Correlation of Dysfunction and Clinical Recovery in Ischemic Stroke

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Abstract

Objective: To correlate the neurological scales National Institutes of Health Stroke Scale (NIHSS) and the Modified Rankin Scale (MRS) with speech therapy scales Functional Oral Intake Scale (FOIS®) and the Severity Scale: Penetration and Aspiration (ROSENBEK) in the acute phase, after 30 and 90 days of ischemic stroke.

Methods: A prospective cohort study in 60 patients, 24 (40.0%) females and 36 (60.0%) were male. All they performed in the first 24 hours of ischemic stroke neurological evaluation through the scales NIH and the MRS, functional clinical evaluation of swallowing with the application FOIS® and up to 72 hours of ischemic stroke nasolaringofibroscópica the evaluation of swallowing with ROSENBEK. Spearman's correlation test was used and the non-parametric Wilcoxon test, Mann-Whitney.

Results: There was in 37.0% of patients in the acute phase, 30.0% after 30 days and 20.0% after 90 days of ischemic stroke. There was moderate correlation between neurological scales NIH and ERm, weak correlation between neurological scales with speech therapy scales and strong correlation between FOIS® and ROSENBEK scales in the acute phase.

Conclusions: Moderate correlation between neurologic scales in the acute phase, after 30 and 90 days suggesting that can be used according to availability and experience of each service. Weak correlation of neurological scales with speech therapy scales is not possible isolated use of only one of the assessments. And a strong correlation between the scales speech therapy in the acute phase may facilitate the clinical assessment in services that do not have the instrumental

Keywords: Stroke; Deglutition; Neurologic Examination; Speech, Language and Hearing Sciences; Deglutition Disorders
**Abbreviations:** NIHSS: National Institutes of Health Stroke Scale; MRS: Modified Rankin Scale; FOIS: Functional Oral Intake Scale; OD: Oropharyngeal Dysphagia; ICT: Informed Consent Term

**Introduction**

It is estimated that in 2016 the Stroke affected more than 17 million people in the world and 100 thousand deaths per year, being the main cause of morbidity and mortality in Brazil [1].

The post-stroke patient may have oropharyngeal dysphagia (OD), which is not considered a disease, but a symptom/sign of the underlying disease. OD is a disorder with specific signs and symptoms that interfere with the swallowing process and can affect any phase in the transportation of the bolus from the mouth to the stomach [2]. Such alterations are associated with increased morbidity and mortality, which can lead to clinical complications such as dehydration, malnutrition and aspiration pneumonia [3-8].

The incidence of OD in post-stroke patients ranges from 20% to 90% in the literature [9-31]. When submitted to speech and language assessment within 48 hours of hospitalization, the incidence varies from 43% to 50% [32,33].

It is absolutely necessary an accompaniment, interdisciplinary and speech therapy assistance to patients with OD through the clinical evaluation of swallowing combined with instrumental evaluation, known as videofluoroscopic and nasolaringofibroscopic evaluation of swallowing. One of the forms of intervention is speech-language rehabilitation aimed at enabling and rehabilitating patients who are unable to feed themselves in order to improve the quality of life [34-36].

Patients with stroke also use neurological assessment scales that measure initial neurological deficits, aiding in the indication of acute treatment and in monitoring the patient’s clinical and prognostic evolution [37]. For this purpose the International Stroke Scale of the National Institutes of Health Stroke Scale (NIHSS) [38] is used.

In the initial and sequential evaluation after stroke, a level of consciousness monitoring method can be used, in which the Glasgow Coma Scale (ECG) is recommended [39]. The modified Rankin Scale (ERm) [40] is used to measure the degree of incapacity and dependence in activities of daily living. Based on the hypothesis that the post-stroke patient may present dysphagia evolution and follow-up with the main neurological monitoring scales, the present study aimed to correlate the NIH and ERm neurological scales with the Functional Oral Intake Scale (FOIS®) [41] and the Severity Scale: Penetration and Aspiration (ROSENBEK) [42] in the acute phase, after 30 and 90 days of the stroke.

**Material and Method**

A prospective longitudinal cohort study performed in patients admitted to the Stroke Unit of a University Hospital from July 2011 to July 2013.

This study was approved by the Research Ethics Committee under no. 2169.064/2010-03 of the Hospital de Clínicas of the Federal University of Paraná (HC-UFPR) and all individuals signed the Informed Consent Term (ICT).

The study sample consisted of 60 patients with stroke, confirmed by computed axial tomography, 24 (40.0%) of the female gender and 36 (60.0%) of the male. The patients’ ages ranged from 30 to 88 years, mean of 61.6 years, standard deviation 13.6 years.

Patients older than 18 years; with clinical criteria of stroke, with recent cerebral image compatible with stroke and confirmed by neurologist; with application of the NIH scale within the first 24 hours after the onset of symptoms; with study of deglutition up to 72 hours after the onset of symptoms of stroke; ECG level of consciousness greater than or equal to 11; without conducting speech therapy and patient and/or legal guardian signed the ICT.

Patients with a previous history of head and neck surgery were excluded; with previous structural anomalies of oropharyngolarynx; with damage to the brainstem; with hemodynamic instability and death.

The study was divided into four stages after confirmation of stroke. The first step was the neurological evaluation where the data were collected in the patient’s medical record. The neurological evaluation was performed by the trained neurologist who performed the NIHSS that occurred within the first 24 hours after stroke.

In the second stage, the functional clinical evaluation of swallowing was always performed by the same speech therapist (author) soon after the patient’s eligibility criteria. The Deglutition Safety Assessment Protocol was used [43].
The clinical signs of aspiration [44], described in the form of feeding were evaluated and the food consistencies prepared at the time of evaluation were evaluated: liquid, nectar, honey and pudding, following the American Dietetic Association [45] standard.

Solid food consistency was excluded from the clinical evaluation, since patients presented complaints of coughing and coughing with other food consistencies.

In the evaluation, three swallowing sequences of 5ml, 10ml and free gullet of each food consistency were offered, without interval. After the functional clinical evaluation of swallowing, FOIS® [41] was applied.

In the third stage, nasolaringofibroscopic evaluation of swallowing was performed by otorhinolaryngologists accompanied by the same audiologist (author) with experience in the examination, up to 72 hours after the stroke in the outpatient clinic of the Peroral Endoscopy Sector and/or in the HC-UFPR bed. The data from the Nasolaringofibroscopic Deglutition Evaluation Protocol [46] were followed. The consistencies offered in the examination were similar to those used in the second step, and the inorganic dye of blue aniline was added to contrast with the pink coloration of the mucosa. After the examination was applied the Severity Scale for Dysphagia: Penetration and Aspiration [42].

In the fourth stage, the re-evaluation was performed after 30 and 90 days of the stroke with the return of the patient to the Sector of Peroral Endoscopy of the HC-UFPR for reevaluation of the three previous stages.

The patient who did not return after 90 days was applied the questionnaire "Telephone Contact After 90 Days". Of the 60 patients, 14 (23.0%) did not return and the telephone contact was made by the same speech therapist (author) with the patient and/or the person using a verbal terminology and was given the opportunity to ask questions.

In the statistical analysis, the non-parametric Spearman test was used to verify the correlation between the scales in the acute phase, after 30 and 90 of the stroke. Fisher’s test was used at a significance level of 0.05.

Results

There was an OR in 37.0% of the patients in the acute phase, 30.0% after 30 days and 20.0% after 90 days of the stroke. The values of ρ (ρ) according to the DANCEY & REIDY (2006) [47] classification were used for the correlations, being ρ weak (0.10 to 0.39), moderate (0.40 to 0.69) and strong (0.70 to 1.00), (Table 1). There was a moderate correlation between the NIH and ERm neurological scales, poor correlation between the neurological scales with the speech-language scales and a strong correlation between the FOIS® and ROSENBEK scales in the acute phase.

| Crossings Between the Scales                  | Correlation* |
|-----------------------------------------------|--------------|
| NIH acute phase X ERm acute phase             | Moderate     |
| NIH acute phase X ERm after 30 days           | Moderate     |
| NIH acute phase X ERm after 90 days           | Moderate     |
| NIH acute phase X FOIS® acute phase           | Weak         |
| NIH acute phase X FOIS® after 30 days         | No correlation|
| NIH acute phase X FOIS® after 90 days         | No correlation|
| NIH acute phase X ROSENBEK acute phase        | Weak         |
| NIH acute phase X ROSENBEK after 30 days      | No correlation|
| NIH acute phase X ROSENBEK after 90 days      | No correlation|
| ERm acute phase X NIH after 30 days           | Moderate     |
| ERm acute phase X NIH after 90 days           | Moderate     |
| ERm acute phase X FOIS® acute phase           | Weak         |
| ERm acute phase X FOIS® after 30 days         | Weak         |
| ERm acute phase X FOIS® after 90 days         | No correlation|


| ERm acute phase X ROSENBEK acute phase | Weak |
|---------------------------------------|------|
| ERm acute phase X ROSENBEK after 30 days | Weak |
| ERm acute phase X ROSENBEK after 90 days | No correlation |
| *FOIS*® acute phase X NIH after 30 days | Weak |
| *FOIS*® acute phase X NIH after 90 days | Weak |
| *FOIS*® acute phase X ERm after 30 days | Weak |
| *FOIS*® acute phase X ERm after 90 days | No correlation |
| *FOIS*® acute phase X ROSENBEK acute phase | Strong |
| *FOIS*® acute phase X ROSENBEK after 30 days | Moderate |
| *FOIS*® acute phase X ROSENBEK after 90 days | No correlation |
| ROSENBEK acute phase X NIH after 30 days | Weak |
| ROSENBEK acute phase X NIH after 90 days | Weak |
| ROSENBEK acute phase X ERm after 30 days | No correlation |
| ROSENBEK acute phase X ERm after 90 days | No correlation |
| ROSENBEK acute phase X *FOIS*® after 30 days | Moderate |
| ROSENBEK acute phase X *FOIS*® after 90 days | Weak |

Source: the author (2015)
Caption: * = rating of DANCEY & REIDY (2006)

**Table 1: Distribution of Crossings between the NIH, Erm, Fois® and Rosenbek Scales in the Acute Phase after 30 and 90 Days of Stroke.**

**Discussion**

It is important to note that in Brazil stroke is considered the main cause of mortality [1], with 10% occurring in the first 30 days and 40% in the first year [48]. Perhaps the greatest number of studies in the acute phase is due to the ease of early hospital intervention, and after discharge there is a greater difficulty for the patient to return to the speech-language pathology, which occurred in the present study, in which we had difficulties adhering to follow-up after the 90 days of the stroke.

It was observed the predominance of OD in the acute phase presenting evolution after 30 and 90 days of stroke, agreeing with the literature, where many patients recover and dysphagia improves or disappears after days or weeks of neurological stroke [16,27,28].

In the literature, the correlation between dysphagia and NIHSS in the acute phase [21,30,48-55] and follow-up after 30 days [56,57] are studied as parameters. Our 90-day follow-up data cannot be compared - because there are no studies - in the present study patients presented mild neurological impairment on the NIH scale with a prevalence of OD in the scores between six and 13 in the acute phase, scores ranging from zero to thirteen after 30 days and a score of zero to five after 90 days, in agreement with the literature [30,48,52,54,58].

Regarding ERm and the presence of dysphagia, acute phase studies [21,59-61] and after 90 days of stroke were found in the literature [29,62]. The data of the present study corroborate with studies [21,29,59,60,62], which report that patients with scores greater than three
(moderate disability) in ERm present difficulties in swallowing, they conclude that the higher the score, the higher the risk of dysphagia.

In the acute phase, 30 and 90 days after the stroke, level 7 prevailed on the FOIS® scale (total oral route without restrictions). Studies have been found correlating FOIS® with dysphagia in the acute phase [27, 41, 63-66] and after 90 days [67].

In relation to the ROSENBEK scale, the score 1 (contrast does not enter the airway) prevailed at all times of the study, in the acute phase, 30 and 90 days after the stroke, corroborating our previous studies [27, 66].

No correlation was found in the literature between the NIH and ERm scales with the FOIS® and ROSENBEK scales at any time of the acute phase at 90 days.

Therefore, the data collected in this study may be considered preliminary for knowledge about the main neurological scales and dysphagia in the acute phase up to 90 days after stroke.

Our study excluded patients with brainstem involvement. The idea was to avoid selection bias of patients with high probability of worsening of the level of consciousness and with possible initial dysphagia.

It is observed in the present study that the crossing between the NIH and ERm scales in the acute phase, after 30 and 90 days of the stroke, showed a moderate correlation between them suggesting that they can be used according to the availability and experience of each service. Considering that the NIH scale needs to be applied by a trained neurologist, ERm is an alternative for other health professionals, such as speech therapists, physiotherapists, nurses, among others, to monitor the evolution after stroke.

All crosses of the NIH neurological evaluation scales and the ERm with the FOIS® and ROSENBEK assessment scales in the acute phase, after 30 and 90 days of the stroke, had a poor correlation, and therefore it was not possible to use only one of the evaluations, necessitating the hiring of the professional speech therapist in the interdisciplinary team to evaluate swallowing.

Of the five crosses between the FOIS® and ROSENBEK scales, the moderate correlation prevailed at two crosses between the acute phase and after 30 days and a strong one in the acute phase. In the 90 days correlations, there was only one weak and one without correlation, which could only be the result of alteration of the sample in the later period. Therefore, it can be suggested that the use of these scales in the acute phase are equivalent and may facilitate the speech-language evaluation.

**Conclusion**

The objective of the study was to correlate the NIH and ERm neurological scales with the FOIS® and ROSENBEK speech scales in the acute phase, after 30 and 90 days of the stroke, a weak correlation of the FOIS® and ROSENBEK scales was observed with the NIH scales and the ER, and moderate correlation between the NIH and ERm scales, both in the acute phase, after 30 and 90 days of the stroke. There was a strong correlation between the FOIS® and ROSENBEK scales in the acute phase after stroke.

It is necessary to carry out more studies related to the neurological scales with the OD.

**References**

1. Data SUS (2017) Ministério da Saúde - Sistema de Informações Hospitalares do SUS (SIH/SUS). Taxa mortalidade por ano processamento segundo lista morbidade CID-10.
2. Donner MW (1986) Dysphagia [Editorial]. Dysphagia 1(1): 1-2.
3. Robbins J, Levine R (1988) Swallowing after unilateral stroke of the cerebral cortex: preminary experience. Dysphagia 3(1): 11-17.
4. Alves N (2003) O fundamental da avaliação fonoaudiológica do paciente disfárico. In: Costa M, Castro L. Tópicos em deglutição e disfagia. Rio de Janeiro: Medsi 9-18.
5. Furkim AM, Mattana A (2004) Fisiologia da deglutição orofaríngea. In: Ferreira L, Befi-Lopes D, Limonge, S. Tratado de Fonoaudiologia. São Paulo: Rocca 212-218.
6. Rosado CV, Amaral LKM, Galvão AP, Guerra SD, Furia CLB (2005) Avaliação da disfagia em pacientes pediátricos com traumatismo crânio-encefálico. Rev CEFAC 7(1): 34-41.
7. ASHA: American Speech and Hearing Association[Internet]. Rockville: American Speech-Language-Hearing Association; Model medical review guidelines for dysphagia services.
8. Skoretz SA, Flowers HL, Martino R (2010) The incidence of dysphagia following endotracheal intubation: a systematic review. Chest 137(3): 665-673.

9. Veis S, Logemann J (1985) Swallowing disorders in persons with cerebrovascular accident. Arch Phys Med Rehabil 66(6): 372-375.

10. Gordon C, Hewer R, Wade D (1987) Dysphagia in acute stroke. Br Med J 295(6595): 411-414.

11. Horner J, Massey E, Riski J, Lathrop DL, Chase KN (1988) Aspiration following stroke: Clinical correlates and outcome. Neurology 38(9): 1359-1362.

12. Splatnagard ML, Hutchins B, Sulton LD, Chaudhuri G (1988) Aspiration in rehabilitation patients: videofluoroscopy vs bedside clinical assessment. Arch Phys Med Rehabil 69(8): 637-640.

13. Kidd D, Lawson J, Nesbitt R, MacMahon J (1995) The natural history and clinical consequences of aspiration in acute stroke. QJM 88(6): 409-413.

14. Smithard DG, O’Neill PA, Parks C, Morris J (1996) Complications and outcome after acute stroke: does dysphagia matter? Stroke 27(7): 1200-1204.

15. Daniels SK, McAdam CP, Brailey K, Foundas NA (1997) Clinical Assessment of Swallowing and Prediction of Dysphagia Severity. AMJSLP 6: 17-24.

16. Smithard DG, O’Neill PA, England RE, Park CL, Wyatt R, et al. (1997) The natural history of dysphagia following a stroke. Dysphagia 12(4): 188-193.

17. Daniels SK, Brailey K, Priestly DH, Herrington LR, Weisberg LA, et al. (1998) Aspiration in patients with acute stroke. Arch Phys Med Rehabil 79(1): 14-19.

18. Schelp A, Cola PC, Gatto AR, Silva RG, Carvalho LR (2004) Incidência de disfagia orofaringea após acidente vascular encefálico em hospitais de referência. Arquivos de Neuro-Psiquiatria 62(2): 503-506.

19. Hinchev JA, Shephard T, Furie K, Smith D, Wang D, et al. (2005) Formal dysphagia screening protocols prevent pneumonia. Stroke 36(9): 1972-1976.

20. Barros A, Fábio S, Furkim AM (2006) Correlação entre os achados clínicos da deglutição e os achados da tomografia computadorizada de crânio em pacientes com acidente vascular cerebral isquêmico agudo da doença. Arquivos de Neuropsiquiatria 64(4): 1009-1014.

21. Grey MA, Carnaby-Man GD, Miller L, Antonios N, Silliman S (2006) Dysphagia and nutritional status at the time of hospital admission for ischemic stroke. J Stroke Cerebrovasc Dis 15(4): 164-171.

22. Gatto A, Rehder M (2006) Comparação entre queixas de deglutição e achados videofluoroscópicos no paciente após-acidente vascular encefálico. Rev CEFAC 8(3): 320-327.

23. Gosney M, Martin MV, Wright AE (2006) The role of selective decontamination of the digestive tract in acute stroke. Age Ageing 35(1): 42-47.

24. Power ML, S Hamdy, S Singh, Tyrrell PJ, Turnbull I, et al. (2007) Deglutitive laryngeal closure in stroke patients. J Neurol Neurosurg Psychiatry 78(2): 141-146.

25. Santoro P (2008) Disfagia orofaringea: Panorama atual, epidemiologia, opções terapêuticas e perspectivas futuras. Rev CEFAC 10(2): 00.

26. Sundar U, Pahujia V, Dwivedi N, Yeolekar ME (2008) Dysphagia in acute stroke: correlation with stroke subtype, vascular territory and in-hospital respiratory morbidity and mortality. Neurol India 56(4): 463-470.

27. Nunes MCA, Jurkiewicz AL, Sampaio RS, Furkim AM, Massi G, et al. (2012) Correlação entre a lesão e a disfagia em pacientes adultos com acidente vascular encefálico. Int Arch Otorhinolaryngol 16(3): 313-321.

28. Remesso GC, Fukujima MM, Chiappetta AL, Oda AL, Aguiar AS, et al. (2011) Swallowing disorders after ischemic stroke. Arq Neuropsiquiatr 69(5): 785-789.

29. Baroni AFB, Fábio SRC, Dantas RO (2012) Risk factors for swallowing dysfunction in stroke patients. Arq Gastroenterol 49(2): 118-124.

30. Okubo P, Fábio SRC, Domenis DR, Takayanagui OM (2012) Using the National Institute of Health Stroke Scale to predict dysphagia in acute ischemic stroke. Cerebrovasc Dis 33(6): 501-507.

31. Flowers HL, Silver FL, Fang J, Rochon E, Martino R (2013) The incidence, co-occurrence, and predictors...
of dysphagia, dysarthria, and aphasia after first-ever acute ischemic stroke. J Commun Disord 46(3): 238-248.

32. Almeida E (2009) Freqüência e fatores relacionados à disfagia orofaríngea após acidente vascular encefálico. Belo Horizonte (BH): Universidade Federal de Minas Gerais.

33. Jacques A, Cardoso MCAF (2011) Acidente Vascular Cerebral e sequelas fonoaudiológicas: atuação em área hospitalar. Rev Neurocienc 19(2): 229-236.

34. Odderson I, Mckenna S (1993) A model for management of patients with stroke during the acute phase. Stroke 24(12): 1823-1827.

35. Furkim AM (1999) O gerenciamento fonoaudiológico das disfagias orofaríngeas neurogênicas In: Furkim AM, Santini CS. Disfagias Orofaríngeas. 2nd (edn), São Paulo: Pró-fono pp: 229-258.

36. Inaoka C, Albuquerque C (2014) Efetividade da intervenção fonoaudiológica na progressão da alimentação via oral em pacientes com disfagia orofarínge após-AVE. Rev CEFAC 16(1): 187-196.

37. Kasner SE (2006) Clinical interpretation and use of stroke scales. Lancet Neurol 5(7): 603-612.

38. Brott TG, Adams HP, Olinger CP, Marler JR, Barsan WG, et al. (1989) Measurements of acute cerebral infarction: a clinical examination scale. Stroke 20(7): 864-870.

39. Teasdale G, Jennett B (2004) Assessment of coma and impaired consciousness a practical scale. Einstein 2(2): 129-130.

40. Haan DR, Limburg M, Bossuyt P, Meulen JVD, Aaronson N (1995) The clinical meaning of rankin handicap grades after stroke. Stroke 26(11): 2027-2030.

41. Crary MA, Mann G, Groher M (2005) Initial psychometric assessment of a functional oral intake scale for dysphagia in stroke patients. Arch Phys Med Rehabil 86(8): 1516-1520.

42. Rosenbek J, Roecker EB, Coyle JL, Wood JL (1996) A penetration aspiration scale. Dysphagia 11(2): 93-98.

43. Furkim AM, Duarte ST, Sória FS, Sampaio RS, Nunes MCN, et al. (2014) Evaluación clínica de las disfagias orofaríngeas. In: Susanibar F (Eds.) Tratado de Evaluación de Motricidad Orofacial Y Áreas Afines. Madrid: EOS, pp: 233-246.

44. Marik P (2001) Aspiration pneumonitis and aspiration pneumonia. N Eng J Med 344(9): 665-671.

45. (2002) ADA: American Dietetic Association Food and nutrition misinformation: position of ADA. J Am Diet Association 102(2): 260-266.

46. Furkim AM, Fugmann EA, Sória FS, Nunes MCN, Sampaio RS, et al. (2014) Protocolo de seguridad de la evaluación nasofibroscópica de la deglución. In: Susanibar F, Marchesan I, Parra D, Dioses A. Tratado de Evaluación de Motricidad Orofacial Y Áreas Afines. Madrid: EOS, pp: 215-223.

47. Dancey C, Reidy J (2006) Estatística Sem Matemática para Psicologia: Usando SPSS para Windows. Porto Alegre, Artime.

48. Padilha ARS (2011) Consulta Pública nº7 de 03 de novembro de 2011. Implantando a linha de cuidado do acidente vascular cerebral – AVC narede atençãoásurgências 01-39.

49. Schlegel D, Kolb SJ, Luciano JM, Tovar JM, Cucchiara BL, et al. (2003) Utility of the NIH stroke scale as a predictor of hospital disposition. Stroke 34(1): 134-137.

50. Bravata DM, Daggett VS, Woodward-Hagg H, Damush T, Plue L, et al. (2009) Comparison of two approaches to screen for dysphagia among acute ischemic stroke patients: Nursing admission screening tool versus National Institutes of Health Stroke Scale. J Rehabil Res Dev 46(9): 1127-1134.

51. Alshekhlee A, Ranawat N, Syed TU, Conway D (2010) National Institutes of Health Stroke Scale assists in predicting the need for percutaneous endoscopic gastrostomy tube placement in acute ischemic stroke. J Stroke Cerebrovascular Dis 19(5): 347-352.

52. Nakajima M, Takada T, Terasaki Y, Nagano K, Naritomi H, et al. (2010) Clinical Significance of oral intake in patients with acute stroke. Dysphagia 25(3): 192-197.

53. Itaquy RB, Favero SR, Ribeiro MC, Barea LM, Almeida ST, et al. (2011) Disfagia e acidente vascular cerebral: relação entre o grau de severidade e o nível de
comprometimento neurológico. Jornal da Sociedade Brasileira de Fonoaudiologia 23(4): 385-389.

54. Nakajima M, Inatomi Y, Yonehara T, Hashimoto Y, Hirano T, et al. (2012) Oral intake 6 months after acute ischemic stroke. Intern Med 51(1): 45-50.

55. Ribeiro PW (2013) Correlação entre a escaletas internacionais de Acidente Vascular Cerebral do Instituto Nacional de Saúde (NIHSS) e a penetração laríngea e aspiração laringotraqueal no Acidente Vascular Cerebral Isquêmico. [dissertação]. Botucatu (SP): Universidade Estadual "Julio de Mesquita Filho" Faculdade de Medicina de Botucatu.

56. Bahia MM (2014) Screening de deglutição na fase aguda do acidente vascular cerebral: uma análise dos preditores clínicos da disfagia. [dissertação]. Campinas (SP: Universidade Estadual de Campinas. Faculdade de Ciências Médicas.

57. Adams Jr HP, Davis PH, Leira EC, Chang KC, Clarke WR, et al. (1999) Baseline NIH stroke scale score strongly predicts outcome after stroke: a report of the Trial of Org 10172 in Acute Stroke Treatment (TOAST). Neurology 53(1): 126-131.

58. Niedeltchev K, Rens N, Karameshev A, Haefeli T, Brekenfeld C, et al. (2010) Predictors of early mortality after acute ischemic stroke. Swiss Med Wkly 140(17): 254-259.

59. Paciaroni M, Mazzotta G, Corea F, Caso V, Venti M, et al. (2004) Dysphagia following stroke. Euro Neurol 51(3): 162-167.

60. Santos (2013) ISSO. Acidente Vascular Cerebral Isquêmico: fatores preditores de mortalidade hospitalar e incapacidade. [tese]. São Paulo (SP): Universidade de São Paulo.

61. Campos TF, Dantas AMT, Melo LP, Oliveira DC (2014) Grau neurológico e funcionalidade de pacientes crônicos com Acidente Vascular Cerebral: Implicações para a prática clínica. Arq Ciênc Saúde 21(1): 28-33.

62. Cavalcante TF, Araújo TL, Oliveira ARS (2014) Efeitos da sondagem nasogástrica em pacientes com acidente cerebrovascular e disfagia. Rev Bras Enferm 67(5): 825-831.

63. Sellar C, Bowie L, Bagg J, Sweeney MP, Miller H, et al. (2007) Risk factors for chest infection in acute stroke: a prospective cohort study. Stroke 38(8): 2284-2291.

64. Fornari A (2009) A importância da avaliação fonoaudiológica da deglutição no protocolo de acidente vascular cerebral do hospital municipal dr moysés deutsch (HMMD). In: Anais 17° Congresso Brasileiro de Fonoaudiologia e 1º Congresso Ibero-Americano de Fonoaudiologia Salvador, São Paulo: Sociedade Brasileira de Fonoaudiologia pp: 2252.

65. Miguel J (2010) Análise comparativa da deglutição no AVE agudo de tronco enCEFálico e Supratentorial. [Trabalho de Conclusão de Curso]. Minas Gerais (BH): Faculdade de Medicina da Universidade Federal de Minas Gerais.

66. Silva R, Jorge A, Peres F, Cola P, Gatto A, et al. (2010) Protocolo para controle de eficácia terapêutica em disfagia orofaríngea neurogênica (PROCEDON). Rev CEFAc 12(1): 75-81.

67. Silvério C, Hernadez A, Gonçalves M (2010) Ingesta oral do paciente hospitalizado com disfagia orofaríngea neurogênica. Rev CEFAc 12(6): 964-970.

68. Pinto G, Zétola V, Lange M, Gomes G, Nunes MCA, et al. (2014) Program to diagnose probability of aspiration pneumonia in patients with ischemic stroke. Int Arch Otorhinolaryngol 18(3): 244-248.