Intensity of Aphasia Therapy, Impact on Recovery

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Background—It has been speculated that the conflicting results demonstrated across poststroke aphasia therapy studies might be related to differences in intensity of therapy provided across studies. The aim of this study is to investigate the relationship between intensity of aphasia therapy and aphasia recovery.

Methods—A MEDLINE literature search was conducted to retrieve clinical trials investigating aphasia therapy after stroke. Changes in mean scores from each study were recorded. Intensity of therapy was recorded in terms of length of therapy, hours of therapy provided per week, and total hours of therapy provided. Pearson correlation was used to assess the relationship between changes in mean scores of outcome measures and intensity of therapy.

Results—Studies that demonstrated a significant treatment effect provided 8.8 hours of therapy per week for 11.2 weeks versus the negative studies that only provided ≈2 hours per week for 22.9 weeks. On average, positive studies provided a total of 98.4 hours of therapy, whereas negative studies provided 43.6 hours of therapy. Total length of therapy time was found to be inversely correlated with hours of therapy provided per week ($P=0.003$) and total hours of therapy provided ($P=0.001$). Total length of therapy was significantly inversely correlated with mean change in Porch Index of Communicative Abilities (PICA) scores ($P=0.0001$). The number of hours of therapy provided in a week was significantly correlated to greater improvement on the PICA ($P=0.001$) and the Token Test ($P=0.027$). Total number of hours of therapy was significantly correlated with greater improvement on the PICA ($P<0.001$) and the Token Test ($P<0.001$).

Conclusions—Intense therapy over a short amount of time can improve outcomes of speech and language therapy for stroke patients with aphasia. **(*Stroke*. 2003;34:987-993.)**

Key Words: aphasia ■ cerebrovascular accident ■ therapy ■ treatment outcome

The Agency for Health Care Policy and Research Post-Stroke Rehabilitation Clinical Practice Guidelines[1] define aphasia as "the loss of ability to communicate orally, through signs, or in writing, or the inability to understand such communications; the loss of language usage ability." Darley[2] noted that aphasia is generally described as an impairment of language resulting from focal brain damage to the language-dominant cerebral hemisphere. This serves to distinguish aphasia from the language and cognitive-communication problems associated with non–language-dominant hemisphere damage, dementia, and traumatic brain injury.[3] However, defining aphasia as purely a disorder of language may oversimplify a complex clinical entity. Kertesz[4] clinically described aphasia as a "neurologically central disturbance of language characterized by paraphasias, word finding difficulty, and variably impaired comprehension, associated with disturbance of reading and writing, at times with dysarthria, non-verbal constructional and problem-solving difficulty and impairment of gesture."

The most effective means of treating aphasia after stroke has yet to be determined, and studies investigating the efficacy of speech and language therapy (SLT) for patients suffering aphasia after stroke have yielded conflicting results. One possible explanation for the observed heterogeneity of findings across studies is a difference in intensity of therapy.[5,6] We have noted that the failure to identify a consistent benefit might have been due to the low intensity of SLT applied in the negative studies, whereas higher intensities of therapy were present in positive studies.[7] A meta-analysis that included all patients suffering from aphasia, not just stroke patients, revealed that the more intensive the therapy, the greater the improvement.[8]

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The objective of the present study is to investigate the relationship of intensity of aphasia therapy and aphasia recovery after stroke. Using published studies of SLT, this study attempts to quantify treatment intensity and determine whether, in fact, intensity correlates with outcome results.

Methods

Study Identification and Selection

A MEDLINE literature review was conducted to identify controlled trials that investigated SLT for aphasia after stroke published

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between January 1975 and May 2002. All searches used the limit terms *human*, *adult*, and *English*. The following MEDLINE search words were used: *aphasia*, *stroke*, *speech therapy or language therapy or speech and language therapy*, and *treatment*, as well as the combined exploded key words *stroke and aphasia* and *speech therapy or language therapy or speech and language therapy* and *treatment*.

Articles identified in the MEDLINE literature search were included in the present analyses if the study compared conventional SLT with treatment of a comparative control group. If the comparative control group underwent an altered form of conventional SLT, then the duration of that therapy had to be of the same duration as the SLT. Articles were limited to stroke survivors suffering from aphasia after stroke, and studies that included patients with traumatic brain injury or any other disorders or illnesses were excluded. Studies that provided a drug and/or placebo as an adjunct to therapy were also excluded from the present review.

After each citation was identified through the literature search, a single investigator (R.T.) reviewed the corresponding abstract to assess the suitability for inclusion. All articles that appeared to be treatment based were considered. The article was examined a final time by the study coordinator to verify that at least 1 treatment intervention had been assessed. Five studies were eventually deemed suitable for inclusion. Studies cited in review articles and in retrieved articles but not identified through the MEDLINE search were also sought. Five more articles were found this way, bringing the total number of articles meeting the inclusion criteria to 10.

Data Abstraction

Several independent reviewers were used to extract data from the selected studies. Two abstractors, each blinded to the other's results, reviewed each article independently. The review process consisted of the following 2 parts. (1) First, data were collected pertaining to study methodology, identification of outcome measures, results, and final conclusions. Data were typed into a computer-generated form to avoid identifying the abstractor via handwriting. (2) A quality rating score was assigned. The quality rating scale used was the Physiotherapy Evidence Database (PEDro) scale, developed by the Centre for Evidence-Based Physiotherapy in Australia (http://www.pedro.fhs.usyd.edu.au/).

PEDro was developed for the purpose of accessing bibliographic details and abstracts of randomized controlled trials, quasirandomized studies, and systematic reviews in physiotherapy. Studies included in this review using a nonexperimental design could not be assigned a PEDro score and were given a designation of no score. The PEDro Scale consists of 10 quality ratings, each receiving either a yes or no score. The maximum score a study could receive was 10. Two independent raters reviewed each article, and a third reviewer resolved any scoring discrepancies between the 2 raters. The score provided by the third reviewer constituted the final PEDro score.

Statistical Analysis

The abstracted data (treatment type, length of therapy period in hours and weeks, and mean change in scores for outcome measures) were entered into SPSS 10.1 for Windows. An independent *t* test was used to determine differences of mean scores and length of treatment between the studies yielding positive results and those yielding negative results. Pearson bivariate correlation was used to determine the association between mean change in scores for outcome measures and the intensity of therapy (length of therapy period and hours of therapy provided per week).

Several articles presented their results graphically. The graphs from these articles were scanned and entered into Microsoft Paint as .jpg files. The bitmap coordinates of the graphs were then recorded, and the individual values estimated relative to the bitmap coordinates of the *y* axis.

Results

Summary of Individual Studies

Ten studies investigating the SLT for stroke patients suffering from aphasia met criteria after being reviewed. These 10 studies represented 864 individual patients. A brief description of each article follows.

Meikle et al[9] compared the progress of 31 acute stroke patients with dysphasia receiving conventional speech therapy from either a qualified speech therapist or a nonprofessional volunteer. Patients received a minimum of 3 and a maximum of five 45-minute sessions per week. Length of treatment was not defined, and therapy sessions were discontinued when the therapist felt that the patient had not improved in 2 consecutive sessions. There were no significant differences in treatment results between the 2 groups. Both treatment regimes appeared to provide the same benefits.

David et al[10] compared the effects of speech therapists and untrained volunteers on recovery from aphasia in the acute phase after stroke. One hundred fifty-five patients received 30 hours of therapy over 15 to 20 weeks. Although patients in both treatment groups improved, there was no overall difference in the amount of progress between the groups. However, patients who were referred to treatment late (the median interval between onset of stroke and starting treatment was 20 weeks) began treatment at a level similar to that of the other patients and showed an identical recovery pattern. This suggested that treatment, and not spontaneous remission, was responsible for the majority of the improvement experienced in these patients.

Lincoln et al[11] examined whether speech therapy produced a better language outcome than natural recovery alone in 327 acute stroke patients with aphasia. Patients in the treatment group received two 1-hour sessions of therapy per week for 24 weeks. Comparison of group results on the Porch Index of Communicative Abilities (PICA) and the Functional Communication Profile (FCP) revealed no significant difference between treated and nontreated patients. Thus, speech therapy did not improve language functioning more than what was achieved by spontaneous recovery. The treatment regime that was used, which was representative of clinical practice, was determined not to be effective for aphasic patients.

Shewan and Kertesz[12] investigated 3 types of speech therapy and compared its effects in 100 acute aphasic stroke patients who received no speech or language therapy. Patients who recovered their language skills within 2 to 4 weeks after onset were excluded from the study. Treatment was provided in three 1-hour sessions per week for 1 year. Shewan and Kertesz[12] noted no difference in Western Aphasia Battery scores, its subsets Language Quotient (LQ) and Cortical Quotient (CQ) scores, or the Auditory Comprehension Test for Sentences scores, between groups. When treated patients were compared with controls, Language Quotient scores of patients in the treatment groups were significantly higher compared with the control groups. Individually, the language-oriented therapy and stimulation-facilitation therapy patients significantly improved compared with the control patients, but no significant differences were observed between the unstructured-settings group and the control group. In addition, the CQ scores of the treatment groups were significantly higher compared with patients in the control group. Individually, stimulation-facilitation therapy patients had higher CQ scores than the controls, but the language-oriented therapy and unstructured-settings groups were not significantly dif-

TABLE 1. Intensity of Aphasia Therapy Poststroke and Its Impact

Authors, Year	PEDro Score	n at Randomization	Intensity of Therapy	Impact of Aphasia Therapy vs Control
Lincoln et al, 1984	6	327	Two 1-hour sessions per week for 34 weeks	−
Wertz et al, 1986	6	121	8 to 10 hours a week for 12 weeks	+
Marshall et al, 1989	6	121	8 to 10 hours a week for 12 weeks	+
Hartman and Landau, 1987	6	60	2 times a week for 6 months	−
David et al, 1982	5	155	30 hours over 15 to 20 weeks	−
Shewan and Kertesz, 1984	5	100	Three 1-hour sessions a week for 1 year	+
Prins et al, 1989	5	32	2 sessions a week for 5 months	−
Meikle et al, 1979	4	31	Minimum of 3 and maximum of 5 sessions a week of 45 minutes	−
Brindley et al, 1989	4	10	5 hours over 5 days a week for 12 weeks	+
Poeck et al, 1989	Not scored	160	9 hours a week for 6 to 8 weeks	+

ferent from the controls. The authors of this study suggested that comparisons of treated patients with untreated aphasic patients demonstrated that treatment was a significant factor in improvement.

Wertz et al[13] compared the efficacy of clinic, home, and deferred language treatment for aphasia in 121 patients between 2 and 24 weeks after onset. Patients received 8 to 10 hours of therapy a week for 12 weeks. The authors noted that at 12 weeks, clinic-treated patients made significantly more improvement on the PICA than did the deferred patients, whereas improvement in the home-treated patients did not differ significantly from either the clinic-treated or deferred-treatment patients. At 24 weeks, no differences were noted on the PICA between all groups. On the basis of these results, Wertz et al[13] concluded that clinic treatment for aphasia was efficacious, and delaying treatment for 12 weeks did not compromise the ultimate improvement in aphasic patients.

Hartman and Landau[14] compared conventional speech therapy provided by professional speech pathologists with emotional supportive counseling therapy in 60 stroke patients 1 month after onset. Therapy was provided twice a week for 6 months. Change scores on the PICA revealed no significant differences between the groups. Hartman and Landau[14] asserted that conventional speech therapy was no more effective than emotional support.

Brindley et al[5] investigated the speech of 10 patients with chronic Broca's aphasia after intensive speech therapy. Patients were provided 5 hours of therapy over 5 days a week for 12 weeks. There was significant improvement on the FCP subscales in movement, speech, reading, and overall score during the intensive period. There was a significant ratio of improvement (ratio of the score at the end of a period to that at the start) on FCP between the intensive period and a second nonintensive period in movement, speech, and overall score. In addition, the Language Assessment Remediation and Screening Procedure showed significant improvement during the intensive period on sentence length increase, a reduction in element omission, and an increase in percentage of full utterances. Thus, the authors of the study concluded that intensive therapy improves speech recovery 1-year after onset of aphasia for some patients.

Marshall et al[15] investigated the impact of home treatment for 121 aphasic patients between 2 to 24 weeks after onset by trained nonprofessionals. Patients received 8 to 10 hours of therapy a week for 12 weeks at 2 to 24 weeks after onset. The authors observed that at 12 weeks the SLT group showed significantly more improvement than the deferred-treatment group. However, improvements noted in the home-treatment group did not differ from those in the SLT group. The authors further noted that at 24 weeks, the deferred-treatment group caught up to the other 2 groups and no significant differences between the groups were observed.

Poeck et al[6] evaluated the outcome of intensive language treatment in 160 acute and chronic aphasic inpatients. Patients undertook 9 hours of therapy a week for 6 to 8 weeks. These patients were compared with a group of aphasic stroke patients who received no aphasia therapy. The authors of the study observed that the mean gain on each measure of the Aachen Aphasia Test improved substantially for both the treated and the control group. However, with intensive therapy, 78% of the patients treated up to 4 months after onset versus 46% of the patients treated from 4 to 12 months after onset improved beyond that expected with spontaneous recovery.

Prins et al[16] compared the effectiveness of systematic aphasia therapy that was organized on 4 levels (nonverbal, phonology, lexical semantics, and morphosyntax) with the effectiveness of conventional therapy. Thirty-two stroke patients exhibiting aphasia for at least 3 months were included in the study. Patients receiving systematic aphasia therapy were compared with aphasic stroke patients receiving conventional SLT and with patients receiving no aphasia therapy. Patients in this study received only 2 therapy sessions per week for 5 months. Multiple regression analysis revealed that there were no significant differences between the groups on all evaluations. Moreover, neither the systematic aphasia therapy nor the conventional therapy had any effect on the recovery progress of the study patients.

Of the 10 studies reviewed, 5 were positive studies and 5 were negative studies (see Table 1). When examining the outcomes related to the amount of therapy provided, it appears the positive studies provided an average of 7.8 (5 to 10) hours of therapy per week for 18 (8 to 12) weeks compared with the negative studies that only provided ≈2.4 (2 to 3.8) hours per week for 22.9 (20 to 26) weeks. Moreover, total number of hours of therapy was, on average

TABLE 2. The 8 Studies Analyzed for Association Between Intensity of Therapy and Aphasia Recovery

Study	Hours per Week	Therapy Length (weeks)	Total Hours of Therapy	Measures Used	Impact of Therapy
David et al[10]		20	30	FCP	−
Lincoln et al[11]	2	24	48	PICA FCP	−
Wertz et al[13]	10	12	120	PICA	+
Hartman and Landau[14]	2	26	52	PICA	−
Brindley et al[5]	5	12	60	FCP	+
Marshall et al[15]	10	12	120	PICA Token Test	+
Poeck et al[6]	9	8	72	Token Test	+
Prins et al[16]	2	22	44	Token Test	−

108 (60 to 156) hours in the positive studies versus only 43.6 (30 to 52) hours in the negative trials.

Relationship Between Intensity of Therapy Provided and Outcome of Study

We next wanted to determine whether there was in fact a correlation between intensity of therapy provided and the outcome of a study. The target outcome measures were the Token Test, PICA, and FCP, which were the scales most often used by the reviewed studies. The Token Test, PICA, and FCP were used in 3, 4, and 3 studies respectively. As such, Shewan and Kertesz,[12] a positive study, was excluded from the analysis because this study did not use any of the targeted outcome measures. Although Meikle et al,[9] a negative study, did use the PICA, the authors did not provide point measures or measures of variability of their results; therefore, this study was excluded from our analysis. Two studies provided their results in graph format.[10,11] The bitmap coordinates of the mean scores from these studies were recorded and their values calculated relative to the bitmap coordinates of the *y* axis.

Eight studies, therefore, provided the appropriate data to allow determination of the relationship between intensity of therapy provided and outcome (see Table 2). Four studies yielded positive results,[5,6,13,15] and 4 yielded negative outcomes.[10,11,14,16]

Of the 4 positive trials analyzed,[5,6,13,15] intensive practice (mean, 8.8 hours a week) was provided over a short amount of time (mean, 11.2 weeks), thereby accumulating an average of 98.4 hours of total therapy time. In the 4 negative studies analyzed,[10,11,14,16] less intense practice (mean, 2.0 hours a week) was provided for a longer duration (mean, 22.9 weeks), accumulating an average of 43.6 hours of total therapy time (see Table 3). In the positive studies, significantly more hours of therapy per week and significantly more total therapy hours in a significantly shorter period of time were provided, as compared with the negative studies.

Total length of therapy time was inversely correlated with hours of therapy provided per week ($r=-0.639$, $P=0.003$, n=19). Moreover, hours of therapy provided in a week was significantly correlated to total hours of therapy provided ($r=0.542$, $P=0.016$). In other words, the shorter the overall therapy period was, the more hours of therapy provided in a week. The more hours of therapy provided per week, the greater the total hours of therapy provided over the study's duration. Stated differently, in studies in which the overall length of treatment was shorter, the therapy was more intensive. As such, the positive studies, which were significantly shorter in duration, were more intensive than the negative studies, which were longer in duration.

The positive studies demonstrated a mean improvement in both the PICA[13,15] and Token Test[6,15] scores of 15.13 (SD, 3.06) and 13.74 (SD, 8.67), respectively. The negative studies demonstrated mean improvement on the PICA[11,15] and Token Test[16] scores of 1.37 (SD, 0.52) and 0.59 (SD, 0.78), respectively (see Table 3). The mean improvements in both PICA and Token Test scores were significantly different between the positive and negative resultant studies (see Table 3).

Brindley et al[5] provided their results in terms of ratio of improvement (ratio of the FCP scores at the end of treatment period to the FCP at the start). A ratio of >1 indicates an improvement, whereas a ratio of <1 indicates decline over time. Because change scores could not be retrieved from this article,[5] we decided to convert the FCP scores of David et al[10]

TABLE 3. Comparing Intensity of Therapy Between Positive and Negative Resultant Studies

	Therapy Measures Mean (SD)			Outcome Measures Mean (SD)	
	Length (weeks)	Hours (per week)	Total (hours)	PICA	Token Test
Positive studies n=259	11.2 (1.7)	8.8 (2.0)	98.4 (28.2)	15.1 (3.1)	13.74 (6.67)
Negative studies n=574	22.9 (2.3)	2.0	43.6 (8.3)	1.37 (1.37)	0.59 (0.79)
t statistic	12.80	8.72	5.61	8.79	2.561
P value	0.001	0.001	0.001	0.001	0.05

TABLE 4. Association Between Intensity of Therapy and Improvement in PICA and FCP Scores

	Length of Therapy	Hours of Therapy per Week	Total Hours of Therapy
PICA	$r=-0.948$	$r=0.957$	$r=0.958$
	$P=0.0001$	$P=0.0001$	$P=0.0001$
Token Test	$r=-0.581$	$r=0.811$	$r=0.963$
	$P=0.171$	$P=0.027$	$P=0.0001$

and Lincoln et al[11] to ratio factors as well. Brindley et al[5] noted a significant ratio of improvement on overall FCP scores between groups (1.10 versus 0.97, $P<0.01$), whereas the ratio of improvement on FCP scores was not significant between groups in the David et al[10] (1.54 versus 1.53) and Lincoln et al[11] (1.14 versus 1.14) studies. As such, the mean ratio of improvement in FCP for group in the negative trials[10,11] was 1.34 (SD, 0.23), whereas for the positive trial[5] it was 1.04 (SD, 0.09). The difference in scores between the negative and positive trials was not statistically significant ($P=0.16$). Because no significant differences in FCP scores were noted between the negative and positive trials, no further analysis using the FCP was attempted.

Analysis revealed that the total length of therapy was significantly inversely correlated with mean change in PICA[11,13,14,15] scores ($r=-0.948$, $P=0.0001$, n=9). That is, the shorter the therapy period, the greater the change in PICA scores. This trend was also evident when we looked at the Token Test[6,15,16] change scores, ($r=-0.581$, $P=0.17$, n=7), although it failed to achieve statistical significance (see Table 4). In addition, the hours of therapy provided in a week was significantly correlated to greater improvement on the PICA ($r=0.957$, $P=0.001$, n=9) and on the Token Test ($r=0.811$, $P=0.027$, n=7).

As noted earlier, total hours of therapy received was significantly greater in the shorter, more intense studies that provided positive results compared with the negative resultant studies. Total hours of therapy were significantly correlated with mean change in PICA ($r=0.958$, $P=0.0001$, n=9) and Token Test scores ($r=0.963$, $P=0.0001$, n=7). As such, the more hours of therapy provided, the greater the improvement in PICA and Token Test scores noted.

Discussion

Four of the 8 reviewed studies that reported significantly positive results[5,6,13,15] provided an average of 8.8 hours of therapy per week for 11.2 weeks compared with the 4 negative studies[10,11,14,16] that only provided approximately two 1-hour sessions per week for 22.9 weeks. Analysis revealed that the more intensive therapies (those that provided greater hours of therapy per week) resulted in the improved outcomes. Significant improvement in PICA and Token Test scores was associated with more intense therapy.

Unfortunately, analysis using the FCP did not yield a similar pattern. Although Brindley et al[5] noted significant between-group differences in their study, there was no significant difference in groups' scores of the negative trials versus the positive study. It should be noted that although the FCP is a widely used assessment of functional language, it is a rather subjective instrument consisting of interviews and observations of patients.

Constraint-induced (CI) aphasia therapy has as its hallmark feature intense therapy for patients suffering from aphasia. The use of intensive practice for short time intervals is preferred over long-term, less frequent training in CI aphasia therapy. The impact of intense therapy using the CI paradigm was demonstrated by the Pulvermuller et al[17] study, in which patients receiving CI therapy (3 hours of therapy per day for 2 weeks) significantly improved on all outcome measures compared with the patients receiving conventional therapy who showed no significant improvement.

Earlier researchers have observed the association between intensive therapy and improved aphasia outcomes. Brindley et al[5] noted that "it is only by radically reorganizing current provision or increasing the time allocated to speech therapists that their expertise can be effective in the field of chronic aphasia." In support of that statement, Poeck et al[6] noted that aphasia improved even in the chronic phase with intensive therapy.

The impact of the intensity of SLT on aphasia recovery still requires further study. Most of the limitations of the present review stem, in part, from the limitations of the original studies. Only 3 studies were rated to be of "good" quality (PEDro score=6), whereas the rest were either of fair quality (PEDro scores=4 and 5) or did not qualify for a PEDro rating[6] because of a lack of randomization of the groups. The use of nonstandardized measures and lack of clarity regarding therapy intensity and the nonreporting of overall mean changes in scores for outcomes measures were noted in several studies. In addition, many of the studies were underpowered with small sample sizes. The largest trial, Lincoln et al,[11] randomized 327 patients; however, only 161 completed analyses were reported, and only 27 patients received >36 treatment sessions.

Given the association between intensity of SLT and aphasia recovery, greater attention needs to be given to structuring the most appropriate treatment regime. Length of therapy and hours of therapy provided per week that allow for maximum recovery require further investigation. Most importantly, this review underscores the importance of SLT to aphasia recovery. Previous highly influential studies such as Lincoln et al[11] have led to doubt as to the efficacy of SLT in aphasia recovery. Our review confirms that lower-intensity therapy provided over a longer period of time does not result in a significant change in outcome. However, more intensive SLT, delivered over a shorter period of time, results in significant improvement in outcome. We conclude that intensive aphasia therapy delivered over 2 to 3 months is critical to maximizing aphasia recovery, and failure to provide it potentially compromises individual outcomes.

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Editorial Comment

Aphasia Therapy Works!

Medical education, it seems to me, has failed the patient with aphasia. Aphasia therapy works. Why isn't the message getting out?

It has always puzzled me that physicians, for the most part, exhibit so little interest in aphasia. Aphasia is, after all, a medical condition—and not a small one. Over one million people today are living in the United States with aphasia.[1] Compare this figure with those for disorders which seem to elicit more interest, and yet are less prevalent, for example, Parkinson's disease: 750 000; multiple sclerosis: 400 000. Eighty thousand new patients with aphasia are added to the total aphasia population each year from stroke alone.[2] Physicians should be encouraged to understand that aphasia therapy, properly selected, carefully targeted to specific aphasic signs and symptoms, and administered with sufficient intensity, works.[3]

Why is it that physicians do not become more directly engaged in helping facilitate access to aphasia therapy programs? One reason, I suspect, is that statistically valid and reliable efficacy studies documenting benefits of aphasia therapy have not been widely publicized. Such studies exist.[4–6] In this regard the paper by Bhogal et al in the current issue of *Stroke* is a well-conceived outcome study with importance to the clinical practice of aphasia management. This study not only documents benefits of aphasia therapy beyond spontaneous recovery but also explains one of the ways aphasia therapy works best. The authors provide strong evidence to support the following conclusion: compared with aphasia therapy administered less intensively, aphasia therapy administered intensively, even over a relatively short period of time, improves outcome for stroke patients with aphasia.

What is it that physicians can do to improve the lot of their patients with aphasia? First, they should think deeply about what it means to an individual to lose the ability to communicate. Imagine one person with severe non-fluent aphasia—one person who retains the ability to think and to understand spoken language, but has lost the ability to express thoughts and feelings. Any improvement in that person's ability to communicate could transform life not only for that individual, but also for his or her family. Contact the National Aphasia Association at www.aphasia.org for useful information. Perhaps new approaches to aphasia therapy from the field of cognitive neuroscience will stimulate more interest in aphasia on the part of physicians, for example, pharmacotherapy for aphasia[7–9] or transcranial magnetic stimulation (A. Pascual-Leone, MD, and M. Naeser, PhD, verbal personal communication, 2003). However, there is no need to wait.

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