Functioning of Stroke Patients during Hospitalisation

Funkcjonowanie pacjentów po udarze mózgu w okresie hospitalizacji

Agnieszka Królikowska[1], **Monika Barbara Rusinek**[2], **Karolina Filipska-Blejder**[1], **Robert Ślusarz**[1]

❶ Department of Neurological and Neurosurgical Nursing, Department of Perioperative Nursing,
Faculty of Health Sciences, Collegium Medicum in Bydgoszcz, Nicolaus Copernicus University in Toruń, Poland

❷ Student Scientific Circle, Department of Neurological and Neurosurgical Nursing, Department of Interventional Nursing,
Faculty of Health Sciences, Collegium Medicum in Bydgoszcz, Nicolaus Copernicus in Toruń, Poland

Abstract

Introduction. Brain strokes remain a major cause of disability in adults, disrupting their daily functioning.
Aim. This study aimed to assess the functioning of stroke patients.
Material and Methods. The study involved sixty stroke patients hospitalised at the Department of Neurology of the Antoni Jurasz University Hospital No. 1 in Bydgoszcz. A diagnostic survey method was used, with the following research tools employed: a questionnaire survey containing demographic data, the Barthel Index, the Beck Depression Scale and the National Institutes of Health Stroke Scale (NIHSS).
Results. According to the Barthel Index, more than half of the patients (53%) had a moderately severe condition, those with a severe condition accounted for 32% of the group, and 15% were those with a mild condition — independent patients. According to the Beck Depression Scale, most subjects (73%) had no symptoms of depression; mild depressive symptoms were noted in 17%. The mean NIHSS score was 3.13, with most people scoring between 0 and 4.
Conclusions. Stroke patients were dependent on the help of others or were completely impaired in terms of self-care and self-keeping; no significant emotional disturbance was demonstrated. Gender did not affect the patients' dexterity, independence and neurological condition. The patients' independence and neurological condition significantly deteriorated with age. Rural residents manifested greater self-care and self-keeping deficits and worse neurological conditions. Economically active patients showed the highest fitness; pensioners had the lowest fitness. A low level of education had a negative impact on the fitness of stroke patients. Married people functioned better than single patients. **(JNNN 2024;13(2):54–61)**
Key Words: patient functioning, sociodemographic factors, stroke

Streszczenie

Wstęp. Udary mózgu są nadal główną przyczyną niepełnosprawności ludzi dorosłych, zaburzając codzienne ich funkcjonowanie.
Cel. Celem pracy była ocena funkcjonowania pacjentów po przebytym udarze mózgu.
Materiał i metody. W badaniu wzięło udział 60 pacjentów po udarze mózgu, hospitalizowanych w Klinice Neurologii Szpitala Uniwersyteckiego nr 1 im. dr. Antoniego Jurasza w Bydgoszczy. Wykorzystano metodę sondażu diagnostycznego, natomiast narzędziami badawczymi były: kwestionariusz ankiety zawierający dane demograficzne, skala Barthel, Skala Depresji Becka, Skala Udaru Narodowego Instytutu Zdrowia (NIHSS).
Wyniki. Według skali Barthel ponad połowa pacjentów (53%) wykazywała stan średnio ciężki, osoby w ciężkim stanie stanowiły 32% grupy, 15% stanowiły osoby z lekkim stanem — pacjenci samodzielni. Według Skali Depresji Becka większość osób badanych (73%) nie miało objawów depresji, lekkie objawy depresji zauważono u 17%. Według skali NIHSS średnia wyników wynosiła 3,13, najwięcej osób uzyskało od 0 do 4 punktów.
Wnioski. Pacjenci po udarze mózgu byli zależni od pomocy innych lub byli całkowicie niewydolni w zakresie samoopieki i samopielęgnacji, nie wykazano znacznych zaburzeń emocjonalnych. Płeć nie wpływała na sprawność, samodzielność

i stan neurologiczny pacjentów. Wraz z wiekiem samodzielność i stan neurologiczny pacjentów istotnie ulegał pogorszeniu. Mieszkańcy wsi przejawiali większy deficyt samoopieki i samopielęgnacji oraz gorszy stan neurologiczny. Pacjenci aktywni zawodowo wykazywali się najwyższą sprawnością, osoby na rencie/emeryturze sprawnością najniższą. Niski poziom wykształcenia wpływał negatywnie na sprawność pacjentów po udarze mózgu. Osoby w związku małżeńskim funkcjonowały lepiej niż pacjenci samotni. **(PNN 2024;13(2):54–61)**
Słowa kluczowe: funkcjonowanie pacjentów, czynniki socjodemograficzne, udar mózgu

Introduction

Stroke is an immediate life-threatening condition requiring mandatory hospitalisation [1–3]. In Poland, it affects about 80,000 people annually and is the third cause of death and the first cause of disability for people over 40 years of age [4,5]. In the USA in 2017, stroke was the leading cause of disability and cognitive impairment and the fifth most common cause of death [6]. Globally, 15 million people develop stroke each year, of which 5 million die and 5 million experience disability [7].

Stroke causes sudden focal neurological abnormalities due to non-traumatic vascular damage to the brain. Out of the total number of strokes, 85% are ischaemic and 15% are haemorrhagic [1,4,8]. Unfortunately, strokes are one of the leading causes of mortality and disability among adults and lead to adverse social and economic consequences [1,4]. The incidence of stroke increases with age in both men and women. They mostly occur in older people, but around 10% affect young adults (under 45 years of age) [1,5].

Strokes cause disability due to neurological symptoms, but also depression, vascular dementia and epilepsy [1,9].

Primary and secondary prevention is important in averting the condition [1]. In the event of a stroke, it is crucial to recognise symptoms promptly and implement targeted treatment that will affect patient survival, prognosis and functional capacity [2].

Functional capacity is defined as the ability to perform daily living tasks safely and independently [10,11]. It is important to emphasise that neurological deficits significantly affect the level of functional capacity associated with performing daily living activities such as moving, eating, dressing, washing and controlling physiological needs [10]. Stroke-related disorders cause deficits in daily functioning but also result in emotional deficits. Disability-preventing rehabilitation measures should be taken as soon as possible to contribute to an optimal level of functioning and to enable the patient to return to life in society [5].

The main aim of this study was to assess the functioning of stroke patients. Another aim was to investigate the influence of sociodemographic factors on patient functionality.

Material and Methods

The study involved 60 stroke patients hospitalised at the Department of Neurology of the Antoni Jurasz University Hospital No. 1 in Bydgoszcz. In the study group, only 5% of patients suffered a haemorrhagic stroke (3 people), while 95% had an ischaemic stroke (57 people). Most respondents were women — 55% (33); 45% were men (27). The mean age of the respondents was 64.6 years, with a minimum age of 40 years and a maximum age of 87 years. The largest group was patients aged 51–60 — 35% (22 patients). In terms of place of residence, the largest subgroup was city dwellers — 80% of respondents (48), with 20% (12) of respondents being rural residents. The patients' occupational activity was also taken into account. It was shown that 58% (35) of the subjects were pensioners. Those who were economically active numbered 30% (18) of the total group. Respondents who lived on benefits or were unemployed accounted for 12% (7 people). Considering the respondents' education, it was found that 38% (23) of them had vocational education. Those with primary education accounted for 28% (17) of the total group. Respondents with secondary and tertiary education each accounted for 17% (10) of the total. The group of respondents was dominated by married people — 68% (41); widowed people accounted for 28% (17), and divorced people for only 4% (2) (Table 1).

The required criterion to qualify a patient for the study was that verbal contact (logical, unrestricted) was

Table 1. Characteristics of the surveyed group

Variable	N	%
1	2	3
Gender		
Women	33	55
Men	27	45
Age		
Up to 40 years	1	2
41–50 years	5	10
51–60 years	22	35
61–70 years	11	18
71–80 years	11	18
Over 80 years	10	17

Table 1. Continued

	1	2	3
Place of residence			
Rural area		12	20
Urban area		48	80
Education			
Primary		17	28
Vocational		23	38
Secondary		10	17
Higher		10	17
Marital status			
Married		41	68
Widow/Widower		17	28
Divorced		2	4
Professional activity			
Gainfully employed		18	30
Pensioner		35	58
Unemployed/unemployment benefits		7	12

N — number of observations; % — percent

maintained, with the patient capable of responding to the investigator's questions.

A diagnostic survey method was used to examine the functioning of stroke patients. The research tools included a survey questionnaire with demographic data, the Barthel Index, the Beck Depression Scale and the National Institutes of Health Stroke Scale (NIHSS).

The Barthel Index is commonly used to assess a patient's functional capacity and need for care. The Barthel Index consists of ten daily living activities, in which the patient can obtain a maximum of 100 points. A score of 0 to 20 points indicates a very severe condition of the patient — total dependency; 21 to 85 points indicates a moderately severe condition, with the patient requiring some assistance from others. A score of 86 to 100 points indicates a mild patient state — the patient is independent [12].

The Beck Depression Scale contained 21 questions. A score of 0 to 11 points indicates the absence of depressive symptoms; 12 to 19 is mild depression, 20 to 25 points moderate depression and scores above 25 points indicate severe depression [13]. The NIHSS is based on 13 questions to assess the neurological deficits of the subject. A score of 0 indicates the absence of stroke symptoms. Scores of 1–4 are indicative of mild stroke; moderate stroke is 5–15 points. Severe stroke patients score above 16 [14].

All data obtained were statistically analysed after being entered into the STATISTICA 13 database. Data not having a normal distribution and recorded on an ordinal scale were analysed using non-parametric rank-sum tests such as the Kruskal–Wallis and Mann–Whitney U tests and Spearman's rank correlation. A significance coefficient of $\alpha=0.05$ was used to verify all analyses, allowing variables to be considered statistically significant at $p<0.05$.

Results

The group of patients included in the study was predominantly post-ischaemic stroke patients. According to the Barthel Index, more than half of the group (53%) showed a moderately severe condition; these were patients requiring partial assistance. Those with a severe condition accounted for 32% of the group and the remaining 15% were those with a mild condition, i.e. independent patients. These data show that stroke patients were highly dependent on the help of others or were completely impaired in terms of self-care and self-keeping.

According to the Beck Depression Scale, most subjects (73%) had no symptoms of depression. Only 17% of the group had mild depressive symptoms; those with moderate or profound symptoms accounted for as little as 5% of all subjects. It can be concluded that stroke patients were not heavily affected by emotional disturbances.

The mean score as per the NIHSS was 3.13. The score range in the group was 0–18, though most people scored between 0 and 4. This means that the patients studied had suffered a mild stroke.

The collected results were analysed in relation to such sociodemographic factors as gender, age, place of residence, occupational activity, education and marital status.

The analysis performed for the level of independence based on the Barthel Index indicated mean scores of 48.9 for women and 50.6 for men; median scores were higher for men. The analysis performed for the compared groups did not indicate statistically significant differences, so gender did not affect the patients' performance and independence ($p=0.864$).

The results for the Beck Depression Scale showed the highest score difference. The difference between means for the scores was 1.3 points with a difference between medians of 5 points. The Mann–Whitney U test result was $p=0.094$. This indicates a certain trend regarding the differences obtained and higher rates of depression for women compared to men. This indicates that post-stroke depression affects women more often.

A similar analysis using the NIHSS did not indicate differences between the groups. Both women's and men's scores were similar, with mean values of 2.8 for the first group and 3.6 for the second. The distribution of the values of the other descriptive statistics parameters was also similar. These results indicate no correlation between the gender of the subjects and the severity of stroke symptoms ($p=0.76$) (Table 2).

Table 2. Analysis of results in relation to patients' gender

Questionnaires	$\bar{x}$	SD	Me	Test result	p-value
Bartel Index					
Women	48.9	32.8	50	–0.171	0.864
Men	50.6	38.5	70		
Beck Depression Scale					
Women	9.1	6.9	8	1.672	0.094
Men	7.8	10.8	3		
NIHSS					
Women	2.8	3.7	2	0.031	0.76
Men	3.6	5.5	1		

Mann–Whitney U test; $\bar{x}$ — mean; SD — standard deviation; Me — median

Table 3. Analysis of questionnaire results in relation to the patients' age

Pair of outcome variables analysed	Spearman's rank order correlation			
	Quantity	Correlation coefficient R	Test result t(N–2)	p-value
Barthel Index	60	–0.535	–4.824	<0.001
Beck Depression Scale	60	0.001	0.007	0.995
NIHSS	60	0.490	4.286	<0.001

The Spearman correlation test

Table 4. Analysis of results in relation to patients' place of residence

Questionnaires	$\bar{x}$	SD	Me	Test result	p-value
Bartel Index					
Urban area	54.6	35.0	65	2.141	0.032
Rural area	30.0	29.4	25		
Beck Depression Scale					
Urban area	8.1	9.1	5.5	–1.272	0.203
Rural area	10.3	7.6	10.5		
NIHSS					
Urban area	2.5	3.9	1	–2.194	0.028
Rural area	5.7	6.1	3.5		

Mann–Whitney U test; $\bar{x}$ — mean; SD — standard deviation; Me — median

The results in Table 3 concerned the correlation between the results obtained from the questionnaires and the age of the subjects.

The comparison showed a statistically significant correlation between the analysed variables for the Barthel questionnaire and NIHSS results, and no correlation for the Beck Depression questionnaire results.

The Barthel Index scores correlated with age to an average extent, with the observed relationship being negative. This indicates that the patients' independence significantly deteriorated with age (p<0.001). A comparison of the results for the Beck Depression Scale and age did not indicate that age contributed in any way to the respondents' depression (p=0.995). Analysis of age in relation to the NIHSS questionnaire yielded a positive relationship. This indicates that older age accompanies neurological deterioration (p<0.001).

Table 4 shows the differences between the groups formed based on the subjects' places of residence.

The analysis conducted for the level of independence based on the Barthel Index indicated median scores of 54.6 for those living in urban areas and 30 for those living in rural areas. Median scores were also higher for those living in the city. The analysis for the compared groups indicated statistically significant differences (p=0.032). This means that the place of residence influences the results obtained by the subjects with the Barthel Index. Hence, it can be concluded that rural patients have a greater self-care and self-keeping deficit compared to urban area residents.

The results for the Beck Depression Scale showed the smallest score differences. The difference between means for the scores was 2.2 points with a difference between medians of 5 points. The Mann–Whitney U test result was p=0.203. This result did not confirm statistically significant differences between the compared groups. This means that the place of residence did not affect the emotional state of the patients.

A similar analysis using the NIHSS indicated differences between the groups. The scores of rural residents were higher on average by 3.2 points, whereas urban area residents scored 2.5 points, respectively. Median values for rural residents were also 2.5 points higher. The Mann–Whitney U test result was p=0.028. The results indicate that patients living in rural areas showed a worse neurological condition.

Table 5 shows the statistical analysis between the scales used and the respondents' work activity. The analysis conducted for the level of independence based on the Barthel questionnaire indicated the presence of a statistically significant difference. Economically active patients showed the highest level of fitness, while those

Table 5. Analysis of results in relation to patients' occupational activity

Questionnaires	$\bar{x}$	SD	Me	Test result	P-value
Bartel Index					
Professionally active	71.1	29.0	80		
Disability pension/retirement pension	39.7	34.9	35	8.726	0.013
Other	44.3	29.9	45		
Beck Depression Scale					
Professionally active	9.6	10.3	7.5		
Disability pension/retirement pension	8.1	8.1	7	0.113	0.944
Other	8.0	9.1	3		
NIHSS					
Professionally active	2.3	5.2	0		
Disability pension/retirement pension	3.9	4.5	3	6.884	0.032
Other	1.4	1.8	0		

Mann–Whitney U test; $\bar{x}$ — mean; SD — standard deviation; Me — median

Table 6. Analysis of results in relation to patients' education

Questionnaires	$\bar{x}$	SD	Me	Test result	p-value
Bartel Index					
Primary	23.8	28.0	10		
Vocational	53.0	34.0	50		
Secondary	76.0	27.4	82.5	15.777	0.001
Higher	61.5	34.4	70		
Beck Depression Scale					
Primary	11.2	10.0	12		
Vocational	7.4	8.7	5		
Secondary	6.7	6.4	6	2.827	0.419
Higher	8.2	9.4	6		
NIHSS					
Primary	5.5	5.2	4		
Vocational	2.7	4.0	1		
Secondary	0.7	1.2	0	12.226	0.006
Higher	2.5	5.2	1		

Kruskal–Wallis U test; $\bar{x}$ — mean; SD — standard deviation; Me — median

on disability/retirement pensions showed the lowest level of fitness (p =0.013).

Depression scores for the three compared groups did not indicate significant differences. Differences between the compared groups reached 1.6 points for the mean and 4.5 points for the median, respectively.

Similar to the Barthel Index, statistically significant differences were obtained for the NIHSS questionnaire results (p=0.032). The results were highest in pensioners.

Table 6 presents the analysis of the results from the questionnaires used and the education of the subjects. Statistically significant differences were found for the Barthel Index (p=0.001) and the NIHSS (p=0.006), and no significant differences were found for the Depression scale.

The results for the Barthel Index score were lowest for those with primary education and at comparable levels for vocational, secondary and tertiary education. This indicated that a low level of education negatively affected the performance of stroke patients. The lack of significant Beck Depression Scale differences indicated that education did not affect the occurrence of post-stroke depression. The NIHSS assessment indicated the highest results for primary education, similar levels for vocational and higher education and the lowest scores for secondary education. The neurological condition was worse in patients with low education.

Table 7 presents a statistical analysis of the results obtained in relation to marital status. The analysis performed for the level of independence based on the Barthel questionnaire indicated mean scores of 56.1 for married people and 36.9 for widowed people; median scores were as much as 55 points higher in the first group. The analysis for the included groups indicated statistically significant differences (p=0.047). This confirms a significant effect of marital status on the results obtained. Married people functioned better than single patients.

The results for the Beck Depression Scale showed the smallest score difference. The scores were 8.3 for married people and 8.8 for widowed people with medians of 5 and 7 points, respectively.

Table 7. Analysis of results in relation to patients' marital status

Questionnaires	$\bar{x}$	SD	Me	Test result	p-value
Bartel Index					
Married	56.1	31.6	65	1.834	0.047
Widow/Widower	36.9	42.6	10		
Beck Depression Scale					
Married	8.3	8.7	5	–0.180	0.857
Widow/Widower	8.8	9.8	7		
NIHSS					
Married	2.3	3.8	1	–1.857	0.063
Widow/Widower	5.2	5.8	3		

Mann–Whitney U test; $\bar{x}$ — mean; SD — standard deviation; Me — median

A similar analysis using the NIHSS did not indicate differences between the groups. Both the scores of married and widowed persons were not statistically significantly different, where the median value for the former group was 2.8 and for the latter 3.6. Notably, the results were slightly higher for the median and quartile values in the case of widowed people. This means that the marital status of the stroke patients had no effect on their poorer neurological condition.

Discussion

Strokes remain a major health, social and economic problem. With respect to the health aspect, the condition causes numerous symptoms. Patients present with hemiparesis or paralysis, hemiplegia, speech disorders (primarily aphasia), visual disturbances, dizziness and headaches with a sensation of the environment spinning, nausea and vomiting, as well as balance disorders [1,15]. Additionally, about 70% of patients in the acute phase of stroke develop cognitive disorders, including disturbances in attention, memory, learning, perception, awareness and thinking [15]. These disorders become a cause of disability and, at the same time, a deficit in daily functioning.

To minimise the risk of mortality, disability and functional impairment, the patient must reach a stroke centre as soon as possible. Underestimating the symptoms indicative of stroke is detrimental to health and life-threatening [16]. Patients are most likely to make a full recovery if care is provided within 4.5 hours of first symptoms. Stroke centres may provide thrombolytic treatment, or thrombectomy [1,3,4,9]. These methods enable the closed or critically stenosed cerebral vessel to be decongested and proper cerebral circulation to be restored [3,4,9]. Intravenous thrombolysis is the gold standard for treating acute ischaemic stroke and should be implemented as soon as possible, even with the recommended 4.5-hour time window, as this translates into improved efficacy of this treatment [3,4,6]. Effective treatment reduces patient mortality and disability.

In this study, patients underwent mild stroke as assessed by the NIHSS (a mean score of 3.13). Despite this, the vast majority of included patients manifested a moderately severe (53%) and severe (32%) condition as assessed by the Bartel Index. Patients were dependent on the help of others and, in many cases, were impaired in terms of self-care and self-keeping. Only 15% of patients were independent during hospitalisation. In Przychodzka's study, the condition of the patients was described as moderately severe, meaning that the patients had a medium severity of disability and were partially unable to handle daily living activities. The authors indicated that the patients showed high dependency in washing and bathing the whole body, as well as in moving on flat surfaces. Additionally, they performed poorly when climbing stairs [10].

Women and men in our study showed similar functionality (a difference of 1.7 points). In the end, there was no relationship between functionality and gender of the subjects. In Biercewicz's study, men showed better functional performance compared to women [17]. Research by Zawadzka also confirms that there is no relationship between the gender of the subjects and quality of life [18].

The study confirmed the relationship between functional capacity and the age of the subjects. It was shown that patients' functional capacity deteriorates with age. Similar results were obtained in a study by Przychodzka [10]. In Biercewicz's study, older age also worsened functional capacity [17]. It should be emphasised that age is one of the most significant non-modifiable factors in stroke. The risk of stroke increases with age both in women and in men [7]. According to Zawadzka, age determines the quality of life of stroke patients in a very significant way (deteriorating quality of life). It particularly affects such areas as mobility, upper limb function, thinking, social roles and energy [18].

The functional capacity of patients was influenced by their place of residence. Urban area residents functioned better than those living in rural areas. These relationships were statistically significant. In Zawadzka's study, no relationship was observed between place of residence and quality of life in stroke patients [18].

Further, it appeared that the respondents' education was related to their physical functioning. Those with secondary and higher education were significantly better

functioning than those with primary education. In Przychodzka's study, functional capacity was also higher the higher the education of the respondents [10].

In our study, economically active people also functioned better compared to pensioners. Notably, pensioners are elderly people, and it is known that the higher the age, the worse the functional capacity.

Taking into account the marital status of the patients, it was shown that married people showed better functional capacity compared to widowed people. In Zawadzka's study, marital status did not affect the overall quality of life of the subjects [18].

Apart from physical disorders, elderly people experience mood disorders after stroke. These may result from a sudden loss of the ability to be fully active, limitation of basic activities and difficulties in communicating with the environment. It is estimated that around 30% of patients manifest depressive symptoms [5]. In our study, the vast majority of subjects did not manifest symptoms of depression after stroke. In Biercewicz's study, functionally fit people also did not show symptoms of depression [17].

In this study, none of the sociodemographic factors influenced the occurrence of depression among stroke patients.

Kowalczyk's study showed that the quality of life is closely related to the level of motor performance. It was indicated that people who are independent and require little assistance have a higher quality of life compared to those dependent on their environment, even to a small extent, irrespective of the time elapsed since the stroke [19].

Conclusions

1. Stroke patients were dependent on the help of others or were completely impaired in terms of self-care and self-keeping, and were not heavily burdened by emotional disturbances.
2. Gender did not affect the patients' dexterity, independence and neurological condition. The results indicated a certain trend for the differences obtained and higher rates of depression for women compared to men. This means that post-stroke depression affected women more often.
3. The patients' independence and neurological condition significantly deteriorated with age. Age did not contribute to respondents' depression.
4. Rural residents had greater self-care and self-keeping deficits and their neurological condition continued to deteriorate. The place of residence did not influence the incidence of depression in the respondents.

5. Economically active patients showed the highest fitness; pensioners had the lowest fitness. Vocational activity did not influence the development of depression either.
6. A low level of education had a negative impact on the fitness of stroke patients. Education did not influence the occurrence of depressive symptoms.
7. Married people functioned better than single patients, while marital status did not affect neurological deterioration and depression.

Implications for Nursing Practice

Assessing the functioning of stroke patients is vital for planning holistic patient care. This will enable the selection of rehabilitation interventions leading to an improvement in functionality, at least in the performance of daily living activities.

References

[1] Chmielecki B., Stępnik L. Wiedza mieszkańców Uniejowa i okolic na temat udaru mózgu. W: Borowska-Stefańska M., Masierek E. (Red.), *Biuletyn Uniejowski*. Wyd. UŁ, Łódź 2020;9:59–80.

[2] Siminska J., Pietkun K., Porzych P. i wsp. Udar niedokrwienny mózgu — postępowanie przedszpitalne i wczesnoszpitalne. *J Educ Health Sport*. 2016;6(8):439–453.

[3] Staszewski J., Bilbin-Bukowska A., Kolmaga N. i wsp. Przyczyny opóźnień postępowania w ostrym udarze niedokrwiennym mózgu. *Lek Wojsk*. 2019;97(1):19–25.

[4] Luchowski P., Rejdak K. Metody leczenia udaru mózgu. *Lekarz POZ*. 2020;3:199–205.

[5] Cipora E., Niemiec M., Ściborowicz A. Medyczno-społeczne aspekty rehabilitacji osób starszych po udarze mózgu. *Med Og Nauk Zdr*. 2022;28(1):28–32.

[6] Zhao Y., Zhang X., Chen X., Wei Y. Neuronal injuries in cerebral infarction and ischemic stroke: From mechanisms to treatment (Review). *Int J Mol Med*. 2022;49(2):15.

[7] Kapica-Topczewska K., Golec W., Kulikowska J. i wsp. Analiza czynników ryzyka i charakterystyka kliniczna pacjentów z udarem mózgu hospitalizowanych w Klinice Neurologii UM w Białymstoku w 2016 roku. *Post Nauk Med*. 2020;33(1):4–11.

[8] Kaźmierski R. Diagnostyka i leczenie chorych w ostrej fazie udaru niedokrwiennego mózgu. *Anest Ratow*. 2014;8:62–75.

[9] Kaczorowski R., Murjas B., Bartosik-Psujek H. Rozwój i nowe perspektywy leczenia udaru mózgu w Polsce. *Medical Review*. 2015;13(4):376–386.

[10] Przychodzka E., Grudzień A., Celej-Szuster J., Turowski K. Ocena wydolności funkcjonalnej chorych po udarze mózgu. *Gerontol Pol*. 2019;27(4):272–279.

[11] Fidecki W., Wysokiński M., Wrońska I. i wsp. Sprawność funkcjonalna pacjentów w podeszłym wieku hospitalizowanych w oddziałach neurologicznych. *Pielęg Neurol Neurochir*. 2017;6(3):102–106.

[12] Grochulska A., Jastrzębska M. Poprawa stanu funkcjonalnego osób po przebytym udarze mózgu — rola pielęgniarki. *Probl Pielęg*. 2012;20(3):300–309.

[13] Parnowski T., Jernajczyk W. Inwentarz Depresji Becka w ocenie nastroju osób zdrowych i chorych na choroby afektywne. *Psychiatr Pol*. 1977;11:417–425.

[14] Książkiewicz B., Nowaczewska M., Wicherska B. i wsp. Kliniczne monitorowanie udaru mózgu. *Udar Mózgu*. 2007;9(2):89–96.

[15] Starosta M., Redlicka J., Brzeziański M., Niwald M., Miller E.D. Udar mózgu — ryzyko niepełnosprawności oraz możliwości poprawy funkcji motorycznych i poznawczych. *Pol Merkuriusz Lek*. 2016;41(241):39–42.

[16] Cieślak K. Wiedza pacjentów po udarze mózgu na temat własnej choroby. *Pielęgniarstwo w Opiece Długoterminowej*. 2018;3(4):15–22.

[17] Biercewicz M. Functional Assessment of Elderly Patients after Stroke. *J Neurol Neurosurg Nurs*. 2020;9(2):59–64.

[18] Zawadzka J., Bejer A., Kwolek A. Wpływ wybranych czynników społeczno-demograficznych na jakość życia pacjentów po udarze mózgu — doniesienie wstępne. *Prz Med Uniw Rzesz Inst Leków*. 2014;1:36–46.

[19] Kowalczyk B., Zawadzka B. Poziom sprawności ruchowej a jakość życia po udarze mózgu osób w wieku produkcyjnym. *Probl Hig Epidemiol*. 2019;100(1):42–49.

Corresponding Author:

Agnieszka Królikowska [ID]

Department of Neurological and Neurosurgical Nursing,
Faculty of Health Science,
The Ludwik Rydygier Collegium Medicum in Bydgoszcz,
The Nicolaus Copernicus University Toruń, Poland
Łukasiewicza 1 street, 85-821 Bydgoszcz, Poland
e-mail: agakrolikowska6@wp.pl