The Evolution of Chronic Aphasia

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Studies of language recovery in aphasia have concentrated on the changes that occur in the first year following injury. They agree that considerable improvement in language may take place within the first three months post onset in both treated and untreated patients (Culton, 1969; Sarno and Levita, 1971; Hanson and Cicciarelli, 1978; Shewan and Kertesz, 1984). Language improvement continues beyond three months postonset in some patients, particularly those who receive language therapy (Basso, Faglioni, and Vignolo, 1975; Basso, Capitani, and Vignolo, 1979; Wertz, et al., 1981). Much less change is expected after 12 months, though only a few studies have assessed improvement in aphasic patients beyond one year post event (Dabul and Hanson, 1975; Kertesz and McCabe, 1977; Broida, 1977; Sands, Sarno, and Shankweiler, 1979).

Little has been written about the long term stability of language performance in aphasia. The prevailing notion seems to be that aphasic patients gradually improve and arrive at a level or "plateau" of performance which they then maintain indefinitely. The limited available data, however, indicate that after about one year postonset some patients continue to show progress, some stay the same, while still others may decline in language performance. Clinically, we have observed each of these long term trends in patients who are receiving treatment and in those who are not.

It was to answer questions regarding the long term changes in the language skills of aphasia patients that the present study was undertaken. Specifically, we attempted to determine the amount and pattern of language change in patients with chronic aphasia across a time span from 3 to 55 months post onset. The study included patients in four separate aphasia categories which were derived from factor and cluster analyses of the Porch Index of Communicative Ability (PICA) (Hanson, Riege, Metter, and Inman, 1982). Five PICA language factors had been identified for study.

METHODS

The aphasia categories included in this study have been described in detail in a previous publication (Hanson, et al., 1982). In that work 118 patients with aphasia, unselected for etiology, were classified into five aphasia categories from factor and cluster analyses of their scores on a PICA test administered more than 6 months postonset. From this population, 35 patients with sequential PICA test scores across 5 years were available for retrospective study. These 35 patients were all males. Each was right handed, and each had been a fluent speaker of English prior to injury. All patients except one had experienced left CVAs. The one exception was a patient who was aphasic following head trauma and who was retained in the study because the amount and pattern of change in his PICA test scores resembled that of other patients with whom he was categorized for type of aphasia. Patient descriptive data, including the amount, duration, and time of initiation of treatment are presented in Table 1.

Table 1. Patient descriptive information.

	*Category 1 N=18	Category 3 N=5	Category 4 N=6	Category 5 N=6
Age at onset				
Mean	56.50	51.40	62.0	55.80
Range	39-73	37-58	59-67	50-65
Education (yrs.)				
Mean	12.00	12.80	14.80	11.80
Range	8-17	9-17	12-18	10-14
Time: onset - initiation of treatment (mo.)				
Mean	2.00	1.40	1.60	4.20
S.D.	1.56	.54	.54	3.77
Treatment duration (mo.)				
Mean	28.06	28.00	37.40	37.00
S.D.	18.85	16.86	18.85	15.55

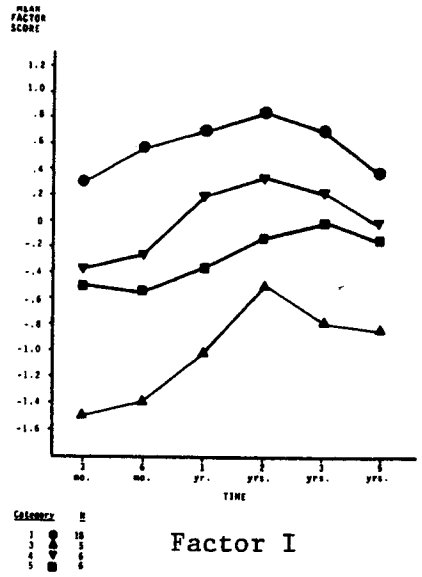
*Patients were categorized for type of aphasia in a previous investigation (Hanson, Riege, Metter and Inman, 1982). No category 2 patients were available for study.

The 35 patients had been administered the PICA at (means and standard deviations) 3 (.49), 6 (.46), 12 (.93), 24 (1.39), 35 (2.26), and 55 (5.89) months post onset. Five factor scores were calculated for each patient at each of the six test intervals. The factor scores were averaged across subjects within each patient's category, yielding, for each of the five factors, a mean factor score (MFS) at each test date. The MFS were then submitted to multivariate trend analyses across the six test intervals from 3 months to 55 months post onset. Thus, comparisons of changes over time could be made in the 5 separate language factors for each of the 4 patient categories. Changes in PICA overall scores over time were also studied.

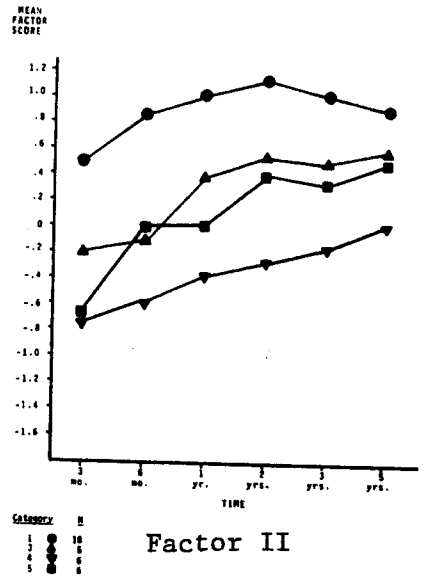
RESULTS

The MFS profiles for the separate factors are presented by patient category in Figures 1a to 1e. Figure 1a shows the SPEAKING performance for each category of patients over time. Notice that Category 1 patients had the highest level of performance and Category 3 had the lowest level of performance at each test date. The order of categories according to level of performance remained constant; 1, 4, 5, and 3. Each category of patients shows significant improvement in SPEAKING from the first test at 3 months postonset to two years post onset. After 2 years there is some deterioration in performance for each of the categories except for Category 5. Category 3, with the most severe impairment in SPEAKING at each test interval, made the greatest actual amount of change, although they remained the most impaired.

For the WRITING factor (Figure 1b) the order of patient categories, in terms of their performance, has changed to 1, 3, 5 and 4. All patient



Factor I



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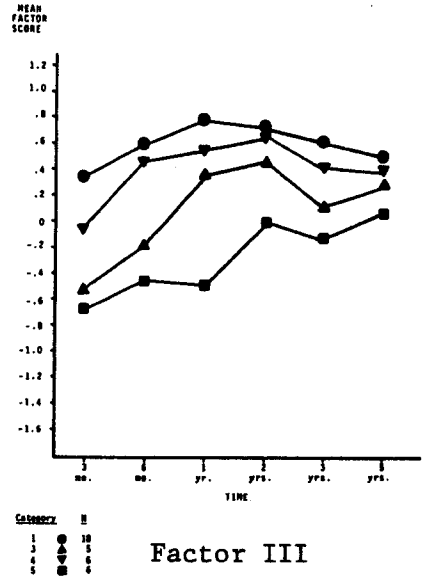
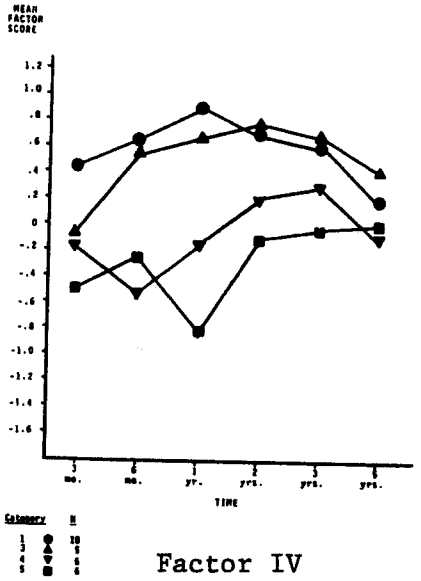
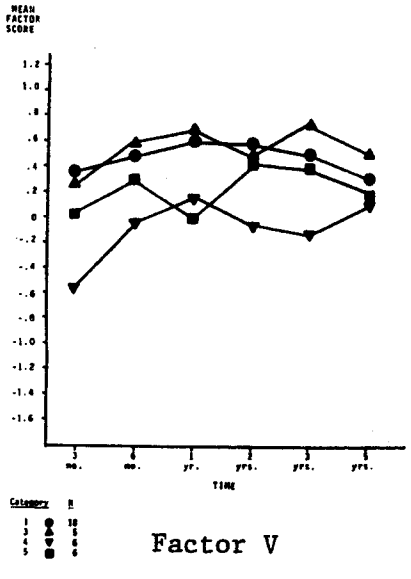


Factor III



Factor IV



Factor V

Figure 1. Recovery profiles. A: Factor I (Speaking. Subtests I,IV,IX,XII). B: Factor II (Writing. Subtests A,B,C,D). C: Factor III (Comprehension--Spoken and Written. Subtests VI,X,V,VII). D: Factor IV (Gesturing. Subtests II,III). E: Factor V (Copying. Subtests E,F).

categories show improvement in WRITING. Also, WRITING seems to be more resistant to decline than SPEAKING, with some categories showing steady improvement over many years.

In Figure 1c it is shown that Category 5 patients, those with the most severe aphasia overall, are the most impaired in COMPREHENSION. Notice the difference in the spread of the scores at the beginning and the end of the curve. In Figure 1d it can be seen that patients in Category 3, the poorest speakers, achieve the highest level of performance on GESTURING. Patients in categories 4 and 5 generally perform rather poorly on this factor. The four aphasia categories were closer together on COPYING (Figure 1e) than on any other factor.

Profile analyses carried out on the factors across the time intervals indicated that the factor score profiles tended to be parallel, ($F < 1.4$, $p < 0.2$), were significantly different in level of performance ($F=8.956$; $p < 0.0001$) and differed significantly between time intervals ($F > 5.02$, $p < 0.002$) Analysis of variance (ANOVA) with repeated measures using a 4 x 5 x 6 design including the 4 patient categories, the 5 factor scores for each subject, and 6 time intervals, indicated that all three main effects and some of their interactions were significant ($p < 0.01$). A significant category by factor interaction was found, resulting from category differences on all factors except copying.

To compare further the differences in language performance of the four patient categories over time, PICA overall percentile score profiles are displayed in Figures 2a to 2d. Beneath each PICA profile is shown the average amount of individual and group therapy received per month by each patient category. It can be seen that the amount and pattern of treatment administered is similar for each patient category. The figures reveal that patients in Category 1 had the least severe aphasia at each point in time. Categories 3 and 4 show approximately equivalent severity levels but, as shown earlier, have quite different impairments as indicated by their separate factor scores. Recall that Category 3 patients were consistently more impaired in speaking, whereas Category 4 patients showed greater impairment in writing and gesturing.

For Categories 1, 3 and 4 the PICA Overall (OA) scores showed an initial increase over the first year, became asymptotic in the second year, and subsequently leveled off or declined in the third and fourth years post onset. Category 5 patients display a PICA OA profile that climbs steadily from the most severe level at 3 months to become the second highest level at 55 months post onset, without a decline.

Each aphasia category studied has a characteristic factor score profile that describes the nature of the aphasia of patients in that category. In Figure 3a the factor score profiles of the 4 categories are shown as they looked at one year post onset. These characteristic profiles are consistent with our description of the categories in our previous study (Hanson, et al., 1982). For example, note Category 3, with poor speech and good gesturing.

Figure 3b shows the profiles at three years post onset. It can be seen that the characteristic patterns of performance have been retained over time, although the levels of severity have shifted and the groups are closer together. These results indicate some stability over time in the patterns of chronic aphasia for different patient categories.

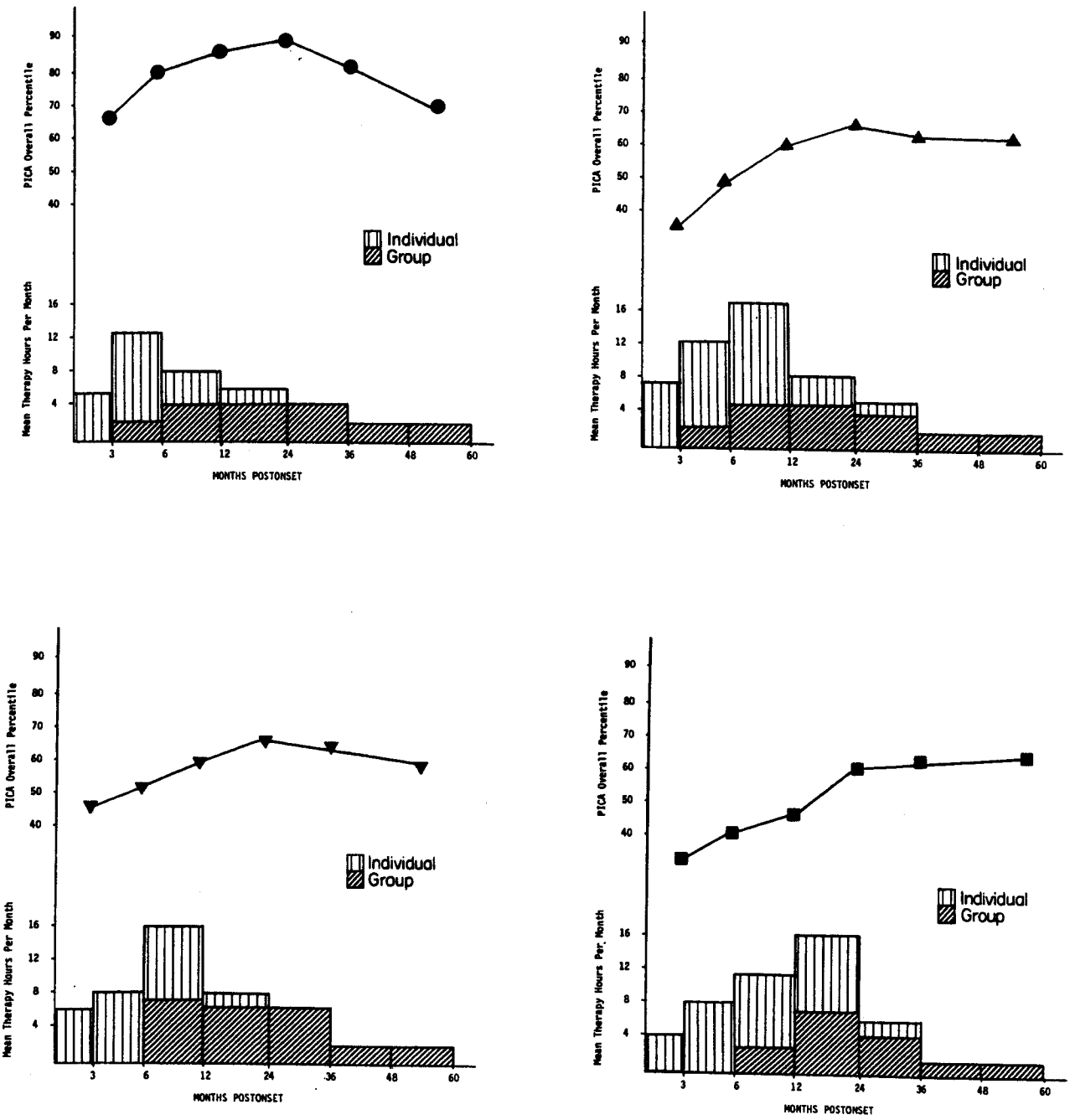


Figure 2. Recovery profile and average amount of treatment per month for patients in Aphasia Category 1 (N=18), Aphasia Category 3 (N=5), Aphasia Category 4 (N=6), and Aphasia Category 5 (N=6).

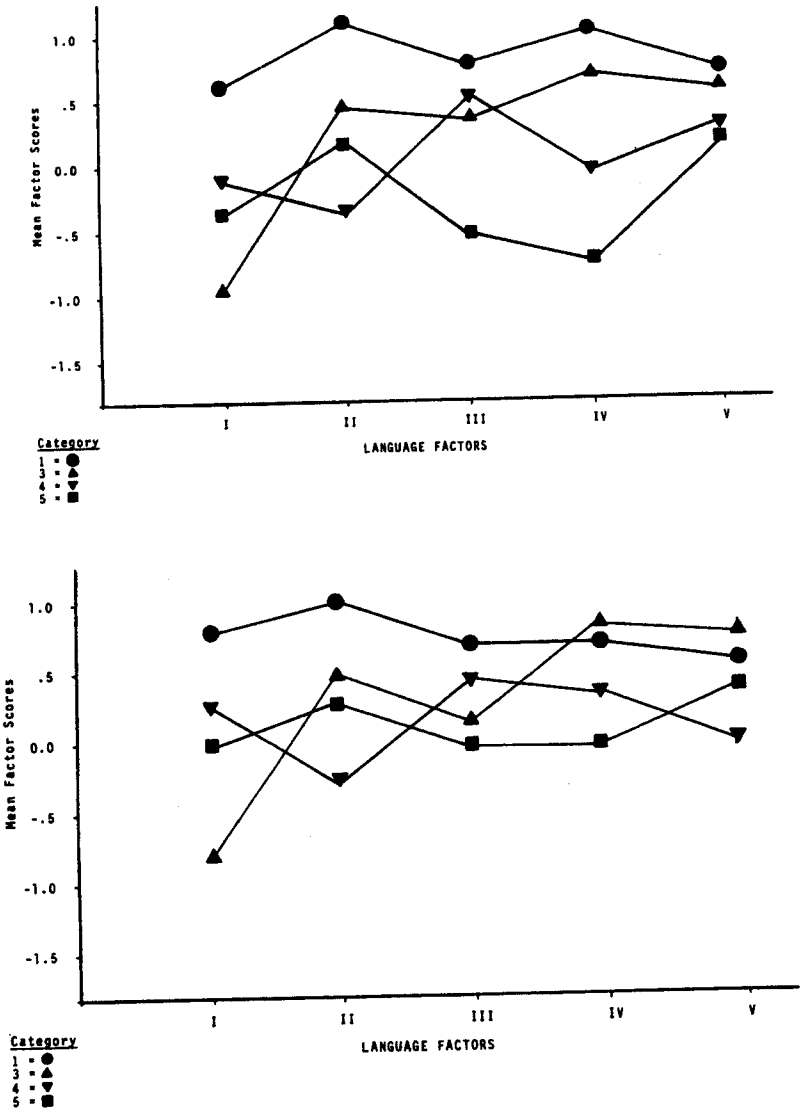


Figure 3. Profiles of mean factor scores (MFS) derived from performances on the PICA at one year (top) and three years (bottom) postonset for Aphasia Categories 1, 3, 4, and 5.

DISCUSSION

A unidimensional severity model of aphasia overlooks the important differences in language performance that may exist between patients. By studying the long term recovery profiles of independent language factors these differences become particularly apparent. For example, the recovery profiles for the Speaking factor (Figure 1a) reveal a group of patients (Category 3) for whom speaking remains nonfunctional for the entire course of their illness. It appears fortuitous that these same patients eventually achieve the highest scores of all patient categories for Gesturing (Figure 1d). This finding seems to provide objective evidence of language reorganization, whereby one language function develops in compensation for the loss of another. The severe loss of speech function for Category 3 patients appears to put them at great disadvantage even though their single overall severity score shows only moderate aphasia and is equivalent to that of many other patients.

When a single score is used as an index of a patient's language ability it is still possible to separate out different patient categories based on overall performance levels. Our overall PICA percentile recovery curves show that patients in Category 1 (Figure 2a) reached the highest level of recovery followed in order by Categories 3, 4 and 5. Interestingly, this order of level of performance had changed to 1, 5, 3, 4 by the final test date. It is apparent from these data that improvement in language skill continued beyond one year post onset for most patients in this study. These results suggest that language therapy for aphasia that is initiated within 3 months post onset may continue to be efficacious well beyond 12 months post onset in some patients. Some combination of both individual and group therapy administered over long periods of time appears to be an appropriate treatment format in aphasia. Of major concern to us, however, are those patients who show signs of deterioration in language performance. Of the total of 35 patients studied, 10 were identified who showed a decline of 11 or more PICA overall percentile points beyond the second year (Figure 4).

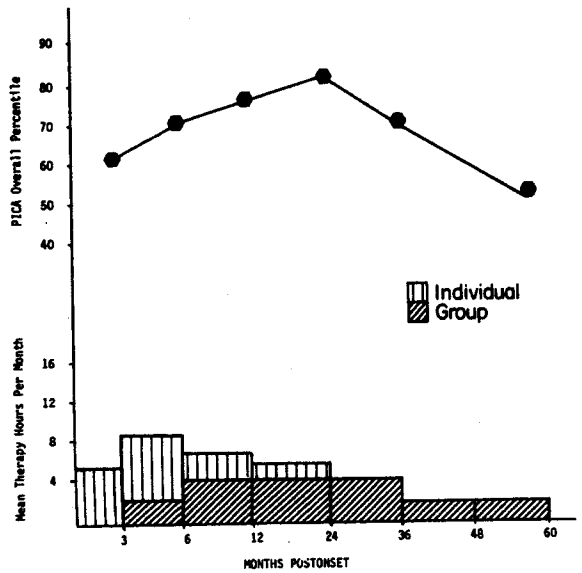


Figure 4. Recovery profile and average amount of treatment per month for patients with deteriorating overall PICA scores (N=10); 8 from Category 1 and one each from Categories 4 and 5.

The PICA overall percentile recovery curve for this subgroup is shown. The precipitous decline in performance between 24 and 55 months postonset is apparent in this figure. The total amount and pattern of treatment after 24 months for this subgroup does not differ from the other patient categories. Descriptive information for patients in this subgroup is presented in Table 2.

Table 2. Patient information for subgroup (N=10) that showed deterioration in language, as measured by PICA overall scores (11 or more precentile points from 24 to 55 months post onset).

Age at Onset		Education (Yrs)		Time From Onset To Initiation of Treatment (Mos)		Treatment Duration (Mos)	
Mean	Range	Mean	Range	Mean	S.D.	Mean	S.D.
60.30	42-73	11.10	8-18	2.30	2.05	25.00	16.51

Comparison of the descriptive data for this subgroup with those for the other patient categories revealed no major discrepancies. A surprising finding was that 8 of the 10 declining patients were in the same group, Category 1. Patients in Category 1 have less severe aphasia than patients in other categories. Also, in a previous investigation (reported to CAC in 1984--(Metter, Hanson, Riege, Kuhl, and Phelps, 1984), we have shown, with PET and CT scans, that Category 1 patients tend to have smaller lesions than patients in other PICA categories. Thus it appears that the language decrements in our present population cannot be associated with larger lesions.

A thorough review of all patient medical records (N=35) by a neurologist and a speech pathologist was conducted. In no instance was a new episode or stroke during the period of study reported for any patient. Of those who declined in language, in only one case was the patient's medical status so unstable as to be considered a possible cause for the reduction in his language scores. In two cases increasing dementia was noted in the medical record and is assumed to have influenced the changes in language. In three patients severe depression was a possible contributor to decline. One depressed patient had experienced the death of his wife in the time period after two years postonset. Chronic alcoholism was also a possible causal factor in the language reduction of one patient. The remaining three patients in this subgroup were all living at home, appeared to be relatively healthy, and showed no obvious reasons for their negative trends in language recovery.

We asked: Could something have been done to prevent the language loss in these patients? We think that at least 3 of the patients, and perhaps more, may have been good candidates for language "tune ups" whereby more intensive short term individual therapy is applied at intervals throughout the course of recovery. It appears that such a treatment format, maintained over a span of many years, may be appropriate for those cases who tend to decline in language skill. For the majority of aphasic patients in this study, language ability was maintained without intensive individual therapy beyond approximately two years postonset. Treatment effectiveness and efficiency are enhanced by periodic reassessment of language ability to determine the level of intervention required for different patients. In this way the expenditure of our limited supply of "silver bullets" can be most judiciously applied in the care of those with aphasia. By preventing language deterioration when

possible, we not only protect our rehabilitation investment but also improve the quality of life for our patients and their families. Health care delivery systems must realize that, in most cases, aphasia is a chronic condition requiring long term monitoring and care. In our study, the presence of some chronic aphasia patients who show continued gains in language over many years is evidence that some persons are amenable to treatment for an extended time following brain injury. Currently the emphasis in aphasia treatment is intense, short term therapy administered as early after onset as possible. We submit that another approach is called for whereby aphasia is managed like the chronic condition it is, more similar to the style of management of heart disease than to that appropriate for broken bones.

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Q: I think it's important to remember that currently a number of us are escaping the limitations of prospective payment by only trying to cut the fat on the inpatient side. But as the system catches up on the outpatient side this type of information will be even more relevant because by being able to predict at the outset what types of patients might need long term association with the therapist we can avoid doing inefficient, unnecessary, expensive treatment initially and save some reimbursement dollars for tuneups later on.

A: Yes, I think we have to come to some agreement here as to how we are going to manage patients and, if we hope to influence health care delivery systems, we must be more assertive. We have to recognize that aphasia in many cases, requires long term monitoring with selective intervention to utilize our resources efficiently.

Q: I have a position in Minnesota as a speech pathology consultant to Medicare and I know that the guidelines that are printed are really quite loose. I am amazed at the power that I've had to determine coverage. One of the things that I have fought for from the beginning (I've been doing this for four years) is that trial treatment is very appropriate for chronic aphasic people and that there should definitely be coverage for it. I've been trying to get that information disseminated across the state. It was something that I fought for and could get. The point is--we do have power. Those guidelines are loose. They're not in concrete, and if you can find out what's happening in your state, you can make some changes.