Cerebrovascular Diseases

Validation of a Structured Interview for Telephone Assessment of the Modified Rankin Scale in Brazilian Stroke Patients

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Abstract

Background: The modified Rankin Scale (mRS) is a commonly used scale to assess the functional outcome after stroke. Several studies on mRS showed good reliability, feasibility, and interrater agreement of this scale using a face-to-face assessment. However, telephone assessment is a more time-efficient way to obtain an mRS grade than a face-to-face interview. The aim of this study was to validate the telephone assessment of mRS among the Portuguese using a structured interview in a sample of Brazilian stroke patients. ***Methods:*** We evaluated 50 stroke outpatients twice. The first interview was face-to-face and the second was made by telephone and the time between the two assessments ranged between 7 and 14 days. Four certified raters evaluated the patients using a structured interview based on a questionnaire previously published in the literature. Raters were blinded for the Rankin score given by the other rater. For both assessments, the rater could also interview a caregiver if necessary. ***Results:*** The patients' mean age was 62.8 ± 14.7, mean number of years of study 5.2 ± 3.4, 52% were males, 55.2% of patients needed a caregiver's help to answer the questions. The majority of caregivers were female (85%), mean age 49.1 ± 15, and mean number of years of study 8.3 ± 3.4. Perfect agreement between the telephone and face-to-face assessments was obtained for 27 (54%) patients, corresponding to an unweighted Kappa of 0.44 (95% CI 0.27–0.61) and a weighted Kappa of 0.89. The median of telephone assessment mRS was 3.5 (interquartile range = 2–4) and of face-to-face assessment was 4 (interquartile range = 2–5). There was no difference between the two assessments (Wilcoxon test, p = 0.35). ***Conclusions:*** Despite the low education level of our sample, the telephone assessment of functional impairment of stroke patients using a translated and culturally adapted Brazilian Portuguese version of the mRS showed good validity and reliability. Therefore, the telephone assessment of mRS can be used in clinical practice and scientific studies in Brazil.

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Introduction

The modified Rankin scale (mRS) is the most widely used scale for the assessment of the functional outcome after stroke [1]. Face-to-face interviews for the mRS scoring has good reliability, feasibility, and inter-rater agreement [2–6]. Telephone assessment of the mRS might be a valuable and cost-effective approach to improve follow-up in clinical studies since face-to-face assessment may be difficult for some patients, caregivers, and investigators due to the transportation requirements and expenses. Some studies have suggested that telephone mRS assessment has a good agreement with the face-to-face assessment when using a structured interview [7, 8]. However, the accuracy and reliability of the mRS when assessed among the Portuguese by telephone in Brazil are still unclear.

The aim of this study was to validate the telephone assessment of the mRS among the Portuguese using a structured interview in a sample of Brazilian stroke patients.

Methods

We evaluated consecutive patients with stroke diagnosis (ischemic or hemorrhagic), approximately 3 months after the stroke onset, attending the Cerebrovascular Disease Outpatient Clinic of the Ribeirão Preto School of Medicine. Patients were excluded if younger than 18 years, if they lost the follow-up assessment, or if they did not consent to participate in the study. This study was approved by the local ethics committee and a written informed consent was obtained from all of the subjects. A structured interview based on a questionnaire previously published [8] was translated to Portuguese and adapted for the Brazilian culture. The questionnaire was composed of 5 questions that required 'yes' or 'no' answers from the patient or from their caregiver (fig. 1).

Four certified raters participated in the study, including 2 stroke specialists and 2 physical therapists specialized in stroke rehabilitation. Telephone raters were blinded for the Rankin score given by the first, face-to-face rater. For both assessments, the raters could interview a caregiver if necessary. When the patient needed the caregiver's help to answer the face-to-face assessment, the same caregiver answered the telephone assessment as well.

All patients were evaluated twice. The time between the two assessments ranged between 7 and 14 days. During the face-to-face interview, raters asked patients about their demographic and clinical data and ranked the mRS using the structured questionnaire. Telephone interview was undertaken by another rater and was composed only by the mRS assessment using the same structured questionnaire.

After rating all subjects, the results were analyzed using the SPSS version 17.0. The agreement between telephone and face-to-face assessment of the mRS was determined by kappa statistics. Based on clinical reasoning on the use of the mRS and in order to penalize a greater degree of disagreement along the scale incrementally, we also calculated weighted kappa with quadratic weights. Kappa statistics with quadratic weights has been compared to interclass correlation coefficient for continuous variables [6, 9]. We also used kappa statistics to analyze the agreement between mRS dichotomized categories. The Wilcoxon test for matched pairs was used to analyze whether there was a systematic difference in face-to-face and telephone scores. For all analyses, a two-sided p value of less than 0.05 was used as the threshold for statistical significance.

Results

We evaluated 50 stroke patients; with a mean age of 62.8 ± 14.7; 52% were males; the mean number of years of study was 5.2 ± 3.4 and 55.2% of patients required the help of a caregiver to answer the questions. The majority of caregivers were female (85%), with a mean age of 49.1 ± 15 years and their mean number of years of study was 8.3 ± 3.4. The mean time between the stroke and the first interview was 171 (±137) days.

The raters obtained a perfect agreement between the telephone and face-to-face assessments for 27 (54%) patients, corresponding to an unweighted Kappa of 0.44 (95% CI 0.28–0.61) and a Kappa with quadratic weighting of 0.89 and a maximum possible quadratic-weighted Kappa of 0.94, given the observed marginal frequencies. Inter-rater agreement between stroke specialists and physical therapists was not inferior to the general agreement (Kappa = 0.61; quadratic Kappa = 0.93). The unweighted kappa statistics between telephone and face-to-face interview among patients was 0.34, and quadratic kappa 0.82. The kappa statistic among caregivers was 0.30 and quadratic kappa 0.61.

Table 1 shows the patients' mRS score on the telephone and face-to-face assessment. The median of telephone assessment mRS was 3.5 (interquartile range = 2–4) and of face-to-face assessment was 4 (interquartile range = 2–5). There was no difference between the two assessments (Wilcoxon test, p = 0.35), which demonstrates no favorable results to face-to-face or telephone interview. The best telephone interview performance for assessing dichotomized mRS categories was for ascertaining no disability (mRS 0–1 vs. 2–5) (table 2). Table 3 shows the comparison of the present results with the studies that used telephone assessment.

Discussion

This study showed good agreement between face-to-face and telephone interviews in Brazil using a translated and culturally adapted Portuguese version of the mRS,
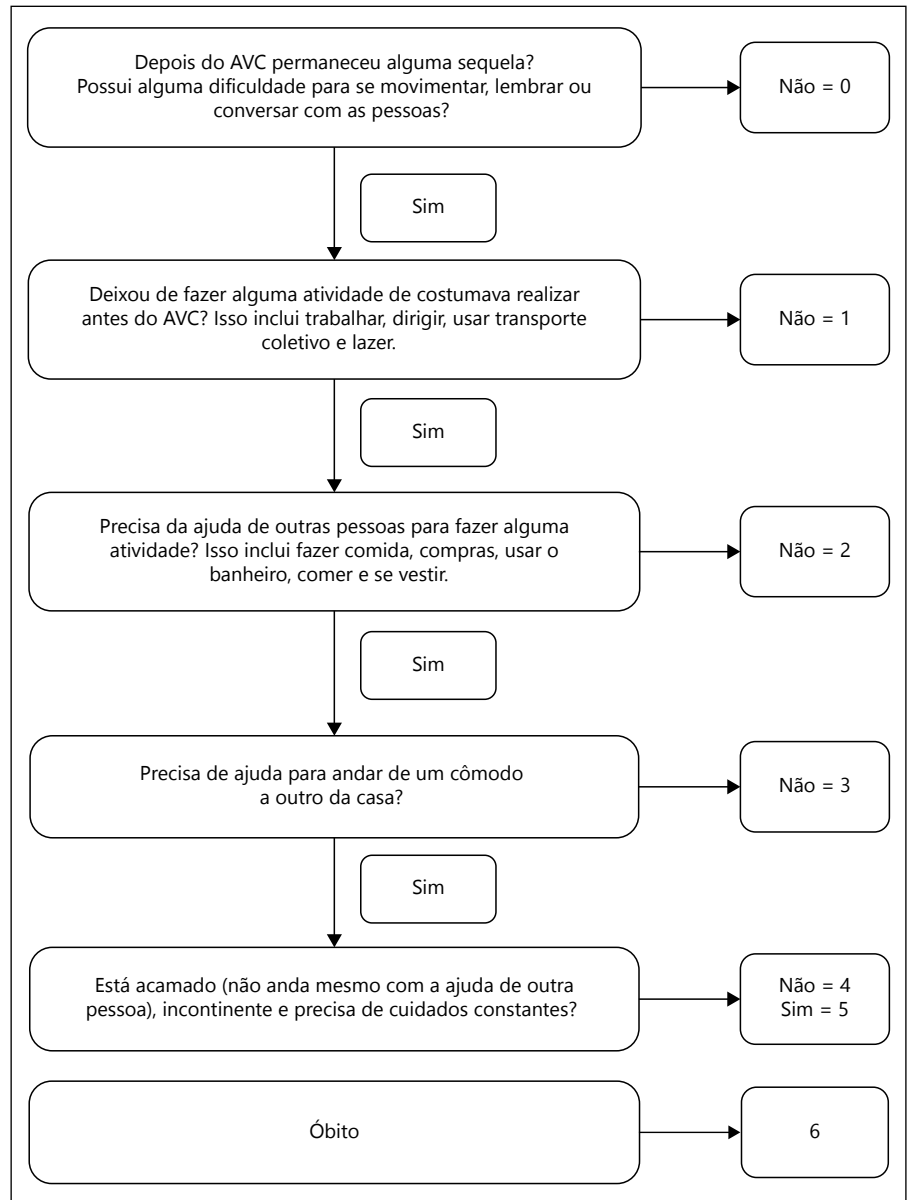
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Fig. 1. Translated and culturally adapted Portuguese version of the modified Rankin scale questionnaire.

with an agreement of 89%. Moreover, the present results are similar to previous studies that were performed in other countries [7, 8, 10] as shown in table 3. One probable peculiarity of our sample might have been the low educational level and the possible low health literacy, which is defined as 'the degree to which individuals have the capacity to obtain, process and understand basic healthcare information and services needed' [11]. Since the inadequate health literacy can lead to a complex array of communication difficulties [12], this feature of our sample could have led to a test reliability decrease. However, despite the low educational level, the telephone as-

sessment of functional impairment of stroke patients using a structured interview in Brazil showed good validity and reliability.

In clinical trials, it is common to use dichotomized mRS in order to analyze it as the primary or secondary outcome. It is recommended to use the mRS cut-off from 0 to 1 if the objective is to assess excellent recovery and to use the mRS cut-off from 0 to 2 to assess independence [13, 14]. In this context, we found excellent agreement in the cut-off of mRS ≥1 (94%) with no false-positive assessments and only 2.5% of false-negative results. Also, good agreement (72%) was observed in the cut-off of mRS ≥2

Table 1. Patients' mRS score on the telephone and face-to-face assessments

Face-to-face	Telephone assessment						Total
	0	1	2	3	4	5	
0	3	4					7
1		3					3
2		1	2	3			6
3			2	4	3		9
4		1			8		9
5				1	8	7	16
Total	3	8	5	8	19	7	50

mRS = Modified Rankin Scale.

Table 2. Performance of telephone interview for dichotomized mRS assessment

	Face-to-face	Telephone	False +	False –	Kappa
mR scale					
0 (vs. 1–5)	3 (6)	7 (14)	4 (57.1)	0	0.56
0–1 (vs. 2–5)	**11 (22)**	**10 (20)**	**0**	**1 (2.5)**	**0.94**
0–2 (vs. 3–5)	16 (32)	16 (32)	3 (18.8)	3 (8.8)	0.72
0–3 (vs. 4–5)	24 (48)	25 (50)	3 (12.0)	2 (8.0)	0.80
0–4 (vs. 5)	43 (86)	34 (68)	0	9 (56.2)	0.51

Figures in parentheses are percentages.

Table 3. Comparison with studies that used telephone assessment

	Candelise et al., 1994	Janssen et al., 2010	Bruno et al., 2011	The present study, 2014
Number of patients	53	83	50	50
Structured interview	no	yes	yes	yes
Perfect agreement, %	79	57	82	54
Weighted Kappa	0.82	0.71	0.87	0.89

with 18.8% of false positive and 8.8% of false negative results. Thus, the present study demonstrated that the telephone assessment of the mRS using a structured interview could be optimal to assess excellent recovery and good to assess independence.

The information of mRS obtained by the caregiver is suggested to be less favorable than the information obtained by the patients themselves [15]. In our sample, there was a moderate weighted agreement among caregivers and a good weighted agreement among the patients. Although these results are similar to previous literature [15], they may not be representative due to the small number of subjects, since the kappa statistics is severely penalized by reductions in sample size.

A possible limitation of the present study is the lack of cognitive evaluation of the person who responded the mRS questions, that is, the patients or their caregivers. Nevertheless, every rater was trained to identify inconsistencies in the patients/caregivers answers. This limitation also extends to other previous studies that analyzed the

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validity of the mRS telephone assessment published in the literature until now.

The worst performance of the score was observed in the range of 2–3. This parallels some prior reports [15, 16]. We believe that the discrimination between absolute independence and minor dependence in the first months after the stroke might be clouded by possible over-reactive concerns from caregivers as well as by the incipient adaptation process. Finally, part of the mRS score disagreement in this study is attributable to inter-rater variability. This couldn't be distinguished from inter-method disagreement since there was no test and retest by the same interviewer. However, our results do support the main aim of this study, which was to verify if mRS by telephone interview would yield reasonable results when compared to a face-to-face interview by a stroke specialist.

The feasibility analysis of any clinical study includes the terms of timelines, targets, and costs. Also, in clinical practice, the evaluation of stroke patients by attendance is often long and the time spent may increase conts. The confirmation that the mRS can be assessed using telephone interviews make outcome testing more feasible and practical than other functional outcome scales due to reduced costs of a telephone call in relation to a face-to-face interview. Therefore, the present study has the potential to facilitate the assessment of the functional status of stroke patients both in clinical practice and in research studies.

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