

# Factors associated with functional disability after ischemic stroke

Fatores associados a incapacidade funcional após acidente vascular cerebral isquêmico  
Factores asociados a incapacidad funcional después de accidente cerebrovascular isquémico

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## Descriptores

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## Abstract

**Objective:** To assess the functional disability level and identify associated factors in people after Ischemic Cerebral Vascular Accident.

**Methods:** A prospective cohort, carried out in a reference hospital in neurology with 224 people with ischemic stroke. Data collection took place between March and October 2019. Participants were followed up during hospitalization, when sociodemographic and clinical variables were collected using specific instruments and contacted after 90 days, by telephone call, to apply the Modified Barthel Index. In the analysis, descriptive statistics and Pearson's chi-square test were applied. Statistical significance of 5% was adopted.

**Results:** Most had some degree of functional disability (58.5%), with 29.5% having moderate dependence and 29.0% having severe dependence. The variables being female ( $p=0.011$ ), time of arrival at the reference hospital greater than or equal to 4.5 hours ( $p=0.017$ ), previous stroke ( $p=0.031$ ), not having undergone thrombolysis ( $p=0.023$ ), having high blood pressure ( $p=0.032$ ) and greater severity estimated by the National Institute of Health Stroke Scale ( $p=0.000$ ) were associated with a higher disability level.

**Conclusion:** Moderate to severe dependence predominated. The severity of the event, previous event, hypertension, non-submission to thrombolysis, delay in arriving at the hospital and female gender were associated with a higher functional disability level.

## Resumo

**Objetivo:** Avaliar o nível de incapacidade funcional e identificar os fatores associados em pessoas após Acidente Vascular Cerebral Isquêmico.

**Métodos:** Coorte prospectiva, realizada em hospital de referência em neurologia, com 224 pessoas com acidente vascular cerebral isquêmico. A coleta de dados ocorreu entre março a outubro de 2019. Os participantes foram acompanhados durante a internação, quando as variáveis sociodemográficas e clínicas foram levantadas empregando-se instrumentos específicos e contatados após 90 dias, por ligação telefônica, para aplicação do Índice de Barthel modificado. Na análise, aplicou-se estatística descritiva e o teste Qui-quadrado de Pearson. Adotou-se significância estatística de 5%.

**Resultados:** A maioria apresentou algum grau de incapacidade funcional (58,5%), sendo que 29,5% apresentaram dependência moderada e 29,0% severa ou grave. As variáveis sexo feminino ( $p=0,011$ ), tempo de chegada ao hospital de referência maior ou igual a 4,5h ( $p=0,017$ ), Acidente vascular cerebral prévio ( $p=0,031$ ), não ter realizado trombólise ( $p=0,023$ ), ter hipertensão arterial ( $p=0,032$ ) e maior gravidade estimada pela *National Institute of Health Stroke Scale* ( $p=0,000$ ) foram associadas a maior nível de incapacidade.

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Conflicts of interest: nothing to declare.

**Conclusão:** Predominou a dependência de moderada a grave. A gravidade do evento, evento prévio, hipertensão, não submissão à trombólise, retardo à chegada ao hospital e sexo feminino foram associados a maior nível de incapacidade funcional.

## Resumen

**Objetivo:** Evaluar el nivel de incapacidad funcional e identificar los factores asociados en las personas después de un accidente cerebrovascular isquémico.

**Métodos:** Cohorte prospectiva, realizada en un hospital de referencia en neurología, con 224 personas con accidente cerebrovascular isquémico. La recopilación de datos se llevó a cabo entre marzo y octubre de 2019. Se acompañó a los participantes durante la internación, momento en que se recopilaron las variables sociodemográficas y clínicas mediante la utilización de instrumentos específicos, y se los contactó 90 días después, por teléfono, para aplicar el Índice de Barthel modificado. En el análisis se aplicó estadística descriptiva y la prueba  $\chi^2$  de Pearson. Se adoptó significación estadística de 5 %.

**Resultados:** La mayoría presentó algún nivel de incapacidad funcional (58,5 %), de los cuales el 29,5 % presentó dependencia moderada y el 29,0 % dependencia severa o grave. Las siguientes variables fueron asociadas a un mayor nivel de incapacidad: sexo femenino ( $p=0,011$ ), tiempo de llegada al hospital de referencia mayor o igual a 4,5 h ( $p=0,017$ ), accidente cerebrovascular previo ( $p=0,031$ ), no haber realizado trombólisis ( $p=0,023$ ), tener hipertensión arterial ( $p=0,032$ ) y mayor gravedad estimada por la *National Institute of Health Stroke Scale* ( $p=0,000$ ).

**Conclusión:** Predominó la dependencia de moderada a grave. La gravedad del evento, evento previo, hipertensión, no realización de trombólisis, retraso de la llegada al hospital y sexo femenino fueron las variables asociadas a un mayor nivel de incapacidad funcional.

## Introduction

Neurological disorders are the leading causes of disability-adjusted life years lost.<sup>(1)</sup> Stroke is the second and third cause of functional disability in the world, in individuals aged 50 to 79 years and 25 to 49 years, respectively.<sup>(2)</sup> The ischemic type is the most common, accounting for approximately 80% of cases.<sup>(3)</sup>

Stroke and the resulting functional disability generate serious emotional impacts, requiring individuals to adapt to a new temporary or permanent condition. There is still an economic impact for the individual and the Brazilian Health System (*Sistema Único de Saúde*), as affected people may need continuous care after discharge and rehabilitation, whose costs are expensive.<sup>(4)</sup> In northeastern Brazil, from 2008 to 2019, the cost per hospitalization due to stroke was R\$1,050.65 and, in this same period, hospitalizations increased by 124.2%.<sup>(5)</sup>

In order to reduce damage, event prevention is fundamental as well as the rapid arrival of individuals to an appropriate health service and the provision of early care and treatment to minimize functional disability, such as infusion of thrombolytics and adequate therapeutic management. Furthermore, etiological investigation, clinical stability, prescription of drugs appropriate to the stroke's etiology, hospitalization in specialized units and early rehabilitation are essential.<sup>(6-9)</sup>

It is also noteworthy that the severity of the injury assessed by the National Institute of Health Stroke Scale (NIHSS), the occurrence of a recurrent

event and the associated complications can predict a worse functional prognosis.<sup>(10)</sup> Other factors such as sex, race/color, age, smoking, arterial hypertension, diabetes mellitus, dyslipidemia and atrial fibrillation can increase the level of functional dependence generated by the condition.<sup>(11)</sup>

Despite some investigations portraying a set of variables associated with disability due to ischemic stroke, little is known about it in the Brazilian population and in other centers of the world, which can be influenced by the specificities of the clinical and sociodemographic profile of the population affected by the care network structure and quality, among other factors.

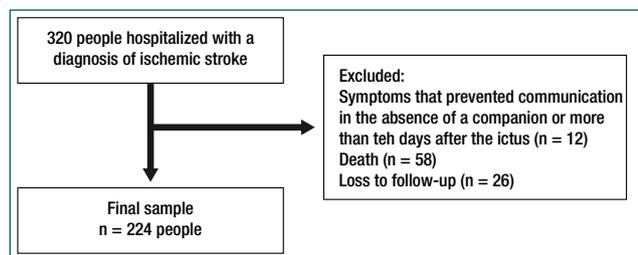
The above shows the importance of knowing the sociodemographic and clinical characteristics of people affected by ischemic stroke in geographic contexts and specific health care as well as the functional disability level resulting from this condition and associated factors. This knowledge can direct and provide improvements in the assistance provided, in rehabilitation actions, and health education focused on individuals' specificities and needs, with a view to preventing and controlling the disease and its complications.

Thus, the study aimed to assess the functional disability level and identify the factors associated with it in people after ischemic stroke.

## Methods

This is a prospective cohort, carried out in a reference hospital in neurology in the state of Bahia,

which has a Level III Stroke Unit (STROKEU).<sup>(12)</sup> Inclusion criteria were being at most 10 days away from the ictus due to the possibility of recall bias and being at least 18 years old. Exclusion criteria were impaired communication in the absence of companions to collect information and the occurrence of death within 90 days of ictus. The access population hospitalized at the study site during the data collection period (March to October 2019) was 320 people with a medical diagnosis of Ischemic stroke. Of these, 12 were excluded due to impaired communication in the absence of companions for data collection. The 308 patients were followed up 90 days after the ictus, and it was found that 58 died. Thus, 26 could not be contacted by telephone calls. Thus, the final sample of this study consisted of 224 participants, as shown in Figure 1.



**Figure 1.** Exclusion criteria and final study sample

Three instruments were used in data collection, namely:

1. Instrument for sociodemographic and clinical characterization and time of arrival at the hospital: composed of open- and closed-ended questions about sex, age, race/color self-declared, marital status, monthly family income and education. It also included questions about the time of arrival at the reference hospital (time elapsed from the onset of symptoms to hospital admission) and about clinical variables such as the presence of hypertension, atrial fibrillation (AF), diabetes mellitus (DM), dyslipidemia, smoking, NIHSS admission score, occurrence of previous stroke and acute myocardial infarction (AMI), thrombolysis and hospitalization at STROKEU. Disability prior to the current event was assessed using the Rankin Scale.

2. Telephone call protocol: used in the monitoring of participants after three months of the event and created with the purpose of standardizing the approach in telephone calls. Consisting of a question to identify the occurrence of death and space to record the Modified Barthel Index score.
3. Modified Barthel Index (MBI): the scale assesses an individual's functional dependence level. It allows assessing basic activities of daily living in 10 dimensions: feeding, personal hygiene, toilet transfers, bathing, bowel control, bladder control, dressing, chair/bed transfers, going up and down stairs and ambulation.

The modified scale was proposed by Shah et al. in the US, and assesses the same activities as the original instrument, except for the wheelchair item.<sup>(13)</sup> In 2009, it was translated and validated in Brazil by Cincura et al.<sup>(14)</sup> A response scale inversely proportional to assistance level is adopted, that is, the more the individual needs assistance, the lower their score will be.<sup>(15)</sup>

For interpretation, the cut-off points proposed by Mendonça et al. were adopted: severe dependence (0 to 60 points), moderate dependence (61 to 99 points) and independence (100 points).<sup>(16)</sup>

Data collection was carried out in three stages.

In the first stage, from March to October 2019, patients were identified at the study site. After identifying those eligible, the research was explained and acquiescence to the study was read and signed by the Informed Consent Form (ICF). Then, the interview with patients or their companions began, when they could not verbalize, using the sociodemographic and clinical characterization instrument and identifying the time of arrival at the reference hospital.

In the second step, from March 2019 to January 2020, patients were followed up during their hospital stay at the study site to identify the units or other hospitals to which they were transferred, length of stay, occurrence of in-hospital death and hospital discharge. Some clinical data that could not be obtained in the first stage were collected from the medical record in this stage.

In the third step, from June 2019 to January 2020, disability assessment was carried out 90 days after the event through telephone call. In this call, the participant or his companion was contacted to collect information, present in the MBI call protocol and application.

Categorical variables were analyzed in relative and absolute frequencies and age in mean and standard deviation. To verify the association of sociodemographic and clinical characteristics with functional disability, Pearson's chi-square test was used. Statistical significance of 5% was adopted. Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 20.0 for Windows.

The study is part of a matrix project entitled "*Fatores associados à incapacidade e mortalidade por acidente vascular cerebral isquêmico e aos tempos de acesso ao tratamento*", approved by the Research Ethics Committee, in accordance with Resolution 466/12 and 580/18 of the Brazilian National Health, under Opinion 3,159,694. The ICF was read and signed by participants and/or family members, explaining the importance and objectives of the study and ensuring personal identity confidentiality and the possibility of withdrawing from the research (CAAE (*Certificado de Apresentação para Apreciação Ética* - Certificate of Presentation for Ethical Consideration) 07935119.5.0000.5028).

## Results

Regarding the sociodemographic variables, the average age of the people affected by Ischemic stroke surveyed was 63.3 years (Standard Deviation=13.7), with a minimum value of 21 and a maximum of 96 years, prevailing the age group of 61 or more years (63.8%). There was a predominance of males (51.3%), self-declared black race/color (85.7%), of people without a partner (53.6%), education up to primary school (66.0%) and monthly family income  $\leq$  3 minimum wages (89.1%). As for functional disability prior to the event, 198 (88.4%) were asymptomatic; 13 participants (5.8%) had

no significant dysfunction or had mild dysfunction; and another 13 (5.8%) scored from 3 to 5 on the Rankin scale, which characterizes moderate to severe disability. Most participants arrived at the hospital in  $\leq$  4.5 hours (56.7%). As for the clinical variables, hypertension was identified in 77.2%, dyslipidemia in 33.5%, DM in 26.4% and AF in 7.0%. It was also found that 31.4% had a previous stroke, 11.7% a previous AMI and 13.0% were smokers. Most participants did not undergo venous thrombolysis (73.7%); however, they were admitted to the stroke unit (74.1%) and had an NIHSS score of 6 to 13 (45.8%). Among the items assessed by the MBI, it was observed that the activities for which people most needed help or supervision were clothing (43.3%), ambulation (45.5%) and stair climbing (50.9%) (Table 1). It is noteworthy that more than 30% reported needing help or total dependence to feeding, dressing, and toilet or chair/bed transfers. The total score for the functional disability level showed that 41.5% of participants were independent, followed by those with moderate dependence (29.5%) and severe dependence (29.0%).

Regarding the association between sociodemographic variables and disability, assessed by the MBI after 90 days of ischemic stroke, a statistically significant relationship was observed between sex and disability, noting a higher proportion of women with severe dependence. However, for the other sociodemographic variables explored, the associations were independent (Table 2).

In the associations between clinical variables and disability 90 days after ischemic stroke, a higher proportion of moderate and severe disability was observed for those who arrived at the reference hospital 4.5 hours after the onset of symptoms or Wake Up Stroke ( $p=0.017$ ), with previous stroke ( $p=0.031$ ) and who did not undergo thrombolysis ( $p=0.023$ ). For hypertensive people, there was a higher proportion of severe dependence ( $p=0.032$ ). Regarding the NIHSS, there was a higher percentage of severe dependence for those with a score greater than or equal to 14, and a higher score of moderate dependence for those with a score of 6 to 13 ( $p=0.000$ ) (Table 3).

## Discussion

The sample was composed mainly of male people, of the black race (black and brown), aged 61 years and older, without a partner, with low monthly family income and education, therefore with characteristics that express a group in situation of social inequality. A cohort study carried out in northern Brazil showed an epidemiological profile of patients with stroke similar to that of this study, with a sample composed predominantly of men, older adults, brown, without a partner and with low income and education.<sup>(17)</sup>

In this study, a statistically significant association was identified between gender and disability, noting a higher proportion of women with severe dependence. A study carried out in Rio Grande do Sul<sup>(18)</sup> and another in 57 countries between 2002 and 2004<sup>(19)</sup> corroborate this finding, which showed a higher prevalence of functional disability in women. Such data may be related to greater female life expectancy and, consequently, to higher rates of chronic diseases that predispose to a decrease in functional capacity.<sup>(20)</sup>

The INTERSTROKE study showed that 90% of strokes were associated with ten risk factors such as hypertension, DM, dyslipidemia, inadequate diet, sedentary lifestyle, increased waist/hip ratio, smoking, alcoholism, depression and heart disease (AF and coronary disease).<sup>(21)</sup> Among these, four were observed in the present study, including SAH, the most prevalent, DM, dyslipidemia and AF.

The highest percentage of hypertensive people identified with severe dependence is in line with another investigation that showed that people with ischemic stroke with comorbidities, over 70 years old and, simultaneously, with hypertension and DM were 1.7 times more likely to develop some degree of dependence compared to those who were only hypertensive.<sup>(22)</sup>

Studies have reported the association of comorbidities with lifestyle-related behaviors that are risk factors for this cerebrovascular event. These behaviors are subject to modification and should be the target of primary and secondary prevention, as if modified, they can reduce mortality and morbidity.

**Table 1.** Barthel Index item characterization and total score for study participants 90 days after ischemic stroke

Barthel Index items	n(%)
Feeding	
0 – Totally dependent	21(9.4)
5 – Needs help	59(26.3)
10 – Independent	144(64.3)
Bathing	
0 – Does not perform without assistance	77(34.4)
5 – Performs without assistance	147(65.6)
Personal hygiene	
0 – Needs help	65(29.0)
5 – Washes the face, combs the hair and brushes the teeth	159(71.0)
Clothing	
0 – Totally dependent	49(21.9)
5 – Needs help, but does at least half the task	48(21.4)
10 – Independent	127(56.7)
Bowel control	
0 – Frequent accidents	22(9.8)
5 – Occasional accidents or needs help with enema or suppository	21(9.4)
10 – No accidents and independent in the use of enemas or suppositories	181(80.8)
Bladder control	
0 – Incontinence or need for catheter use	27(12.1)
5 – Occasional accidents or needs help with the device	31(13.8)
10 – No accidents, independent in handling the collection device	166(74.1)
Toilet transfers	
0 – Does not use the toilet, restricted to bed	29(12.9)
5 – Needs help	49(21.9)
10 – Independent	146(65.2)
Chair/bed transfers	
0 – Restricted to bed	18(8.0)
5 – Able to sit but needs help with transfer	31(13.8)
10 – Minimal assistance or supervision	30(13.5)
15 – Independent	145(64.7)
Ambulation	
0 – Sits in chair, but does not push	38(17.0)
5 – Independent in a wheelchair	7(3.1)
10 – Walks with help	57(25.4)
15 – Independent for 50 meters, may use assistive devices other than the wheeled walker	122(54.5)
Stair climbing	
0 – Does not climb stairs	51(22.8)
5 – Needs help or supervision	63(28.1)
10 – Independent, may use assistive device	110(49.1)
Total score for the Barthel Index	
Severe dependence (0-60 points)	65(29.0)
Moderate dependence (61-99 points)	66(29.5)
Independence (100 points)	93(41.5)

It is noteworthy that healthy eating and regular physical activity contribute to the control of hypertension, dyslipidemia and DM, which, in turn, are risk factors for ischemic stroke.<sup>(23)</sup>

In this study, the association of moderate and severe dependence with a previous stroke corroborates the investigation that assessed the sociodemographic and clinical profile of people with stroke and showed that the previous event is a risk factor for the emergence of new events and a predictor of greater dis-

**Table 2.** Association between sociodemographic variables and disability after 90 days of ischemic stroke in study participants

Sociodemographic variables	n=224 n(%)	Independence n(%)	Functional disability level		p-value
			Moderate dependence n(%)	Severe dependence n(%)	
Age group					
21 to 40 years	16(7.2)	10(62.4)	5(31.3)	1(6.3)	0.083
41 to 60 years	65(29.0)	31(47.7)	14(21.5)	20(30.8)	
61 or older	143(63.8)	52(36.3)	47(32.9)	44(30.8)	
Sex					
Female	109(48.7)	36(33.0)	32(29.4)	41(37.6)	0.011
Male	115(51.3)	57(49.5)	34(29.6)	24(20.9)	
Self-declared race/color (n=223)					
White/Indigenous	32(14.3)	16(50.0)	6(18.8)	10(31.2)	0.357
Black/brown	191(85.7)	77(40.3)	59(30.9)	55(28.8)	
Marital status					
Married/stable union	104(46.4)	50(48.1)	31(29.8)	23(22.1)	0.740
No partner	120(53.6)	43(35.8)	35(29.2)	42(35.0)	
Education (n= 221)					
Up to 1 <sup>st</sup> grade	146(66.0)	44(35.5)	44(35.5)	36(29.0)	0.114
Up to 2 <sup>nd</sup> grade	64(29.0)	42(48.8)	19(22.1)	25(29.1)	
Incomplete/complete higher education	11(5.0)	7(63.6)	2(18.2)	2(18.2)	
Income in minimum wages*(n=221)					
≤ 3	197(89.1)	78(39.6)	59(29.9)	60(30.5)	0.213
>3	24(10.9)	14(58.4)	5(20.8)	5(20.8)	

\* Minimum wage value in 2019: R\$1,040.00. Severe dependence (0 to 60 points), moderate dependence (61 to 99 points) and independence (100 points)

**Table 3.** Association between clinical variables and disability according to the Barthel Index 90 days after the ischemic stroke

Clinical variables	n=224 n(%)	Independence n(%)	Functional disability level		p-value*
			Moderate dependence n(%)	Severe dependence n(%)	
Time of arrival at the locus					
≤4.5h	127(56.7)	62(48.8)	29(22.8)	36(28.4)	0.017
>4.5h	97(43.3)	31(32.0)	37(38.1)	29(29.9)	
Hypertension					
Yes	173(77.2)	65(37.6)	51(29.5)	57(32.9)	0.032
No	51(22.8)	28(54.9)	15(29.4)	8(15.7)	
Dyslipidemia					
Yes	75(33.5)	27(36.0)	20(26.7)	28(37.3)	0.149
No	149(66.5)	66(44.3)	46(30.9)	37(24.8)	
Diabetes mellitus (n= 220)					
Yes	58(26.4)	21(36.2)	14(24.1)	23(39.7)	0.096
No	162(73.6)	72(44.4)	50(30.9)	40(24.7)	
Atrial fibrillation (n=215)					
Yes	15(7.0)	5(33.3)	4(26.7)	6(40.0)	0.635
No	200(93.0)	83(41.5)	60(30.0)	57(28.5)	
Previous stroke (n=223)					
Yes	70(31.4)	20(28.6)	24(34.3)	26(37.1)	0.031
No	153(68.6)	72(47.0)	42(27.5)	39(25.5)	
Previous acute myocardial infarction (n=222)					
Yes	26(11.7)	9(34.6)	7(26.9)	10(38.5)	0.471
No	196(88.3)	84(42.9)	59(30.1)	53(27.0)	
Smoking					
Smoker	29(13.0)	11(37.9)	14(48.3)	4(13.8)	0.125
Former smoker	59(26.3)	25(42.4)	14(23.7)	20(33.9)	
Never smoked	136(60.7)	57(41.9)	38(27.9)	41(30.2)	
National Institute of Health Stroke Scale (N=190)					
≤ 5	58(30.5)	41(70.7)	16(27.6)	1(1.7)	0.000
6 to 13	87(45.8)	34(39.1)	30(34.5)	23(26.4)	
≥ 14	45(23.7)	7(15.5)	8(17.8)	30(66.7)	
Performance of venous thrombolysis					
Yes	59(26.3)	33(55.9)	11(18.6)	15(25.5)	0.023
No	165(73.7)	60(36.4)	55(33.3)	50(30.3)	
Admission to the stroke unit					
Yes	166(74.1)	76(45.8)	45(27.1)	45(27.1)	0.090
No	58(25.9)	17(29.3)	21(36.2)	20(34.5)	

ability.<sup>(24-26)</sup> It should be noted that the dependence prior to the stroke in the participants of this study was only 8.3% with moderate to severe dependence.

The proportion of smokers was low in this study. Smoking confers predisposition to stroke, although there are no recent studies on this association. A research, carried out in the same locus of this study, investigated the predictors of community integration after stroke and observed that smoking was associated with a negative prognosis related to disability that decreases individuals' integration with the community.<sup>(11)</sup>

The prevalent NIHSS score, between 6-12 points, showed moderate severity, corroborating Matos et al., 2019, who reported this severity level among people with stroke in a prospective cohort.<sup>(11)</sup> In this study, an NIHSS score greater than or equal to 14 was associated with severe dependence, corroborating results obtained in another study conducted with people with ischemic stroke in Salvador.<sup>(24)</sup> This scale assesses neurological damage and higher scores are associated with the severity of the injury. These damages can alter functional performance, reflecting on individuals' interpersonal relationships and quality of life.

Regarding participants' therapy, intravenous thrombolysis is associated with positive clinical results such as improvement in the NIHSS score, hospital discharge, low mortality and occurrence of complications, which makes it the main treatment for acute ischemic stroke. However, administration within a therapeutic window of up to 4.5 hours is required to ensure its benefits.<sup>(25)</sup> It was observed that most participants arrived at the service in less than 4.5 h after the onset of symptoms or wake up stroke, but did not have access to this therapy and a higher percentage of moderate and severe disability was observed for those who did not benefit from it. A survey on the course of patients with ischemic stroke showed that the lack of understanding of the severity of the symptoms and the lack of association of the event with a serious problem by the victims and people around them resulted in the delay in seeking the service and, thus, in the decrease of thrombolysis rate and worsening disability level.<sup>(22)</sup>

Most participants were hospitalized in a specialized unit for treatment, which favors the reduction

of mortality and disability, as it has a specialized multidisciplinary team, equipment and materials necessary for treatment.<sup>(27)</sup> A Brazilian study assessed pre- and post-implementation disability of STROKEU and observed a higher disability level in patients before implementation.<sup>(28)</sup> Although this tendency was present in the results of this investigation, there was no significant association between admission to STROKEU and functional disability.

Finally, it was possible to observe that more than half of participants in this study had some level of dependence after three months of being affected by an ischemic stroke. A study, in Vitória-ES, also showed that 66% of the studied population had functional disability. These results also corroborate with other investigations that showed that stair climbing, ambulation and dressing were the activities most impacted by the disease, demanding the need for assistance or supervision.<sup>(24,27)</sup> The present study observed that more than 30% of participants reported the need for help or total dependence for feeding, dressing, and toilet or chair/bed transfers. These dependencies have repercussions on the lives of individuals, families and society, and can increase the chance of hospitalization and higher health expenses.<sup>(29)</sup>

Early rehabilitation is a strategy aimed at recovery, minimizing functional disabilities, favoring the ability to perform basic activities, raising self-esteem and giving autonomy to the individual. Ideally, it should start in the hospital and continue after discharge, and primary care should continue care and treatment.<sup>(30)</sup> A study with patients after stroke, pointed out that all volunteers performed physiotherapy twice a week, with visible functional gains in daily activities.<sup>(31)</sup> However, another study pointed out that 44% of patients with ischemic stroke did not undergo physical therapy due to lack of information.<sup>(32)</sup> Therefore, victims of this cerebrovascular event should be guided and supported by services offered by the SUS.

Functional disability affects physical, emotional, economic and social well-being, as it affects the lives of individuals who become dependent on someone as well as the lives of family members who need support to provide care. Nurses, together with other health professionals, must inform, guide and

support patients and families for greater independence and prevention of disease complications.<sup>(7)</sup> Public policies are also fundamental to ensure the necessary support for the rehabilitation of those who suffer ischemic stroke.

It should be noted that knowing the functional disability allows the nurse to develop practices of caring for individuals and supporting families. In the hospital environment, they need to guide and participate in the planning of patients' recovery, with the active participation of families in the care to be performed at home.<sup>(33,34)</sup> Undoubtedly, the care practices of nurses in primary care, where they monitor patients with potential risks for ischemic stroke, actions to promote healthy lifestyle habits to prevent cardiovascular risk factors, are also fundamental for event prevention.

The results also demonstrated the importance of health education actions conducted by nurses with the population and people at potential risk for ischemic stroke, aiming at the recognition of signs and symptoms and the early search for health services. Moreover, the study highlights the need for improvements in the health care network, aiming at early access for people with stroke to specialized units, reperfusion treatments and rehabilitation. Policies to support caregivers and family members are also fundamental, considering that they are in charge of home care for people dependent on care on a daily basis. With this, it will be possible to contribute to the reduction of individuals' dependence and to better face the daily challenges after the event.

As for the limitations of this study, it is noteworthy that it was carried out in only one hospital in the state of Bahia, which does not allow the generalization of results, and follow-up was carried out via telephone after 90 days of ictus, resulting in some losses.

## Conclusion

Moderate to severe dependence predominated. The variables female gender, having arterial hypertension, NHISS  $\geq 6$  and previous stroke, not having undergone thrombolysis and having arrived at the

study locus in a time greater than or equal to 4.5 hours from the onset of symptoms were associated with a higher disability level.

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## Collaborations

Sales RS, Moraes MA, Muniz LS, Jesus PA, Ribeiro LS and Mussi FC collaborated with the study design, data analysis and interpretation, article writing, relevant critical review of intellectual content and approval of the final version to be published.

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