



Characterization of individual communication disturbs after ICVA through application of adapted MAC battery

Caracterização dos distúrbios comunicativos em indivíduos pós AVCI por meio da aplicação adaptada da bateria MAC

Caracterización de trastornos comunicativos en individuos afectados por ACVI través aplicación adaptada de la batería MAC

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Abstract

This study aimed to characterize the communicative disorders in individuals after ischemic stroke, through implementation of the adapted MAC Battery. In the period from June 15 to September 5, 2014, entered the hospital foundation Santa Casa de Misericórdia de Franca, 15 subjects aged 40-75 years, males and females diagnosed with the first case of ischemic stroke, valued at two sessions of twenty-five minutes each, at the bedside. Clinical evaluation consisted of fourteen tasks of the MAC Battery, which has been adapted for application in hospitals. The results showed the prevalence of communicative disorders in 64% of the tasks performed, indicating significance in the responses regarding the level of education in the MAC Battery performance; differently, the variable age does not influence significantly. The study stresses the importance of research aimed at developing protocols to assess the communication of aphasic patients in hospitals, enabling the early identification of communicative alterations present in patients affected by ischemic stroke.

Keywords: *Speech, Language and Hearing Sciences; Aphasia; Stroke.*

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Resumo

A presente pesquisa teve por objetivo caracterizar os distúrbios comunicativos em indivíduos pós Acidente Vascular Cerebral Isquêmico (AVCI), por meio da aplicação adaptada da Bateria MAC. No período de 15 de junho a 05 de setembro de 2014, deram entrada em um Hospital de Referência, 15 indivíduos com idades entre 40 a 75 anos, dos gêneros masculino e feminino, diagnosticados com primeiro caso de AVCI, avaliados em duas sessões de vinte e cinco minutos cada, à beira do leito. A avaliação clínica foi composta por quatorze tarefas da Bateria MAC, que foi adaptada para aplicação no âmbito hospitalar. Os resultados obtidos no estudo demonstraram a prevalência dos distúrbios comunicativos em 64% das tarefas executadas, indicando que a variável escolaridade influencia no desempenho da Bateria MAC, diferentemente da idade, que não apresenta variável significativa. O estudo salienta a importância de pesquisas direcionadas à elaboração de protocolos que avaliem a comunicação de pacientes afásicos no âmbito hospitalar, possibilitando a identificação precoce das alterações presentes nos pacientes acometidos pelo AVCI.

Palavras-chave: Fonoaudiologia; Afasia; Acidente Vascular Cerebral.

Resumen

Este estudio tuvo como objetivo caracterizar los trastornos de comunicación en las personas después del accidente cerebrovascular isquémico, a través de la aplicación adaptada de la Bateria MAC. En el período de 15 de junio al 5 de septiembre de 2014 fueron admitidos en lo hospital Fundação Santa Casa de Misericórdia de Franca, 15 sujetos con edades entre 40-75 años, hombres y mujeres diagnosticadas con el primer caso de un accidente cerebrovascular isquémico, evaluados por dos sesiones de veinte y cinco minutos cada uno, junto a la cama. La evaluación clínica consistió en catorce tareas de la Bateria MAC, que ha sido adaptada para su aplicación en los hospitales. Los resultados mostraron la prevalencia de los trastornos comunicativos en el 64% de las tareas realizadas, indicando la importancia de las respuestas relativas a lo nivel de educación en las tareas realizadas, diferentemente de la edad que no presenta variable significativa. El estudio subraya la importancia de la investigación e desarrollo de protocolos para evaluar la comunicación de los pacientes afásicos en los hospitales, permitiendo la identificación precoz de las alteraciones comunicativas presentes en pacientes afectados por accidente cerebrovascular isquémico.

Palabras claves: Fonoaudiología; Afasia; Accidente cerebrovascular.

Introduction

The Cerebral-Vascular Accident (CVA) can be considered a worldwide public health problem, as it is found amongst the main death and physical incapacitation causes. It's an abnormality generally abrupt of the cerebral function caused by a cerebral circulation interruption (Ischemic Cerebral-Vascular Accident – ICVA) or bleeding (Hemorrhagic Cerebral-Vascular Accident – HCVA)¹.

The CVA occurs when blood flow which feeds a brain region is interrupted due to obstruction of one of the vessels, as in ICVA cases, or in a bleeding, in HCVA² cases.

This pathology founds itself amongst the three main death causes in developed and in development countries. It can provoke as well speaking altera-

tions (dysarthria and apraxia), of oral language (aphasia), of deglutition (dysphagia), also global motor sequels³.

Currently, CVA is the second death cause and one of the biggest incapacity causes among adults in Brazil. These incapacities affect the patient's life and the family ones as well, in a way that the rehabilitation methods assume central role in treatment^{4,5}.

Due to a bigger population survival and access to diagnoses instruments, the brain damages have been more diagnosed, although the population in general does not know information over the sequels that these damages could bring in the person's life.

The motor impairment, the speaking and language alterations are important sequels of CVA and produce enormous impact in the person's life quality. Amongst them, it can be mentioned hemiplegia,

paraplegia and paresias, related to motor aspect, and aphasia, related to communication disorder.

The aphasia is a language alteration acquired as a result of a focal cerebral injury in the dominant hemisphere for the language. This deficit can be present in all language elements (syntax, semantic, phonology, morphology and pragmatics), in all modes (speaking, writing, reading and singing) and in *input modes* (comprehension) and *output* (expression) that attack social and communicative functioning, also of the life quality of individual.

Amongst the patients that have suffered from CVA, the aphasia is a language disruption of major prevalence among the total number of serviced cases in hospital issues³.

Due to language disorder present in aphasia, it becomes necessary a speaking and language assessment to verify any impairment in this aspect^{6,7}.

The main language prejudices identified in aphasic patients are stereotypes, anomies, paraphasias, agramatisms, suppression, and many others in levels of word, sentence and discourse⁸. The same are decurrent from cerebrovascular injuries and can result in deficits from light to severe, being needed the observation of many factors, such as, the brain area affected, the injure extension, the time that the individual has taken to the service, as well as the age and the school level.

The aphasias are classified habitually in its relationship with groups of symptoms related to brain region affected and different characteristics define them. The most encountered types are: Wernicke Aphasia, Conduction Aphasia, Expressive Aphasia, Global (Motor Transcortical, Sensorial Transcortical and Transcortical Mixed) and Anomic Aphasia^{9,10}.

The incapacities resulting from CVA affect the taken patient's life, as his family ones, and so, the speech language therapist, as facing the individual that presents language alteration due to a cerebral injure, shall realize a communication assessment, so to check prematurely if there is some sequel in this section.

To do so, it becomes necessary the analysis of these individuals right after the injure, or, during its hospital hospitalization. Although the physical and emotional conditions of the patient are affected by CVA, the bedside assessment is recognized as a guidance instrument to take measures as routing to assessment covering communication, so it can

reduce the risk of permanent sequels and best therapeutic prognostic¹¹.

The communication assessment has as goal to describe the characteristics of presented disorder, determining more efficient manners of therapeutic intervention. Currently, there are many instruments with this purpose, amongst them we can name Boston Naming Test^{12,13} and Montreal-Toulouse Language Assessment Battery – MT-86b^{12,13}, but both are not available in market for commercialization and use. Other instrument available for assessment is the Aphasia Rehabilitation Test: Rio de Janeiro¹² which is not ruled for research use. In Brazil, as is known, the unique ruled instrument for adult population with specific communication abilities assessment purposes is the Montreal-Toulouse Language Assessment Battery - Battery MAC^{12,14}, which is an adapted version to Brazilian Portuguese of the Canadian instrument Protocole Montréal d'Évaluation de la Communication – Protocole MEC¹⁵.

This tool was presented to speech language and hearing sciences for quantification and assessment. The professionals start to count with a tool that contributes for the formulation of the diagnosis. The use of protocols like this – which is not unique – can encourage studies and the consequent publication of results that aware the necessity of assessment and patients routing for a specific rehabilitation, giving possibility to the development of more communication assessment instruments.

This validated protocol is an important tool that assesses four different communicative processes: discursive, pragmatic-inferential, lexical-semantic and prosodic, which gives possibility to characterization of communicative disorders present in aphasic individuals^{15,16}.

It is composed by 14 tasks and divided by communicative processes: difficulties conscience questionnaire, metaphors interpretation, free lexical evoking, language prosody repetition and comprehension, narrative discourse, emotional prosody repetition and comprehension, lexical evoking with orthographic criteria, interpretation of indirect speaking actions, lexical evoking with semantic criteria, emotional prosody production, discourse, semantic conversation and judging.

The MAC Battery adapted to Portuguese follows detailed rules of how to apply, register and interpret each task, establishing an alert point for each normative group, divided in three age

stages (19-39 yrs, 40-59 yrs and 60-75 yrs) and sub divided by schooling time (2-7 study years and 8 years or more). From the alert and score points, the examiner is capable to suppose possible communication deficits found^{15,16}.

This assessment is performed in two or three sessions, with length of 45 minutes to one hour each one. In this form, it became necessary the adaptation of Battery MAC with the reduction of tasks and stimulations amount, so that it was possible to make an assessment of communication of patients with ICVA in hospital area.

As seen that the occurrence of the communicative disorder in the post - ICVA patients has considerably risen, the use of the protocol can help in earlier assessment of speaking and language of patients in bed, being possible to supply to the rehabilitation services important information for therapeutic intervention and planning.

This research has as goal to characterize communication disorder in individuals post ICVA, by adapted application of Battery MAC.

Methods

This research was submitted to the Ethics and Research Committee, number CAAE 30912414.0.0000.5438. In the period from July 15th to September 5th 2014, entered in a Reference Hospital, 15 individuals with ages from 40 to 75 years, 7 males and 8 females, that attended the inclusion criteria. The individuals presented CVA diagnosed by image exam (cranium computerized tomography), accompanied Medical Clinical Nursery of Neurology Sector of the Hospital. The responsible people for the individuals, or those in stable and satisfactory situations, have signed a Free and Clarified Agreement Term (FCAT), after clarifications over the issue.

As inclusion criteria were inserted individuals with first Ischemic Cerebral-Vascular Accident (ICVA) occurrence, of both genders, that were interned in a Reference Hospital, that have not made speech language communication assessment, that were in alert state, that were literate and presented school level equal or major to two years, aged from 40 to 75 years. For exclusion criteria were considered the individuals that presented second Ischemic Cerebral-Vascular Accident (ICVA) occurrence or Hemorrhagic Cerebral-Vascular Accident (HCVA), that already had communication assessment throu-

gh Battery MAC, which were not hospitalized and presented conscience level lowering and that present school level minor to two years.

The clinical speech language assessment consisted of applying an adapted Battery MAC that was constituted by fourteen tasks: metaphors interpretation, free lexical evoking, language prosody repetition and comprehension evoking with orthographic criteria, interpretation of indirect speaking actions, lexical evoking with semantic criteria, emotional prosody production, discourse, semantic conversation and judging.

For the using of Battery MAC in hospital environment, were selected more significant tasks, excluding stimulations that represented regionalism influence, hard understanding words for low school level individuals and less used metaphors in daily life. The difficulty consequence questionnaire was not used, because the patient should answer whether she/he recognizes or not, even partially, her/his sequels. So his conscience of language disorder and the impact in daily life would be investigated. Therefore, the individual should have already known his/her condition and under clinical treatment, but such aspects are not addressed in this study since the same is focused in bedside assessment right after ICVA diagnosis.

In Battery MAC bedside application were assessed the patients with ICVA diagnosis in seated position. The individuals were assessed independently of the injury place, 24 hours after ICVA confirmation.

It is known that computerized cranium tomography has been the most used image exam, not only to diagnose CVA, but as well to specify which type of CVA (ischemic or hemorrhagic). The exam should be repeated in 24 - 48h in cases that no alterations were highlighted in initial exam or unsatisfactory evolution¹⁷. So, after 24 hours, it was possible to assess patients with confirmed ICVA diagnosis.

The assessment was performed in two sessions, with approximate length of twenty-five minutes each one. The data involving each speech language assessment item were noted in the Battery MAC register protocol by the speech language service responsible in the Hospital Neurology Sector.

In the beginning of assessment, a spontaneous talk was made with the patient, in which were covered the subjects related to work, family, study and daily life. In language prosody tasks application

(comprehension and repetition) and emotional prosody (comprehension and repetition) was used a recording presented to patient by a portable radio, which contained the stimulus referred to the executed task. In metaphor interpretation tasks, narrative discourse (full story re-telling and text comprehension), indirect speaking and semantic judging interpretation were performed questions with alternatives. In relation to emotional prosody task (production) were orally presented three situations for the patient to reproduce an adequate prosody following recommendation.

As performing the free lexical evoking task, the patient was guided to evoke, with eyes closed, the biggest number of words in a time of 90s excluding names and numbers. In lexical evoking with orthographic criteria, the time of 90s was also determined, in which the patient should evoke words initiated by the letter (p); in lexical evoking task with semantic criteria, the patient should evoke words correspondent to clothes in a time of 60s. For the tasks above, it was used a chronometer to limit the time in which the patient should evoke the words in accordance with the speech language pathologist guidance.

The assessment through adapted Battery MAC was ended with the classification of communicative disorders and behaviors to be defined by the responsible speech language pathologist.

The gathered data by the protocol were showed through table 1, being used the percentage referring to assessment of communicative disorder in the studied population. The results referring to presence and absence of deficits related to school and age were showed through table 2. To check this association was used the Exact Test of Fisher that replaces statistics of X^2 (Squared X) in tables 2x2 when awaited attendances are low. The pre-fixed significance level was of 5% or $p < 0,05$ ¹⁸.

Results

Fifteen individuals attended the study, with minimum age of 40 years and maximum of 75 years, with average of 65,2 years and pattern detour of $\pm 10,5$ years; it was observed a major prevalence of CVA cases in the female gender, corresponding to 8 patients (53% of the sample), while the male gender presented 7 patients (47% of the sample). About the school level referred in the study, it was found an average of 5,2 years with pattern detour $\pm 3,26$, ranging between 2 and 11 school years.

The gathered data through adapted Battery MAC were presented in percentage, being showed in table 1 the communicative disorder of studied population. The relevant data found with major alteration related to free lexical evoking task, lexical evoking with semantic criteria and semantic judgement.

The table 2 presents results referring to deficit presence and absence related to school and age. The data were presented by the test Qui-squared used to association between deficit presence and absence with age and school time, adopted as significance level $p < 0,05$.

The found deficits presented significant association with the education variable in conversational discourse tasks ($p=0,0350$), free lexical evoking ($p=0,0256$), lexical evoking task with orthographic criteria ($p=0,0089$), indirect speaking acts interpretation ($p=0,0420$) and emotional prosody production ($p=0,0014$). In relation to emotional prosody comprehension and repetition tasks there was significant association, as well with age variable ($p=0,0170$), as school level ($p=0,0186$).

Table 1. Distribution of total subject sample number, as alteration presence or absence in communicative disorder assessment.

ASSESSED TASK	WITH ALTERATION n (%)	NO ALTERATION n (%)
Conversational Discourse (verbal expressive and receptive communication)	9 (60)	6 (40)
Metaphor Interpretation (Interpretation of figurative or non-literal meaning)	5 (33)	10 (67)
Free Lexical Evoking (word evoking capacity with no pre established criteria)	11 (73)	4 (27)
Language Prosody (Comprehension) (language tones pattern identification and perception)	6 (40)	9 (60)
Language Prosody (Repeating) (language tones repeating)	7 (47)	8 (53)
Narrative Discourse (text comprehension and synthesis)	9 (60)	6 (40)
Text Comprehension Assessment (discursive comprehension and information storage)	7 (47)	8 (53)
Lexical Evoking with Orthographic Criteria (P) (word evoking capacity with orthographic criteria)	8 (53)	7 (47)
Emotional Prosody (Comprehension) (capacity of comprehending emotional tones)	8 (53)	7 (47)
Emotional Prosody (Repeating) (capacity of repeating emotional tones)	10 (67)	5 (33)
Indirect Speaking Interpretation (direct or indirect speaking act comprehension)	5 (33)	10 (67)
Lexical Evoking with Semantic Criteria (Clothes) (word evoking capacity with semantic criteria)	13 (87)	2 (13)
Emotional Prosody (Production) (production of tones from emotional situations)	9 (60)	6 (40)
Semantic Judging (identification of semantic relations among words)	12 (80)	3 (20)

Legend:

n = subjects number ; % = percentage.

Table 2. Association among deficit presence or absence with age and time of education

Task	Age	Education
CONVERSATIONAL DISCOURSE	p = 0,2937 ns	p = 0,0350 *
METAPHOR INTERPRETATION	p = 0,1668 ns	p = 0,1818 ns
FREE LEXICAL EVOKING	p = 0,5934 ns	p = 0,0256 *
LANGUAGE PROSODY (COMPREHENSION)	p = 0,2867 ns	p = 0,3776 ns
LANGUAGE PROSODY (REPETITION)	p = 0,4266 ns	p = 0,3996 ns
NARRATIVE DISCOURSE	p = 0,2937 ns	p = 0,2308 ns
TEXT COMPREHENSION ASSESSMENT	p = 0,1818 ns	p = 0,1002 ns
LEXICAL EVOKING WITH ORTHOGRAPHIC CRITERIA (P)	p = 0,1818 ns	p = 0,0089 *
EMOTIONAL PROSODY (COMPREHENSION)	p = 0,0170 *	p = 0,0186 *
EMOTIONAL PROSODY (REPETITION)	p = 0,0170 *	p = 0,0186 *
INDIRECT SPEAKING INTERPRETATION	p = 0,0769 ns	p = 0,0420 *
LEXICAL EVOKING WITH SEMANTICAL CRITERIA (CLOTHES)	p = 0,5417 ns	p = 0,2000 ns
EMOTIONAL PROSODY (PRODUCTION)	p = 0,4336 ns	p = 0,0014 *
SEMANTICAL JUDGING	p = 0,7363 ns	p = 0,4462 ns

Legend:

Analysis by exact Fisher test

p = significance to $p < 0,05^*$.

* = Significant association in which deficit occurrences use to accumulate in a different form among individuals of less age and school education.

ns= Non - significant association: The deficit occurrences distribute randomly, independently of age and school education.

Discussion

The proposal of this study was to characterize communicative disorders in individuals with first ICVA case in bed, co-relating to Adapted Battery MAC findings, age and school level.

Because the high CVA cases occurrence in Brazil and in the world, as well as the sequels left by it, it becomes necessary to worry about the affected patients. To do so, it is fundamental to seek instruments that offer an assessment to identify possible alterations of communication, beginning treatment quickly, and then enhancing life quality of the individual⁵.

As said before, there are many instruments for communication assessment, but, currently, they are not available to use. In Brazil, the only ruled instrument for communication abilities assessment in adult population is the Battery MAC. This protocol permitted to trace communicative disorder of each patient relating to tasks presented.

In this study, it was seen a bigger prevalence of CVA in female gender, corresponding to 08 patients (53% of sample), while male gender presented 07 patients (47% of sample). These results confirmed some literature findings, in which CVA is more common in female people^{19,20,21} what differs from other findings, which found bigger predominance of CVA in male population^{22,23,24}.

In women, the CVA cases increase has been related to the use of oral contraceptives, that, in a general way, increases the risk in about six times, mainly in women with thromboembolic diseases, sedentarism, tabagism, headache and diabetes mellitus²⁵ history. It is believed, furthermore, that this light domination of female gender can be associated to age, as the life of women to most advanced ages is superior to men, and, by this way, it is visible and apparent excess of CVA cases in female population^{20,26}.

Relating to age, the age of study participants ranged from 40 to 75 years, with average of 65,2 years and pattern detour \pm 10,5 years. The age presented is compatible to the age group most propitious to present cerebrovascular diseases^{19,27}. Though CVA is a cerebrovascular disease capable of attacking any age group, its occurrence raises as age grows, and doubles at each life decade⁶. When cardiovascular alterations sum with metabolic alterations, the incidence of CVA shows a peak

between seventh and eighth decade of life, relating to population aging process¹⁹.

The studied population communicative disorder assessment was described by percentage and presented in table 1, related to presence and absence of communication alteration. It was observed that the patients assessed showed alteration in nearly 64% of executed tasks, amongst them conversational discourse 60%, free lexical evoking 73%, narrative discourse 60%, lexical evoking with orthographic criteria 53%, emotional prosody comprehension 53%, emotional prosody repetition 67%, lexical evoking with semantic criteria 87%, emotional prosody production 60% and semantic judgement 80%.

The communicative disorders found can be named as predominately emissive aphasia. It is known that language has an important role in individual life, and being so, the presence of aphasia causes a communication restriction with people of its environment, bringing prejudices in speaking and language, significate alterations as complete or partial loss of capacity of expressing thoughts or gestures, interfering in comprehension of what is said or written. In this form, the results obtained in tasks application shows deficits in communicative processing that interfere in social and emotional individual's life²⁸.

The average school background referred in this study was of 5,2 years and pattern detour \pm 3,26, ranging between 2 and 11 school years, what does not confirm the data found in literature by other authors, that refer average education of 4 years^{21,24}.

In literature, the school education is described as a variable which influences in verbal and nonverbal tasks performance^{29,30}, occurring a tendency to more high scores with the increase of study years, which corroborates in results of table 2, in which conversational discourse tasks $p = 0,0350$, free lexical evoking $p = 0,0256$, lexical evoking with orthographic criteria (p) $p = 0,0089$, emotional prosody comprehension $p = 0,0186$, emotional prosody repetition $p = 0,0186$, indirect speaking actions interpretation $p = 0,0420$ e emotional prosody production $p = 0,0014$, showed significate association with this variable, obtaining the best results in patients with high educational level.

It is important to enhance the benefits of an assessment in hospital environment, as it makes easier to access the information over therapeutic

prognostic and rehabilitation, in which family and speech language therapists can help each other.

The reduction of the Battery MAC was needed to the assessment of communicative disorders, as well as it exceeds proper extension for applicability in hospitals. We understand that, in this study, the adapted Battery MAC has attended the role of identifying communicative alterations in patients with ICVA, which helps professionals to worry about language disorders caused by ICVA, launching a wide looking over individual. Such movement favors a best comprehension of patient and facilitating therapeutic intervention in aphasia treatment.

Conclusion

The results showed prevalence of communicative disorder in 64% of executed tasks by the patients.

The communicative disorder identified by the Battery MAC were the ones related to verbal expressive and receptive communication, word evoking capacity with no pre stated criteria, text comprehension and synthesis, word evoking capacity with orthographic criteria, capacity of comprehending emotional tones, capacity to repeat emotional tones, word evoking capacity with semantic criteria, tone production from emotional situation and identification of semantic relations amongst words; the most relevant and meaningful results were in relation to word evoking capacity.

The obtained results indicated that the education variable influences in Battery MAC performance, differently of age that shows no significant variable.

It is important to highlight that, although the importance of statistical results raised in this research, its population (15 patients) is reduced. So, it would be of great value for Speech Therapy, if it had more studies directed to instruments elaboration that assess patients' communication in hospital area.

The Battery MAC was originally made to use in clinical environment during rehab process. Through its adaptation, the study gained satisfactory results, but evidences as well the need to elaborate a specific protocol to hospitals that had this instrument as base, supplying the professionals with a specific protocol for this area, that helps in characterization of communicative alterations present in patients attacked by ICVA.

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