gender division of respondents was almost balanced with a slight predominance of women (55%). The average age of respondents ranged 67.5 ± 11.7 years. The majority (69%) of the respondents lived in the city. More than half (60%) of the respondents were married. More than half (51%) of the population studied had a vocational education, 27% secondary education. 14% of respondents included patients with primary education, and 8% with higher education.

Most respondents suffered from hypertension (88%). More than half (56%) of respondents indicated the insufficiency of the cardiovascular system. Almost every third of the respondents (30%) was charged with diabetes, and some of the respondents (17%) had abnormal lipid profile of hypercholesterolemia characteristics.

The level of patients' functional capacity after intensive neurological treatment was assessed with the use of the FIM Scale. It is a seven-degree scale, assessing 18 activities, which include: self-service, sphincter control, mobility, the ability to communicate social awareness [10].

Progression of functional capacity was measured during the patients' stay in a stroke unit and it was based on the analysis of medical records of patients. For that purpose the Scandinavian Stroke Scale (SSS) was applied. This scale takes into account the basic symptoms of the disease in the context of the patient's functional capacity (state of consciousness, eye movements and leg strength — the strength of the upper limb, lower limb strength, orientation in space, speech, facial palsy, and impaired walking). It allows for the determination of two indicators: the forecasting indicator and the long-term one. The former consists of the assessment of consciousness, setting of eyes, muscle strength of upper and lower limb. The long-term scoring concerns the assessment of muscle strength of upper and lower limbs, orientation, speech, facial palsy, and walking [11].

The results were statistically analyzed. The values of the measurable parameters analyzed have been shown by the mean value, median and standard deviation whereas for the immeasurable parameters by means of cardinality and percentage. For the measurable characteristics, the normality of the analyzed parameters distribution was evaluated by means of the Shapiro-Wilk test. For the purpose of comparing two independent

groups the Mann-Whitney test was applied. For more than two groups the Kruskal-Wallis test was used. For unrelated quality characteristics homogeneity χ^2 test was used for the purpose of detecting the existence of differences between the groups compared. In order to investigate the existence of the relationship between the features measured, independence χ^2 test was applied. The level of significance of $p < 0.05$ was adopted, indicating the existence of statistically significant differences or relationship.

Results

The carried out research has shown that less than half of the respondents (42%) already after the first stage of treatment returned to full functional capacity. Every sixth hospitalized patient (16%) required only moderate support from relatives in their everyday functioning. 42% of patients after stroke required further rehabilitation. The analysis has shown that after the completion of the treatment of stroke nearly one-third (28%) of respondents need substantial support from their caregivers, in order to function outside the hospital ward, and 14% of patients require constant care.

Therefore, the patients were enquired about the type of stroke being the reason for their hospitalization. The research has shown statistically significant ($\chi^2 = 26.238$, $df = 6$, $p < 0.001$) (Table 1) differences regarding treatment results due to different background of cerebrovascular insufficiencies. It turned out that after a transient ischemic attack (TIA) the patients almost in all cases (91.67%) regain full functional capacity already after the first stage of treatment. Almost all patients (90.01%) after brain hemorrhagic stroke required further rehabilitation treatment, whereas almost three quarters (72.73%) of this group of patients despite intensive treatment depended on considerable assistance from caregivers in their everyday functioning. Only slightly better results were reported in respondents with ischemic stroke of the brain, where 38.96% of the patients declared the return to full functional capacity. However, every third (24.68%) patient from this group required considerable assistance from third persons in their everyday functioning. Whereas every fifth (18.18%) respondent after ischemic stroke of the brain, despite the therapy applied, was completely inefficient and functionally dependent on the caregiver (Table 1).

Only 38.96% of patients with ischemic stroke of the brain regained full functional capacity, and 18.18% of this group of patients, despite treatment, still remains completely dependent on the constant assistance from caregivers even in the simplest activities. The overall rate of functional capacity on the FIM scale among the patients with transient ischemic attack (TIA) was

Table 1. The functional capacity of patients within the eligibility period for hospital discharge according to the type of stroke

Level of capacity	TIA		Ischemic stroke		Hemorrhagic stroke	
	N	%	N	%	N	%
Patients completely dependent	0	0.00	14	18.18	0	0.00
Patients requiring significant assistance	1	8.33	19	24.68	8	72.73
Patients requiring moderate assistance	0	0.00	14	18.18	2	18.18
Independent patients	11	91.67	30	38.96	1	9.09
Overall	12	100.00	77	100.00	11	100.00

Chi²=26.238, df=6, p<0.001

Table 2. The functional capacity of patients within the eligibility period for hospital discharge in particular areas (FIM Scale) according to the type of stroke

Areas of capacity	I. TIA		II. Ischemic stroke		III. Hemorrhagic stroke		H	p	Differences between groups
	M	SD	M	SD	M	SD			
The overall level of capacity	118.08	18.16	75.77	37.91	55.09	25.32	19.451	<0.001	I–II, I–III
Self-service	6.60	0.85	4.25	2.10	3.05	1.45	19.858	<0.001	I–II, I–III
Sphincter control	6.67	0.89	4.26	2.34	2.82	1.66	16.913	<0.001	I–II, I–III
Mobility and locomotion	6.63	0.91	4.00	2.31	2.42	1.66	21.361	<0.001	I–II, I–III
Communication	6.50	1.24	4.84	1.99	4.50	1.50	9.451	0.009	I–II, I–III
Social awareness	6.33	1.58	4.03	2.20	3.36	1.66	14.598	0.001	I–II, I–III

M — arithmetic average, SD — standard deviation, H — Kruskal-Wallis test, p — statistical significance

Table 3. Change in the patients' capacity within the period from hospital admission to eligibility for hospital discharge (SSS Scale) considering the type of stroke

Type of stroke	Area of capacity	Capacity at the moment of hospital admission		Capacity within the eligibility period for hospital discharge		t	p
		M	SD	M	SD		
TIA	Prognostic scoring	20.00	0.74	21.67	0.78	-8.864	<0.001
	Long term scoring	40.42	6.29	46.17	3.93	-5.880	<0.001
Ischemic stroke	Prognostic scoring	16.82	4.51	19.34	2.99	-10.003	<0.001
	Long term scoring	26.83	14.16	35.13	11.98	-13.151	<0.001
Hemorrhagic stroke	Prognostic scoring	12.36	4.63	18.27	2.49	-5.336	<0.001
	Long term scoring	16.18	10.51	30.55	7.75	-6.285	<0.001

M — arithmetic average, SD — standard deviation, t — t-Student test, p — statistical significance

M=118.08. In the group of patients after ischemic stroke of the brain the average functional capacity was M=75.77, and among patients with hemorrhagic stroke merely M=55.09.

The most difficult problem in everyday functioning for the patients after stroke were difficulties with moving. They mainly considered the patients after hemorrhagic stroke (M=2.42). Ischemic stroke gave more promising prognosis in this area of capacity (M=4.00). Slightly more satisfactory treatment effects were observed in the sphere of the sphincter control (from M=2.82 for hemorrhagic stroke to M=4.26 for ischemic stroke). The

most satisfactory results of treatment in stroke hospital units were observed in the area of communication of patients with the immediate environment. In this area the functional capacity sub-index was M=4.50 for hemorrhagic stroke of the brain, and M=4.84 for ischemic stroke.

The differences in the results of all the analyzed areas of functional capacity between the groups of patients studied are statistically significant (p<0.050) and relate to the comparison of patients with TIA with patients after ischemic and hemorrhagic stroke of the brain. Similarly to the case of the overall indicator of

the functional level, there were no statistically significant differences reported between the patients after ischemic stroke and those after hemorrhagic stroke of the brain (Table 2).

The long-term indicator of functional capacity in patients after a hemorrhagic stroke at the time of admission to hospital was $M=16.18$ and after treatment increased to the $M=30.55$. Among patients with ischemic stroke of the brain, this rate has increased from $M=26.83$ to $M=35.13$. In terms of predictive scoring, there also occurred positive changes. Among patients with cerebral hemorrhagic stroke of the brain there was noted an increase from $M=12.36$ to $M=18.27$. In the group of patients with ischemic stroke of the brain there also increased the level of positive prognosis from $M=16.82$ to $M=19.34$ (Table 2).

The study showed a statistically significant ($p<0.001$) relationship between the reason and the extent of the brain damage and the level of the observed and predicted improvement in functional capacity of patients. Also, there has been identified a very large increase in the long-term capacity SSS rate in the group of patients after hemorrhagic stroke. At the moment of admission to hospital it had the value of only $M=16.18$ and was quite highly diversified in the group ($SD=10.51$), and during the hospitalization period it was significantly improved up to $M=30.55$ with much less differentiation of the results ($SD=7.75$) ($t=-6.285$, $p<0.001$).

A significant improvement in the quality of everyday life has also been noted among patients with ischemic stroke, where the corresponding rate from the period of admission to hospital was $M=26.83$, and at discharge it increased to $M=35.13$ ($t=-13.151$, $p<0.001$).

Such a large change regarding capacity has not been recorded in the TIA group (increase from $M=40.42$ to $M=46.17$, $t=-5.880$, $p<0.001$), this may be due to the generally good capacity of these patients already at the moment of hospital admission, and therefore the improvement of the quality of everyday life was not as spectacular among this group of patients.

Similarly to the case of the long-term score, the greatest changes were observed among patients with cerebral hemorrhagic stroke of the brain (an increase from $M=12.36$ to $M=18.27$, $t=-5.336$, $p<0.001$) and patients with ischemic stroke of the brain (increase from $M=16.82$ to $M=19.34$, $p=-10.003$, $p<0.001$). In the group of patients with transient ischemic attack (TIA) there was also improvement of prognosis for the future, however it was already much lower (from $M=20.00$ during hospital admission to $M=21.67$ during the eligibility period for hospital discharge, $t=-8.864$, $p<0.001$) (Table 3).

Discussion

Insufficient performance of the vascular system of the brain, which requires emergency hospitalization almost always leaves a lasting effect on the quality of patient's functioning in family and professional life as well as at the level of social relations. It seems to be justified therefore, to commence the consideration from examining the functional capacity of patients after intensive treatment at the neurological ward immediately after the incident of cerebrovascular disorder [12].

The studies show high effectiveness of professional medical treatment in the acute period of vascular disease of the brain. Patients leaving the stroke unit were on the right course to return to active life from the period preceding the disease.

It should be noted that despite the high effectiveness of stroke treatment, significant percentage of stroke patients require assistance in everyday functioning as well as further rehabilitation proceedings. The wide variation in treatment results regarding the aforementioned group is probably due to the different background of acute cerebral circulatory insufficiency [13].

The authors' intention was to identify the activities of daily living, which the patients after the first stage of treatment find the most difficult. Based on the analysis of the results gathered on the basis of the FIM Scale, patients' functional capacity was subject to further analysis with respect to basic daily activities such as: self-service (eating, paying attention to appearance and personal hygiene, bathing, getting dressed and toilet), sphincter control, mobility and locomotion (moving from bed to the chair or wheelchair, sitting on the toilet bowl, stepping into the shower or bath, walking or riding in a wheelchair, walking up the stairs), communication (understanding and speaking out), as well as social awareness (contact with other people, problem solving, and memory).

The analysis confirmed that after the transient ischemic attack (TIA), full functional capacity is regained by patients as early as after the first stage of treatment. Unlike this group of patients, the other respondents had significant problems in all examined areas of daily functioning despite intensive treatment in a stroke unit. However, there was observed a slightly better functional capacity in patients after ischemic stroke than in the case of patients with cerebral hemorrhage.

Another element of the authors' investigation was to assess the extent to which the health condition of patients changes during the hospitalization period since the moment of their being qualified to hospital discharge. The study confirmed a number of reports made by other authors that intensive neurological and rehabilitation treatment carried out immediately after the occurrence of cerebrovascular insufficiency, significantly

improves the prognosis assessing the possibility for patients to regain full functional capacity [14]. In all patients there was observed a significant increase in functional capacity in the course of treatment. It should be emphasised that the observed improvement in daily functioning of patients took place regardless of the reason for their hospitalization.

It should be noted that in the case of all patients, intensive neurological treatment contributed to a significant improvement of the prognosis regarding further improvement of functional capacity.

Conclusions

The research results show the high effectiveness of professional medical treatment in the acute period of vascular disease of the brain. The study showed that:

1. After a transient ischemic attack (TIA) patients almost always (91.67%) regain full functional capability already after the first stage of treatment.
2. There is a very considerable improvement in the long-term capacity in patients after hemorrhagic stroke.
3. In all patients, the intensive neurological treatment contributed to a significant improvement in the prognosis regarding further recovery of functional capacity.

Implications for Nursing Practice

The observations clearly demonstrate the effectiveness of the treatment course carried out immediately after the occurrence of circulation insufficiency within the nervous system. Real possibilities of gaining, by applying appropriate treatment and professional care, a significant improvement in functional capacity in patients who experienced cerebrovascular disorder, indicate the validity of supporting patients and their caregivers in the difficult process of treatment, particularly immediately after the occurrence of the disorder. It seems to be very important to make the patients and their caregivers aware of the significance of undergoing certain medical procedures and to provide information regarding the possibility of improving health condition as well as the quality of daily functioning.

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