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ORIGINAL REPORT

COMMUNICATION ACTIVITY IN STROKE PATIENTS WITH APHASIA

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Objective: **To study communication disability in stroke patients with aphasia.**

Patients and methods: **Prospective, multicentric cohort study of patients with aphasia, consecutively included after a first stroke, and examined 1 year later at home. Assessment included a stroke severity scale, the Barthel Index, the Boston Diagnostic Aphasia Examination, a communication questionnaire, and the Aphasia Depression Rating Scale.**

Results: **A total of 164 patients were included. Among the 100 survivors assessed at follow-up, 24% had severe aphasia, 12% moderate aphasia and 64% mild aphasia according to the Boston Diagnostic Aphasia Examination severity score. Patients mainly reported difficulties in conversation with strangers and/or on abstract topics, using a phone, reading and writing administrative documents, dealing with money and outdoor communication activities. Communication was strongly related to aphasia severity. Age, gender, education level, residence status and type of stroke had no influence on communication activity. On multivariate analysis, severity of stroke and severity of aphasia on inclusion were found to account for 58% of variance and were independent predictors of the communication questionnaire score at follow-up.**

Conclusion: **Documenting the most impaired communication skills may help to set priority goals for speech and language therapy in aphasia.**

Key words: aphasia; communication; stroke; ICF.

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Aphasia is an acquired language impairment that affects onr third of stroke patients (1, 2). Traditionally, aphasia has been studied in terms of linguistic symptoms that are interpreted by referring to models of cognitive or neuroscience-based neuropsychology and brain imagery. However, information is also needed on how aphasic persons function in daily living in order to identify priority goals for intervention and to plan for social support and service delivery. The World Health Organization's (WHO) International Classification of Functioning, Disability and Health (ICF) (3) provides an interesting framework for this, while defining disability in terms of multiple dimensions, including Activities and Participation. It was recently recommended to study aphasia within the ICF framework (4). Restricted participation in social functioning has been reported in aphasic subjects, such as loss of friends, isolation, social withdrawal, and reduced work and leisure activities (5–9), while psychological consequences, distress, depression and poor quality of life related to aphasia are now under study (10–14). The impact of aphasia on spouses and family members is also acknowledged (15).

Difficulty in communication, which is the most obvious functional consequence of aphasia, has mostly been studied at the Impairment level; for example, while confronting verbal and non-verbal communication, or while assessing to what extent non-verbal communication, e.g. gesturing or drawing, might help to overcome or compensate for verbal difficulties (16–18). However, relatively few studies have examined the Activity level, as if it is taken for granted that all activity of verbal communication is impaired in aphasia to the same extent. Although conversation (19–20) and phone use (21) have been investigated, comprehensive and systematic studies of limitations in communication activity in relatively large samples of patients remain sparse.

The aim of the present study was to provide further insights into verbal communication activity in stroke patients with aphasia in an attempt to understand which activities are the most or least impaired, and to determine whether ability in verbal communication is related to severity of aphasia.

METHODS

Participants

The present study was a prospective, multicentre cohort study of patients with aphasia consecutively included after a first documented stroke during a 14-month period in 3 centres in south-western France: Bordeaux (urban area, over 50,000 inhabitants), Libourne (semi-urban area, from 10,000 to 50,000 inhabitants) and Mont-de-Marsan (rural area, under 10,000 inhabitants). The stroke unit in Bordeaux, private clinics and all the neurology, neurosurgery and emergency units in these hospitals participated in the survey. Patients were included if they were between 18 and 85 years of age, French-speaking, living in the Aquitaine region, and had had a first documented stroke with obvious language impairment lasting at least 24 h. Exclusion criteria

were: presence of non-aphasic communication impairments, aphasia of non-vascular origin, severe associated illness with a poor life prognosis, history of a previous stroke, brain tumour or dementia, and patient's and/or relative's refusal to participate after explanation of the goals of the study. All patients were met by one of the authors in the acute units as soon as possible after the stroke. Written consent to participate was received from the patients themselves when possible and/or from a significant relative.

Methods

On inclusion, demographics, data about the cerebrovascular accident (CVA) and activity limitation in daily living, as assessed by the Barthel Index (BI, range 0–100) were registered (22). Neurological impairments were assessed by Orgogozo's score (OS), which is a French scale similar to the National Institutes of Health Stroke Scale; ranging from 0 to 100: 0–10 points for head posture and cranial nerves, 0–25 for the upper limb, 0–25 for the lower limb, and 0–40 points for vigilance and cognition (23). Following Marshall & Phillips's recommendation (24), no formal aphasia test was performed at this time, the aphasia examination being restricted to a clinical assessment of fluency (lower, higher, normal), auditory comprehension (presence/absence of impairment) and global severity in a face-to-face interview. Severity was scored on the Goodglass & Kaplan's Aphasia Severity Rating Scale (ASRS), an ordinal scale ranging from 0, very severe aphasia with "No usable speech or auditory comprehension" to 5, "Very slight language impairment, which is only perceived by the patient himself" (25).

Twelve to 18 months after inclusion, survivors were assessed again at home by a doctor and a speech therapist. The follow-up medical examination included questions about general health status, changes in life conditions and events since inclusion, the Barthel Index and the Aphasia Depression Rating Scale (ADRS), a depression scale designed specifically for aphasic patients, which has been validated in French-speaking subjects (26). The speech therapist documented aphasia therapy since inclusion (total number of sessions) and assessed aphasia impairment with a French adaptation of the Boston Diagnostic Aphasia Examination (27) including the ASRS.

Communication activity was assessed with the Echelle de Communication Verbale de Bordeaux (ECVB), a French questionnaire including 34 questions about current communication behaviours in daily living (ICF categories d2 to d9) (28). When it was designed, the items were selected from the opinions of aphasic persons themselves, as the situations in which they found themselves in difficulty most often. Items are scored by the examiner according to the patient's and a significant other's opinions. In the event of disagreement, the examiner asks both of them to debate until they agree. If they fail to do so, the item is not scored (which did not happen during the present study). The scale documents activity limitation, but not participation restrictions. It also includes questions about motivation for communication, strategies implemented by the patient to cope with his/her difficulty, qualitative features of communication, understanding humour, planning for expenses and budget and a visual analogue scale about satisfaction with communication. It was designed to provide a full ceiling effect in normal subjects (maximal score 102) and was validated in 20 healthy subjects and 126 patients with chronic aphasia of traumatic or vascular origin. The questionnaire had good internal consistency (Cronbach's alpha coefficient = 0.95) and relatively good inter-rater reliability (inter-rater concordance = 63%, Cohen's kappa coefficient = a mean of 0.45. A principal component analysis showed that a model with one factor accounted for 48% of the variance. No significant influence of age, gender or education level was disclosed on the sum score. The latter was correlated with a French objective assessment of verbal communication, the Test Lillois de Communication (rho coefficient = 0.74 $p < 0.001$) (28, 29).

Statistics

Statistical processing of data was performed with SAS 9.1.3 (SAS Institute, Cary, NC, USA). Analysis of qualitative data was carried out using the χ^2 test or Fisher's exact method according to the expected samples under the independence hypothesis. Comparisons were adjusted with logistic or polytomous regression models according to the Hosmer & Lemeshow goodness of fit test. Analysis of quantitative data was done with Student's *t*-test and analysis of variance (comparisons of means), Wilcoxon and Kruskal–Wallis tests (comparisons of distributions). Transformations to normality were performed when necessary. Comparisons were adjusted with linear regression models. A univariate analysis was carried out to examine determinants of ECVB scores. A step-by-step multivariate analysis was then implemented including the variables with a value below $p < 0.25$ in the univariate analysis. Significance was set $p = 0.05$.

RESULTS

Patient inclusion

A total of 164 patients fulfilling the inclusion criteria agreed to participate in the study. Patients were included 1 month after stroke (mean 16.3 days, standard deviation 25.1). Demographic and pathological data are shown in Table I. Most patients were right-handed, with a low level of education, married or living in a couple at their own homes, 20% were working full-time and 63% were retired. Sixty-nine percent had had an ischaemic stroke. Aphasia features and severity on inclusion are provided in Table II: 81% were non-fluent, and 62% had severe aphasia (ASRS score 2 or below).

Patients at follow-up

At follow-up, 34 patients were dead, 19 were lost to follow-up, 11 refused to be examined again and the 100 others are studied here. The deceased patients were significantly older than the studied patients (mean age 73.1 vs 65.1 years, $p < 0.005$), had a lower BI score (mean 33.1 vs 55.3, $p < 0.005$) and more severe aphasia (ASRS, Fisher's test $p < 0.005$). Patients who refused to participate or were lost to follow-up generally had a lower education level, a lower BI and a more severe ASRS score than the patients under study, but the difference did not reach significance. No difference was found between inclusion centres (urban, semi-urban and rural). With regard to survivors, one third had changed their activity status, but few had changed their place of residence. One-quarter of patients had an ADRS score above the cut-off for depression of 9, one third were receiving antidepressant drugs. The mean number of speech and language therapy sessions since the CVA was 72 (range 0–252).

Aphasic impairments at follow-up

Aphasia recovered rather well, with only 24% of patients having still severe aphasia (ASRS score 2 or below), whilst 12% had moderate (ASRS 3) and 64% mild aphasia (ASRS 4 and 5). Table II shows the results for some Boston Diagnostic Aphasia Examination (BDAE) items at follow-up, which were all above the mean.

Communication at follow-up

Engaging in conversation on complex themes and/or with strangers (mean ECVB score 1.71, maximum = 3), using the phone for a meeting (mean score 1.53), using checks and credit

Table I. *Demographic, pathological and clinical data at inclusion and follow-up*

	On inclusion $n=100$	Follow-up $n=100$
Age, years, mean (SD)	65.1 (13.5)	
Gender: men/women, %	51/49	
Lateralization, %		
Right-handers	90	
Left-handers	4	
Ambidextrous	6	
Education level, %		
No diploma	28	
Junior college	46	
Senior college	19	
University	7	
Marital status, %		
Married or in couple	73	
Single	6	
Divorced	8	
Widowed	13	
Activity, %		
Full-time working	20	4
Part-time working	5	3
Unemployed	1	2
Disabled	2	10
Retired	63	67
Housewives, others	6, 3	4, 5
Profession (past or present), %		
Managers	17	
Shopkeepers	15	
Blue/white collars	53	
Farmers, rural dwellers	9	
Others	6	
Housing, %		
Urban	29	29
Semi-urban	34	34
Rural	36	36
Home, %		
Own home	100	89
With children		2
Nursing home		9
Lived close to family, %	81	
Ischaemic stroke, %	69	
Haemorrhagic stroke	31	
Presence of hemiplegia	60	46
Orgogozo score (20–100)		
Mean (SD)	70 (24.3)	
Median	78	
Barthel Index (maximum 100)		
Mean (SD)	48.3 (37.2)	55.3 (36.2)
Median	45	60
ADRS, mean (SD)		6.5 (5.1)
above the cut-off score of 9		25
Antidepressant drugs, %	0	33

ADRS: Aphasia Depression Rating Scale; SD: standard deviation.

Table II. *Aphasia severity and clinical features*

	On inclusion $n=100$	At follow-up $n=100$
ASRS, *n* (%)		
Grade 0	11 (11)	5 (5)
Grade 1	26	9
Grade 2	25	10
Grade 3	17	12
Grade 4	18	62
Grade 5	3	2
Fluency, clinical assessment, %		
Reduced	81	
Normal	9	
Auditory comprehension, clinical assessment, %		
Enhanced	11	
Impaired	51	
Aphasic syndromes, *n*		
Fluent		41
Non-fluent		20
Mostly written language		5
Global		34
BDAE items: mean score, (SD)		
Complex ideational material (0 to 12), mean (SD)		7.66 (3.43)
Verbal fluency		10.87 (7.04)
Confrontation naming (5–105), mean (SD)		84.57 (30.53)
Reading sentences-paragraphs (0–10), mean (SD)		6.51 (2.91)
Written naming (0–10), mean (SD)		6.95 (4.01)

ASRS: Goodglass and Kaplan's Aphasia Severity Rating Scale; BDAE: Boston Diagnostic Aphasia Examination. Grade 0:"No usable speech or auditory comprehension". Grade 1: "All communication is through fragmentary expression". Grade 2: "Conversation on familiar subjects is possible with help from listener". Grade 3: "The patient can discuss almost all everybody problems with little or no assistance". Grade 4: "Some obvious loss of fluency in speech or facility of comprehension without significant limitation on idea expressed". Grade 5: "Minimal discernible speech handicaps".

cards (1.34), communicating during social activities (1.51), and writing administrative documents (1.21) were the most impaired activities, although basic communication, asking for daily living needs (2.56), talking about one's wishes and purposes (2.37), expressing feelings (2.11), conversation with relatives (2.22), answering on phone, reading time (2.64), and reading family post (2.45) were the least impaired. All mean ECVB scores according to ASRS severity score can be seen in Appendix I. Patients were moderately satisfied with their communication activity, with a mean score of 7.0 ± 3.1 on a visual analogical scale (range 0–12). Sixty-three percent stated that they wanted to communicate as much as before their stroke, 31% less than before, and 6% not at all. Twenty-four percent acknowledged difficulty in understanding humour.

Univariate analysis showed that ECVB total scores were significantly related to:

- work status and type of job on inclusion ($p=0.0002$);
- stroke severity, as assessed by the Orgogozo score on inclusion ($p<0.0001$) and BI on inclusion and at follow-up ($p<0.0001$);
- ASRS aphasia severity score on inclusion and at follow-up ($p<0.0001$);
- auditory comprehension impairment on inclusion ($p<0.0003$);

- BDAE items rating auditory comprehension, fluency, naming, reading and writing at follow-up ($p < 0.0001$);
- mean number of speech and language therapy sessions received since CVA ($p < 0.0001$);
- depression at follow-up (ADRS score, $p < 0.05$).

However, no significant influence of age ($p = 0.96$), gender ($p = 0.31$), education level ($p = 0.10$), residence status ($p = 0.24$) or type of stoke (ischaemic/haemorrhagic, $p = 0.21$) on ECVB scores was found. ECVB scores and satisfaction with communication were correlated ($p < 0.0001$).

A step-by-step regression multivariate analysis was performed (Table IV) including factors related to ECVB scores in the univariate analysis. Owing to a strong relationship between OS and BI, the latter was not entered in the model. Results showed that OS and ASRS scores were independent predictors of ECVB total scores. The estimation values and 95% confidence intervals were, respectively: 0.32 [0.09–0.58], for 1 point higher of OS ($p < 0.01$); –54.75 [–74.29;–35.21] for ASRS of 0, –35.92 [–50.26; –21.58] for ASRS of 1; –9.36 [–23.04; 4.23] for ASRS of 2 and -1.26 [–15.44;12.92] for ASRS.

OS and ASRS scores accounted for 58% of ECVB variance ($R^2 = 0.575$). Ten points more on OS on inclusion predicted an improvement of 3.2 points on ECVB score at follow-up. An ASRS score of 0 on inclusion was associated with a 55-point lower score on the ECVB compared with ASRS 4 or 5. Entering auditory impairment in the model did not improve the prediction ($R^2 = 0.576$).

DISCUSSION

This study documented self-rated communication activity in 100 first-stroke patients with aphasia included in a French regional survey. Only 5 patients had severe limitations (mean score of 17.9), while all others had medium (42.9) to good scores (mean 71.9 and above). Ten patients with severe aphasia and 12 others with moderate aphasia on inclusion reached the communication level of those with mild aphasia 1 year after stroke.

Qualitatively, talking with strangers, conversation on abstract or complex subjects, using the phone, reading and writing administrative documents, dealing with money and outdoor activities were the most severely impaired activities. The lowest scores were observed for reading and writing administrative documents and using cheques and credit cards. These tasks probably involve higher level linguistic skills that are impaired even by moderate aphasia. Therefore, persons with aphasia need to be represented or assisted in administrative affairs and in those activities involving interaction with other people (participation restriction). Using the phone was difficult for aphasic persons in this study, perhaps because no visual cue is available to understand and adjust to their interlocutor. Finally, impairments in conversation on abstract or complex subjects, and difficulty in communicating with strangers and participating in outdoor activities might mean that people with aphasia meet fewer friends and have smaller social networks (6, 8). Recovery of aphasic impairment seemed good: on inclusion, 62% patients had severe aphasia (ASRS 0–2) and 21% had mild aphasia (ASRS 4 and 5), while these rates at follow-up were 24% and 64%, respectively. This is consistent with previous studies showing that 20–25% of stroke survivors with aphasia have a good recovery by 6 months and one-third at 18 months after their stroke (1, 30–32). Similarly, as far as a questionnaire reflects communication ability, recovery of verbal communication was good in 86% of the sample, with significant correlations between aphasic impairments and communication limitations. Influence of depressive mood was found only in univariate analysis. Multivariate analysis displayed only stroke severity and aphasia severity on inclusion as independent predictors, suggesting that recovery of verbal communication activity depends on the same factors as recovery from impairments (33–35).

This study has some limitations. First, we were able to assess at follow-up only 100 survivors of the 164 patients enrolled in the study, and these 100 were younger and probably had less severe strokes than those who died or were lost to follow-up. Furthermore, because of our inclusion criteria, patients with short-lasting aphasia might be included. Since these subjects were not expected to have communication limitations at follow-up, there may be some biases toward less severely impaired aphasic persons in our study. Secondly, we performed only a brief global assessment of aphasia on inclusion, which precluded examining the role of aphasic impairments in the acute phase as possible predictors of communication activity when patients returned to the community. Another limitation might be that a questionnaire such as the ECVB might reflect more what patients and relatives think than what they can perform. Nevertheless, good correlations exist between the ECVB sum score and results of an objective assessment of communication, the Test Lillois de Communication (TLC 36), so we think that this score is truly related to the communication ability of aphasic subjects. Another limitation is that our study was restricted to aphasic persons' verbal communication abilities. We were unable to address the question of the compensatory role of non-verbal communication, because ECVB items were exclusively verbal and might hardly be compensated by non-verbal communication. Lastly, our study was restricted to the ICF dimension of activity, and therefore it provided no information on communication as an interaction, the influence of partners' attitudes and behaviours, and contextual factors as barriers or facilitators, with the exception of difficulty in phone use. These questions should be addressed in forthcoming studies in order to document in depth the participation of aphasic persons and their implications for therapeutic interventions, social support and service delivery.

In conclusion, in this study, most of the aphasic subjects had a rather positive opinion about their communication activity 1 year after their stroke. Only 14% reported limitations in their activity, but in these cases the limitations were severe. Forthcoming studies will explore to what extent communication ability might still improve over time.

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APPENDIX I. Limitation in communication activity: Echelle de Communication Verbale de Bordeaux (ECVB) mean scores according to Goodglass and Kaplan's Aphasia Severity Rating Scale (ASRS) severity score. Maximum score: 102 for total score, 3 for all other items

ASRS score	0	1	2	3	4–5	Together
ECVB total score	17.9	42.9	71.9	84.0	89.1	64.0±32.3
Basic communication						
Asking for daily living needs	1.73	2.19	2.84	2.88	2.86	2.56
Talking about wishes and purposes	1.45	1.88	2.64	2.65	2.90	2.37
Asking one's way	0.64	1.38	2.40	2.59	2.90	2.08
Conversation						
With proxy, usual theme	0.82	1.65	2.68	2.59	2.81	2.22
With proxy, complex theme	0.36	1.19	1.92	2.18	2.48	1.72
Engaging in conversation	0.91	1.50	2.16	2.12	2.10	1.83
Expressing feelings	0.73	1.58	2.48	2.53	2.71	2.11
Conversing with strangers, usual theme	0.27	1.42	2.32	2.47	2.86	2.00
With strangers, complex theme	0.18	0.92	1.88	2.35	2.76	1.71
Walking the first	0.36	0.92	2.00	1.82	2.38	1.59
Phone use						
Calling relatives	0.00	1.31	2.48	2.71	2.95	2.04
Calling friends	0.09	1.12	2.40	2.76	2.90	1.98
Calling for a meeting	0.00	0.65	1.76	2.41	2.43	1.53
Calling a stranger	0.18	0.96	2.16	2.53	2.86	1.84
Answering when alone	1.09	1.85	2.64	2.71	2.90	2.33
Answering when others cannot	0.36	1.00	2.00	2.29	2.43	1.70
Passing on a phone message	0.09	1.15	2.60	2.65	2.71	1.98
Shopping						
Shopping alone	0.18	0.73	1.68	2.88	2.38	1.62
Asking the shopkeeper	0.18	0.81	2.04	2.76	2.29	1.69
Using money	0.00	1.04	2.00	2.88	2.43	1.77
Using check and credit card	0.09	0.62	1.48	2.06	2.14	1.34
Social communication						
Asking for information	0.36	1.27	2.60	2.65	2.95	2.09
Social leisure	0.82	1.15	1.72	1.82	1.81	1.51
Ordering in a restaurant	0.55	1.27	2.16	2.59	2.89	1.96
Talking with a grocer or a shopkeeper	0.36	1.38	2.40	2.76	2.90	2.08
Reading						
Newspapers, books	1.18	1.81	2.12	2.47	2.43	2.06
Family mail	1.45	2.12	2.48	2.94	2.95	2.45
Administrative mail	0.55	1.04	1.68	2.24	2.52	1.66
Time	1.36	2.54	2.80	3.00	2.95	2.64
Writing						
Shopping list	0.64	1.38	1.72	2.47	2.86	1.88
Letters	0.09	0.65	1.36	2.00	2.43	1.37
Administrative documents	0.00	0.27	1.32	2.18	2.10	1.21
Checks	0.00	0.37	1.24	2.16	2.10	1.21