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Relationship between oral intake and severity of Acute Stroke

Relação entre ingestão oral e gravidade do Acidente Vascular Cerebral Agudo

ABSTRACT

Purpose: To correlate stroke severity with oral intake level of the studied population and compare the two factors at the time of admission and after swallowing management. **Methods:** A total of 137 patients hospitalized in the cerebral vascular accident unit (CVAU) of a teaching hospital participated. During the stay at CVAU, the patients were submitted to daily neurological evaluation and application of National Institutes of Health Stroke Scale (NIHSS), to evaluate the severity of stroke, ranging from zero (without evidence of neurological deficit) to 42 (in coma and unresponsive). Functional Oral Intake Scale (FOIS), which is a marker for evolution of oral intake and ranges from level one (nothing oral) to seven (oral total restrictions). Data from the NIHSS and FOIS scales of admission and discharge were analyzed and compared to verify association between improvement of oropharyngeal dysphagia with functional improvement of individuals. **Results:** At admission, 63 (46.0%) patients had mild strokes, 38 (27.7%) had severe and very severe stroke; 46 (33.6%) had oral intake and need for special preparation or compensations. At discharge, there was an increase in patients with mild stroke (76 - 55.5%); oral intake without special preparation or compensations, but with food restrictions (18 - 13.1%), and oral intake without restrictions (44 - 32.1%). **Conclusion:** The level of oral intake increased as the severity of stroke decreased. Speech and language therapy contributed to a decrease in stroke severity and improvement in oral intake.

RESUMO

Objetivo: Correlacionar gravidade do AVC com nível de ingestão oral desta população e comparar os dois fatores mencionados na admissão e após gerenciamento da deglutição. **Método:** Participaram 137 pacientes internados na Unidade de Acidente Vascular Cerebral (UAVC) de um hospital de ensino. Durante a permanência na UAVC, os pacientes foram submetidos diariamente a avaliação neurológica e aplicação da escala *National Institutes of Health Stroke Scale* (NIHSS), para avaliação da gravidade do AVC, que varia de zero (sem evidência de déficit neurológico) a 42 (paciente irresponsivo, em coma). Após cada atendimento fonoaudiológico diário, foi aplicada a escala de ingestão oral *Functional Oral Intake Scale* (FOIS), que consiste em um marcador para evolução da ingestão por via oral e varia do nível um (nada por via oral) a sete (via oral total sem restrições). Os dados das escalas NIHSS e FOIS de admissão e alta foram analisados e comparados, para verificar associação entre melhora da disfagia orofaríngea com melhora funcional dos indivíduos. **Resultados:** Na admissão, 63 (46,0 %) pacientes apresentaram AVC leve e 38 (27,7%), grave e gravíssimo; 46 (33,6%) com ingestão oral e necessidade de preparo especial ou compensações. Na alta, houve aumento de pacientes com AVC leve (76 - 55,5%); ingestão oral sem necessidade de preparo especial ou compensações, porém com restrições alimentares (18 - 13,1%), e ingestão oral sem restrições (44 - 32,1%). **Conclusão:** O nível de ingestão oral aumentou conforme a gravidade do AVC diminuiu. O atendimento fonoaudiológico contribuiu para diminuição da gravidade do AVC e melhoria da ingestão oral.

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INTRODUCTION

The World Health Organization (WHO) describes stroke as the rapid development of clinical signs of focal (or global) disorders of brain function, with symptoms that last for more than 24 hours, or lead to death , with no other apparent cause than that of vascular origin. In addition, it is considered the main cause of disability and death in Brazil[1].

Studies have shown that vascular brain diseases can cause multiple sequelae, especially swallowing. Thus, an oropharyngeal dysphagia due to stroke can be considered morbidity, depending on the type of injury, comorbidities and the individual's age[2].

Oropharyngeal dysphagia in stroke leads to pulmonary impairments, in addition to malnutrition and dehydration, and can be considered a predictor of morbidity and mortality, especially in acute stroke[2-4]. It can occur in up to 80% of stroke cases, with 43 to 54% of patients having tracheal aspiration, around 37% developing aspiration pneumonia, and 3.8% progressing to death, in the lack of early diagnosis and installation rehabilitation programs. In addition, more than 48% of post-stroke patients in the acute phase with dysphagia present malnutrition[5].

The Stroke Care Units (SCU) were created to provide specialized care to users, with a defined physical area and hospital beds for the care of the individual who is already stabilized, but still in an acute phase, starting rehabilitation early. These units have an interdisciplinary team, whose coordinated dynamics of medical, rehabilitation, educational and social procedures aim to take the individual to the best possible functional level[6].

In addition to the medical team, patients are evaluated and monitored daily by the multidisciplinary team and, in these cases, specific classifications are made for each team, aiming at therapeutic monitoring, as well as the evolution of the clinical condition[6].

The speech-language therapists, in addition to classifying aphasia, dysarthria and oropharyngeal dysphagia, perform therapeutic interventions in the bed of the unit, aiming at rehabilitation, even in a short period of hospitalization. This approach aims to offer better care and minimizes the risk of complications, which can cause clinical worsening and, consequently, prolong the hospital stay and increase hospital costs[7].

Although there are specific objective tests to assess swallowing, the specialized clinical evaluation, and the use of specific scales for the classification of several domains in the face of oropharyngeal dysphagia, are necessary to define management in patients after acute stroke[8].

Considering that oropharyngeal dysphagia is an important marker of worsening during recovery from stroke, this study aimed to correlate the severity of stroke with the level of oral intake of this population, in addition to comparing the two factors at the time of admission and after swallowing management.

METHODS

The research project was approved by the Research Ethics Committee of "Faculdade de Medicina de São José do Rio Preto", under Protocol No. 2,488,608, of February 7, 2018. The signing of the Informed Consent Form (ICF) was waived as the data was collected from medical records.

A total of 137 patients were included in the study, 71 men and 66 women, with ages ranging from 18 to 92 years old and average of 66.6 years old. All individuals were diagnosed with stroke (131 patients with ischemic stroke and six with hemorrhagic stroke), through imaging tests and neurological evaluation, and were admitted to the Stroke Care Unit of the "Hospital de Base de São José do Rio Preto". Patients with a Glasgow scale below 10 and with a previous history of oropharyngeal dysphagia were excluded.

Patients underwent neurological evaluation and application of the National Institutes of Health Stroke Scale (NIHSS)[9] in the first 24 hours after admission and then daily, until the moment of hospital discharge. It is noteworthy that the application of this scale is part of the service routine and was carried out by the doctors and nurses responsible for the patients admitted to the Unit.

The NIHSS scale is known worldwide as a research tool to measure the initial neurological status in clinical examinations of the acute phase of stroke. Currently, the scale is used to assess acute stroke, determine the most appropriate treatment and predict the patient's prognosis. It consists of 11 items of neurological examination to assess the effect of acute stroke in the following aspects: level of consciousness, language, neglect, loss of visual field, eye movements, muscle strength, ataxia, dysarthria and sensory loss[9]. Despite assessing several functions, NHISS does not include swallowing assessment.

Based on the literature, from the NIHSS score, severity levels of stroke were established, according to the grouping of values, being: NIHSS 0-4 = Mild Stroke; NIHSS of 5-10 = Moderate Stroke; NIHSS of 11-20 = Severe Stroke; NIHSS> 20 = Very Severe Stroke[10,11].

Within 24 hours of the initial date of the neurological evaluation, a clinical swallowing evaluation was performed by a speech-language therapist responsible for the stroke unit, using an adapted protocol for the clinical evaluation of swallowing at the speech-language therapy service of "Hospital de Base de São José do Rio Preto" (Chart 1). After this evaluation, the oral intake level was classified using the Functional Oral Intake Scale - FOIS[12].

Chart 1 - Clinical swallowing assessment protocol of the speech-language therapy service of "Hospital de Base de São José do Rio Preto"

DYSPHAGIA EVALUATION PROTOCOL				
PREVIOUS COMPLAINT HISTORY				
( ) Pneumonia	( ) Weight Loss	( ) Choking	( ) Other	
BEHAVIORAL STATE				
( ) Alert	( ) Drowsy	( ) Oriented	( ) Collaborative	( ) Responsive
( ) Conscious	( ) Well-positioned			

Chart 1 - Continuation...

BREATHING PATTERN				
( ) Ambient Air	( ) O2 Catheter	( ) O2 Mask	( ) Nebulization	( ) Ventilatory Weaning
( ) Metallic or plastic tracheostomy		( ) Cuff ( ) Insufflated ( ) Deflated		

FEEDING ROUTE		
( ) Oral	( ) Partial Oral - Consistency	( ) SNE / SNG / Gastrostomy

PRESERVED MYOFUNCTIONAL ASPECTS AND MOBILITY OF:			
( ) Lips	( ) Tongue	( ) Cheeks	( ) Palates

INDIRECT CLINICAL EVALUATION	
( ) Lip sealing at rest, present or absent	( ) Sialorrhea present or absent
( ) Oral hygiene (adequate or altered)	( ) Dental prosthesis
( ) Xerostomia (present or absent)	( ) Vocal quality (adequate or altered)
( ) Rhyme deviation (present - right / left or absent)	

DIRECT SWALLOWING ASSESSMENT	Liquid	Pasty	Solid
Lip Sealing (adequate or altered)			
Previous oral escape (present or absent)			
Nasal reflux (present or absent)			
Oral transit time (adequate, increased, decreased)			
Propulsion, bolus arrangement and oral ejection (present or absent)			
Pharyngeal response (present, delayed or absent)			
Multiple swallowing (present or absent)			
Laryngeal elevation (adequate, reduced, absent)			
Cervical auscultation (adequate or altered)			
Vocal quality (adequate or altered)			
Cough (absent, present – before, during or after swallowing)			
Choking (absent, present - before, during or after swallowing)			
Respiratory tiredness (present or absent)			
Drop in saturation (absent / present – from ... to ... / not assessed)			
In case of TQT: Ruddy consistency after aspiration or spontaneous			

MATERIAL USED FOR OFFERING CONSISTENCY				
Liquid	( ) Cup	( ) Syringe	( ) Straw	( ) Other
Pasty	( ) Spoon	( ) Spatula	( ) Other	

FUNCTIONAL ORAL INTAKE SCALE - FOIS
( ) Level 1: Nothing orally.
( ) Level 2: Dependent on alternative and minimum oral route for some food or liquid.
( ) Level 3: Dependent on alternative route with consistent oral route of food or liquid.
( ) Level 4: Total oral route of a single consistency.
( ) Level 5: Total oral route with multiple consistencies, but with the need for special preparation or compensation.
( ) Level 6: Total oral route with multiple consistencies, without the need for special preparation or compensation, but with dietary restrictions.
( ) Level 7: Total oral route without restrictions.

DIAGNOSTIC HYPOTHESIS
( ) FUNCTIONAL SWALLOWING
( ) MILD DYSPHAGIA – alteration in the labial sphincter, tongue incoordination, delay in pharyngeal response, absence of cough, without marked reduction in laryngeal elevation, without alteration in vocal quality after swallowing, without alteration in cervical auscultation.
( ) MODERATE DYSPHAGIA – alteration in the labial sphincter, tongue incoordination, delayed pharyngeal response, absence of cough, without marked reduction in laryngeal elevation, presence of cough before, during or after swallowing.
( ) SEVERE DYSPHAGIA – delay or absence of the pharyngeal response, absence of cough, reduction of laryngeal elevation, absence of cough before, during or after swallowing, evident respiratory alteration, incomplete swallowing and altered cervical auscultation.
Daily progression
Conduct

The FOIS scale consists of seven levels, namely: Level 1: Nothing orally; Level 2: Dependent on alternative and minimum oral route of some food or liquid; Level 3: Dependent on alternative route with consistent oral route of food or liquid; Level 4: Total oral route of a single consistency; Level 5: Total oral route with multiple consistencies, but with the need for special preparation or compensation; Level 6: Total oral route with multiple consistencies, without the need for special preparation or compensation, but with dietary restrictions; Level 7: Total oral route without restrictions[13].

After clinical swallowing evaluation, specific rehabilitation strategies were defined for each patient and daily care was provided by the service's Speech-Language Therapy team, trained and specialized in Dysphagia. Thus, each therapeutic program was carried out individually, during the hospitalization period, which varied from one to 14 days, with one service per day. Each patient underwent, on average, four speech-language therapy sessions, consecutively, and these consultations were performed daily until hospital discharge. Thus, patients who stayed in the SCU for a longer period underwent a greater number of speech-language therapy visits. Specific therapeutic strategies were defined for each patient, including orofacial myofunctional exercises, gustatory thermal tactile stimulation, postural maneuvers, vocal exercises, adaptation and transition of food consistency.

Patients were classified daily by the NIHSS functional scale and the FOIS scale, applied by the medical and nursing staff, and by the Speech-Language Therapy team, respectively.

Data analysis was performed using SPSS Software, version 20.0. The data on stroke severity scale and the oral intake scale obtained at the patient's admission were analyzed and compared with the data at the time of discharge, in order to verify whether, with the patient's functional improvement, there was an improvement in oropharyngeal dysphagia, after consultations for patient rehabilitation.

The correlation analysis between the severity of the stroke and the oral intake was performed using the Spearman's Correlation test, with a significance level of 95% ($p \leq 0.05$).

RESULTS

From the 137 patients, 71 (51.8%) were male and 66 (48.2%) were female; 24 (17.5%) had history of previous stroke, without complaints of swallowing until the time of the new event; 31 (22.6%) had previous heart disease; 34 (24.8%) had Diabetes Mellitus (24.8%), and 101 (73.7%) were hypertensive. One hundred and two (74.5%) patients had more than one comorbidity and seven (5.1%) patients did not have comorbidities. All were alert and responsive, and none were tracheostomized. The age ranged from 17 to 92 years, with a median of 66.6 years.

Upon admission, 30 (21.9%) patients were on an alternative feeding route (AFR). At hospital discharge, this number was maintained and, in addition to the 30 (21.9%) patients with AFR, there were three (2.2%) patients with oral AFR +. After hospital discharge, all patients were referred and followed up weekly at the outpatient clinic (one session per week) and rehabilitated, with reintroduction of oral intake, in which the first consistencies to be introduced were pasty consistency and liquid consistency. The average time for reintroduction of the oral route was 14 days. It was observed that the therapeutic gains were greater with the daily intervention at hospitalization, when compared to the weekly outpatient care.

The results of the assessment of stroke severity (NIHSS) and oral intake (FOIS) showed that patients showed improvement in the neurological condition caused by stroke and oral intake, after speech-language therapy rehabilitation, as shown in Table 1.

Table 1 - Stroke severity and oral intake at admission and discharge

Scales	Admission	Discharge
NIHSS	n (%)	n (%)
Mild Stroke	63 (46.0)	76 (55.5)
Moderate Stroke	33 (24.1)	27 (19.7)
Severe Stroke	33 (24.1)	23 (16.8)
Very Severe Stroke	5 (3.6)	4 (2.9)
No information	3 (2.2)	7 (5.1)
FOIS		
Level 1	40 (29.2)	30 (21.9)
Level 2	2 (1.5)	2 (1.5)
Level 3	1 (0.7)	1 (0.7)
Level 4	-	-
Level 5	46 (33.6)	37 (27.0)
Level 6	10 (7.3)	18 (13.1)
Level 7	37 (27.0)	44 (32.1)
No information	1 (0.7)	5 (3.6)

As shown in Figure 1, the severity of the stroke, classified by the NIHSS scale, was variable, but the patients were distributed at lower levels of the scale, that is, it was a less "severe" sample. At hospital discharge, the severity of the stroke was less evident when compared to the levels observed at the time of admission.

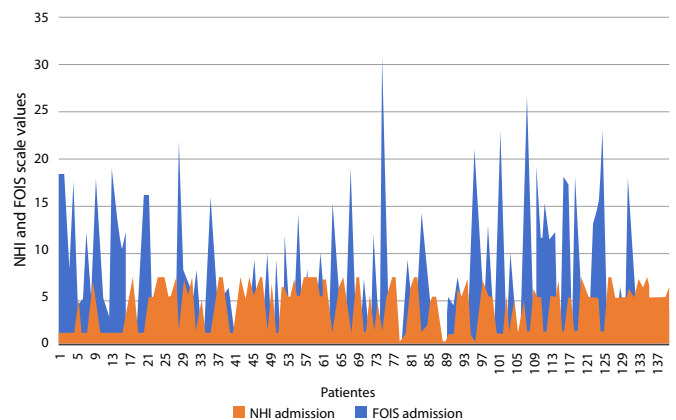**Figure 1 -** Stroke severity upon admission and discharge

In relation to oral intake, most patients concentrated at levels above 5 on the FOIS scale, that is, they ate mostly by mouth, with some need for special preparation in food consistencies. At discharge, individuals were classified with better levels when compared to oral intake at admission (Figure 2).
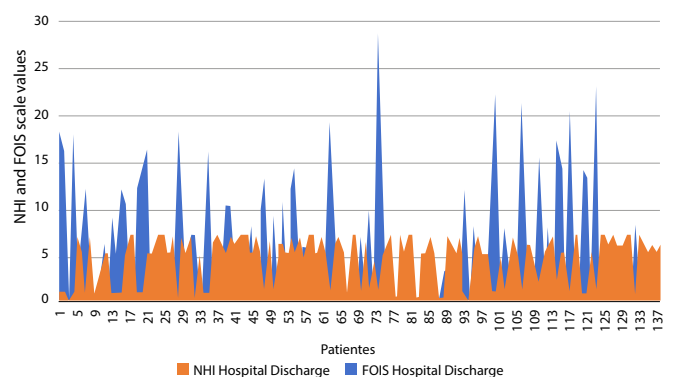

Figure 2 - Oral intake on admission and discharge

Table 2 shows the comparison between the severity of the stroke and oral intake on admission and discharge. Spearman's correlation test showed that, as the severity of stroke in patients decreased, the level of oral intake increased, and this result was statistically significant (p<0.001).

Table 2 - Correlation between oral intake and severity of stroke

	FOIS Admission	FOIS Discharge	p-value
NIHSS Admission	-0.618*		<0.001
NIHSS Discharge		-0.671*	<0.001

* Spearman's Correlation Test

DISCUSSION

The improvement in the neurological condition caused by the stroke and the oral intake presented by the patients after the speech-language rehabilitation shows the importance of inserting the speech-language therapist in the stroke care units. In this sense, the literature highlights that the daily presence of the speech-language therapist, who acts directly on individuals after acute stroke, can change the profile of their oropharyngeal dysphagia[6,7].

In this context, we highlight that SCUs are specific units for the treatment of acute stroke, and that hospitals that have these units are better prepared to provide specialized care and specific treatments for stroke control. Thus, we expect a functional improvement in the hospitalized patient, due to the complexity and the beginning of rehabilitation in the acute phase of stroke.

Although the NIHSS scale does not refer to swallowing, some studies have used the score obtained on this scale as a clinical predictor of risk identification for oropharyngeal dysphagia[2,14,15], directing the performance of the speech-language therapist. A study carried out at "Hospital das Clínicas da Faculdade de Medicina de Ribeirão Preto", of "Universidade de São Paulo", with 212 stroke patients, showed that 134 (63.0%) had oropharyngeal dysphagia, classified as mild, moderate to severe. In this study, when correlating the severity of the stroke with the degree of oropharyngeal dysphagia, a statistically significant correlation was observed between the NIHSS score and the degree of impaired swallowing, that is, stroke with NIHSS considered mild was associated with normal swallowing or oropharyngeal dysphagia mild, and severe NIHSS score was associated with severe oropharyngeal dysphagia[16].

In the present study, the classification of oral intake by the FOIS scale showed a decrease in the number of patients classified at level 1 (nothing by mouth) and an increase in patients at level 7 (total oral route without restrictions) at the time of hospital discharge, corroborating a study performed with patients admitted to a federal hospital in the city of Rio de Janeiro[17]. For the authors, speech-language therapy rehabilitation is effective for improving the oral intake of stroke patients treated in the hospital environment.

This improvement in the levels of oral intake presented by patients at the time of discharge, with advances as the severity of the stroke decreased, shows the importance of early identification of changes in swallowing, as well as the selection of relevant measures, in the face of dysphagia oropharyngeal, which allows the prevention of possible complications[6]. In addition, the spontaneous recovery from oropharyngeal dysphagia in the first weeks, associated with swallowing management by a specialized team should be taken into account[6,15].

Studies suggest that swallowing difficulties are associated with increased length of hospital stay[18,19], which is confirmed in this study, regarding the level of oral intake and the severity of the stroke. European authors emphasize that the validity of a screening test for swallowing in stroke may vary according to the severity of stroke in the studied population[20].

These results confirm the relevance of using the oral intake scale as an indicator of prognosis and the need for early intervention, with the management of dysphagia, to prevent pulmonary complications, enable safe oral feeding or even indicate alternative routes of feeding, when necessary.

The negative, moderate and statistically significant correlation between the NIHSS and FOIS scales shows that the decrease in stroke severity improves the level of oral intake. Therefore, these scales are effective tools for directing and evaluating speech-language therapy interventions in the rehabilitation of stroke patients.

Through the level of oral intake, it is possible to infer the need for compensation in food, due to oropharyngeal dysphagia, corroborating with findings in the literature in which the presence of oropharyngeal dysphagia in acute stroke is closely associated with worse results on functionality scales and severity[21,22].

Swallowing can spontaneously improve in the acute phase of stroke, but early identification and intervention for dysphagia after stroke are critical. A recent study, which proposed specific and individualized strategies for rehabilitation of oropharyngeal dysphagia, showed evidence that these individualized rehabilitation interventions were much more effective strategies, with implications for better results for dysphagic patients after stroke compared to conventional rehabilitation interventions[23].

Although other processes are involved in the acute phase of stroke, such as lesion regression and symptom transience, speech-language therapy rehabilitation is fundamental for the patient's recovery. Earlier evaluation leads to faster assistance, shorter hospitalization time and lower risk of complications, such as aspiration, and the patient's recovery will be better[24].

CONCLUSIONS

The level of oral intake increased as the severity of the stroke decreased. Speech-language therapy rehabilitation increased the number of patients with mild oropharyngeal dysphagia, with total oral intake with multiple consistencies, dietary restrictions and without the need for special preparation or compensation; and increased the number of patients with total oral intake, without restrictions. Therefore, speech-language therapy assistance contributed to mitigate the neurological symptoms of stroke and improve patients' oral intake.

The NIHSS and FOIS scales are effective tools for directing and evaluating speech-language therapy interventions in the rehabilitation of stroke patients.

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Authors' contributions

BCB was responsible for the idealization of the study, analysis, data interpretation and writing of the article; MAOMS was responsible for the writing of the article and relevant critical review of the intellectual content; CGR was responsible for the collection, analysis and interpretation of data and writing of the article; was responsible for the collection, analysis and interpretation of data and writing of the article; LGL was responsible for the analysis and interpretation of data, writing of the article and relevant critical review of intellectual content .