

RESEARCH SUMMARY

Aphasia overview

Aphasia is an “acquired disorder of previously intact language ability secondary to brain disease.”¹ Aphasia may affect the production of, or comprehension of, speech, as well as the ability to read or write.

According to current accepted estimates, one million people in the United States and an additional one million in the rest of the world have aphasia. Most of these people have acquired aphasia as a result of a stroke, although head injury, brain tumor and other neurological trauma may also result in aphasia.²

Of the approximately half-million stroke victims each year in the US, about 40 % of patients will have some kind of speech and language disorders,³ and, of those, half will have been rendered aphasic.⁴

Other speech disorders, such as dysarthria, arise as a result of stroke and other neurological damage. These are motor speech problems resulting from

damage to cranial nerves or the frontal lobe (motor cortex).

When motor speech disorders causing difficulty with articulation, speech speed and evenness occur concomitant with aphasia after strokes and brain injury, it creates a more complex language problem than aphasia alone.

Most current research has centered on aphasia as the result of stroke because these lesions can be mapped more readily. Disorders such as brain tumors or injuries tend to be less well localized in the brain, with remote pressure effects that are difficult to identify and isolate.⁵

Currently, no steps can be taken to prevent the onset of aphasia following stroke or head injury.⁶

The prevailing thought is that the severity of aphasic condition is determined by the location and size of damaged area in the brain,⁷ so therapies that offset stroke damage may also mitigate the degree of aphasia.

Rapid spontaneous language improvement may be seen in many cases. And it appears that some degree of improvement can continue for a long period.

Problems persist, however, even in patients who recover partial speech. Loss of familiar employment, social isolation, disruption of family roles, and

¹ Kirshner HS. “Introduction to aphasia.” In: *Handbook of Neurological Speech and Language Disorders*. Ed. Howard S. Kirshner. New York Marcel Dekker. 1995.

² *Aphasia Fact Sheet*. National Aphasia Association. <http://www.aphasia.org/NAAfactsheet.html>

³ Gresham GE, Duncan PW, Stason WB, et al. *Post-Stroke Rehabilitation*, Clinical Practice Guideline, No. 16. Rockville, MD: U.S. Department of Health and Human Services, Public Health Service, Agency for Health Care Policy and Research. AHCPR Publication No. 95-0662. May 1995.

⁴ Kirshner, HS. “Introduction to aphasia.” In: *Handbook of Neurological Speech and Language Disorders*. Ed. Howard S. Kirshner. New York Marcel Dekker. 1995.

⁵ Kirshner HS. “Introduction to aphasia.” In: *Handbook of Neurological Speech and Language Disorders*. Ed. Howard S. Kirshner. New York Marcel Dekker. 1995.

⁶ Gonzalez Rothi LJ, Nadeau SE, Ennis MR. “Aphasia treatment: a key issue for research into the twenty-first century.” *Brain and Language*. 71, 78-81 (2000).

⁷ Warburton E, Price CJ, Swinburn K, Wise RSJ. “Mechanisms of recovery from aphasia: evidence from positron emission tomography studies.” *J Neurol Neurosurg Psychiatry*. 1999; 66:155-161.

depression create enormous barriers to adequate recovery

In addition, there may be specific neurobehavioral correlates that can occur with aphasia, corresponding to lesion location.⁸ Not all patients will develop severe emotional reactions following stroke, however, the presence of neuropsychiatric difficulties will impact treatment efficacy and can delay or prevent recovery.

Depression is the most common mood disorder observed after stroke. Some researchers report finding clinically significant depression in up to 50 % of patients after acute stroke.

“Much work remains in the development of a comprehensive understanding of the neurobiological basis of neuropsychiatric syndromes associated with local brain injury.”⁹

Recovery

There is no way to predict the outcome of post-stroke aphasia for an individual. A number of factors may come into play:

“Unique patterns of individual emotional and psychosocial adjustment were found even in patients with similar aphasia type and severity.”¹⁰

“Other factors, concerning imprecise variables such as level of

motivation, pre-traumatic response to challenge, and other personality factors, probably also modulate the effects of treatment for aphasia...no clear answer is available as to precisely which patient characteristics are consistently associated with failure.”¹¹

Although the effect of stress on stroke recovery isn't widely discussed per se in the aphasia literature, it is important to note that long term stress has deleterious effects on the brain and body.

Robert M. Sapolsky, Ph.D., professor of neuroscience at Stanford University, notes that, “Westernized humans...are likely, to an unprecedented extent, to be made seriously ill by a stress-related disease.”¹²

He reports that recent evidence demonstrates how prolonged stress damages the nervous system.

Glucocorticoids that are released by the body as a result of stress reactions are neurotoxic and may accelerate the rate of neuron loss, resulting in memory degradation. Glucocorticoids can also interfere with the ability of certain neurons important to memory function to survive strokes, seizures or certain infections.

And to add to the difficulty of endogenous stress, synthetic glucocorticoids such as prednisone or dexamethasone are often given to stroke victims, with the belief that their action will reduce edema. Unfortunately, post-stroke edema, unlike edema due to a brain tumor, is resistant to the action of these

⁸ Helm-Estabrooks N and Albert ML. *Manual of Aphasia Therapy*. Austin: Pro-Ed. 1991.

⁹ Craig AH and Cummings JL. “Neuropsychiatric aspects of aphasia.” In: *Handbook of Neurological Speech and Language Disorders*. Ed. Howard S. Kirshner. New York Marcel Dekker. 1995.

¹⁰ Helmsley G, Code C. Abstract: “Interactions between recovery in aphasia, emotional and psychosocial factors in subjects with aphasia, their significant others and speech pathologists.” *Disability and Rehabilitation*. 18 (11): 567-584.

¹¹ Holland AL, Beeson PM. “Aphasia therapy.” In: *Handbook of Neurological Speech and Language Disorders*. Ed. Howard S. Kirshner. New York Marcel Dekker. 1995.

¹² Margolis D. “Neuroscience 2000: a new era of discovery.” *Annals of Internal Medicine*. 1999; 131: 318-320.

steroids. But the brain is not resistant to the neurotoxicity of the synthetic glucocorticoids either!¹³

This could have less than happy consequences on the memory and cognition of stroke patients.

In addition, chronic stress, even a low levels, can contribute to depression, lack of attention, lowered immunity to disease, increased difficulty handling pain, as well as decreased ability to cope with day to day life.

Damage from strokes in an already stressed person cannot be readily measured. Research on chronic conditions which are rooted in disturbances of the neuroendocrine systems (as a result of stress) are only now being examined with brain imaging.

The loss of speech can itself be considered a major stressor. Since strokes are likely to create a variety of other physical challenges leading to stress reactions, it is likely that one of the reasons individuals with similar kinds of lesions nonetheless do not progress equally well has to do with the pre-stroke health of the brain and neuroendocrine system.

Some researchers in the field of cognitive neurology have suggested that attention and similar deficits may account for some of the difficulty regaining speech functions after a stroke.

“Indirect evidence exists that attempts to treat attentional dysfunction in individuals with aphasia may ameliorate the language disorder; and experimental

¹³ Sapolsky RM. *Why Zebras Don't Get Ulcers: An Updated Guide to Stress-Related Diseases, and Coping*. 1998. New York: W.H. Freeman and Company.

studies are just beginning to test this hypothesis.”^{14, 15}

Who speaks for the voiceless?

Seventy of those with aphasia surveyed felt that people avoided contact with them because of difficulty with communication.

The National Aphasia Association reports that the general public knows little about aphasia.¹⁶ Aphasia is not only invisible, it is silent.

Ninety percent of those with aphasia surveyed by the NAA felt that the public's awareness of this disability is minimal.

Further, NAA reports:

- although people with aphasia are likely to be elderly, aphasia can occur in all age groups
- people with aphasia come from all races, educational and socio-economic groups
- 70 % of those with aphasia surveyed felt that people avoided contact with

¹⁴ Albert, ML. “Treatment of aphasia.” *Archives of Neurology* 1998; 55:1417-1419.

¹⁵ Petry MC, Crosson B, Gonzalez RLJ et al. Abstract: “Selective attention and aphasia in adults: preliminary findings.” *Neuropsychologia*. 1994; Nov 32 (11): 1387-1408.

¹⁶ *Impact of Aphasia on Patients and Family. Results of a Needs Survey*. National Aphasia Association. <http://www.aphasia.org/NAAImpact.html>

them because of difficulty with communication

- 60 % of those with aphasia surveyed indicated that more information about aphasia was needed, both for the public and themselves; they also felt that healthcare professionals needed to be better informed about resources for people with aphasia and their families.

Loss of, or profound changes in, the ability to communicate challenges the inner resources of the patient with aphasia or motor speech difficulties, as well as disrupting his or her family, work, and social environment.

Aphasia therapy

We now understand that social isolation affects health in a number of ways. Not only does loneliness and isolation increase certain unhealthy behaviors like overeating, smoking and drinking, “*they increase the likelihood of disease and premature death from all causes by 200 to 500 percent, independent of [self-destructive] behaviors...*”¹⁷

Restoring a patient’s communication to his or her desired level is not a luxury!

It is important to consider that loss of language may impact the overall physical health of individuals by downgrading their quality of life, making them more likely to develop chronic, stress-related illnesses, as well as

distancing them from family and community.

This represents a cost not only in the quality of individual human life, but in medical and social resources, including long-term care expenses, costs of assistive therapies, and disability payments.

Views on the value of interventions for language disorders have fluctuated in the last half century. Some researchers insist that spontaneous recovery accounts for improvement. Others have seen significant improvements when evaluating pre- and post-therapy language skills.

Although this statement is from Italy, it is nonetheless a good statement of the issues plaguing aphasia therapy in the U.S. and elsewhere:¹⁸

“Over the last years there have been important developments in the treatment of aphasia. Contributions from Europe, America and Australia covering cognitive, linguistic and social aspects of the aphasia therapy, carry out a well articulated theoretical framework for a variety of approaches and research to support the claim that aphasia therapy works.”

“Eight different schools of aphasia therapy have been defined and described in literature (behavioral, cognitive, neuropsychological, pragmatic, etc.) with common assumptions about the process of therapy and the nature of aphasia. In spite of the wide spectrum of theoretical perspectives related to aphasia therapy, at the present, the common idea among therapists and researchers is to address attention to the individual needs and social problems of the aphasic persons.

¹⁷ Ornish, Dean, *Love and Survival*. New York: HarperPerennial. 1998.

¹⁸ *Aphasia Forum*.
<http://www.aphasiaforum.com/engl.htm>

In this recent view, aphasia is not only a deficit of speech language, but a disorder of the communication in all its modalities. In this way the aim of aphasia therapy is not to re-learn specific damaged skills, but to increase the use of all other potential means of communication to support and compensate impaired language.

In Italy the study of language disability has been neglected and the therapy has been undervalued respect to the diagnosis. In Italy, aphasics benefit from intervention of National Health Service's speech therapists. **They offer a 'traditional' treatment, based usually on unselected 'stimulation' or many personal therapeutic approaches.**

Italian speech therapists take care of aphasic people alone, without possibility to discuss their professional choices with other members of the rehabilitation team. There are many reasons to explain this situation: big cultural distances among rehabilitation members, lack of contact between neuropsychological researchers and local operators.”

The question of aphasia therapy efficacy lingers. Although many aphasia researchers (and, of course, speech and language pathologists) staunchly support therapeutic intervention, there is no question that clear evidence derived from randomized controlled trials (RCT) is lacking.¹⁹

The Cochrane Library reported a major survey of the speech and language rehabilitation literature (the “black box”

of rehabilitation²⁰) current through July 1999. They reviewed decades of journal articles and isolated 60 studies that met certain experimental criteria and examined these in detail. Only 12 of the 60 were even suitable for their review. And of these, most were “old with poor or unassessable methodological quality.”

Their review of speech and language therapy after stroke stated:

“It is...important to determine whether formal speech and language therapy is effective in treating people with aphasia, or whether any improvement would be as great or greater when left untreated or treated informally by an unqualified person or friend/family member. If speech and language therapy is effective, it would also be important to identify the optimal approaches to treatment.”

“The main conclusion of this review is that speech and language therapy treatment for people with aphasia after a stroke has not been shown either to be clearly effective or clearly ineffective within a RCT. Decisions about the management of patients must therefore be based on other forms of evidence. Further research is required to find out if effectiveness of speech and language therapy for aphasic patients is effective (sic). If researchers choose to do a trial, this must be large enough to have adequate statistical power, and be clearly reported.”

¹⁹ Greener J, Enderby P, Whurr R. *Speech and language therapy for aphasia following stroke* (Cochrane Review). In: The Cochrane Library, Issue 4, 2000. Oxford: Update Software.

²⁰ Azouvi P, Denys P, Bussel B. Abstract: “Validation of procedures of rehabilitation after cerebrovascular accident.” *Rev Neurol (Paris)*. 1999; 155 (9): 737-742.

A foremost researcher on aphasia says: ²¹

“One reason, I suspect, that many neurologists have been skeptical about the value of aphasia therapy was the relative dearth of statistically valid and reliable studies documenting the benefit of aphasia therapy over spontaneous recovery. Research over the last 10 years has changed that picture.

In a meticulously detailed study on the efficacy of treatment for individuals with aphasia, Robey ²² carried out a meta-analysis of 21 studies that provided sufficient information for inclusion.....

The effect of treatment beginning in the acute stage of recovery was nearly twice as large as spontaneous recovery alone, while treatment initiated after the acute period achieved a smaller, but nevertheless appreciable, effect....

Holland and colleagues ²³noted that nearly 200 studies pertaining to aphasia treatment have been published in the English language alone....Holland et al conclude that individuals with aphasia meeting certain specific selection criteria who are treated improve more than those who do not receive treatment. Improvement was documented in both the quantity and quality of language.”

What is good enough?

“How are therapeutic goals for aphasia treatment too modest?”

An accurate diagnosis of aphasia demands a multi-disciplinary approach. The neurologic examination combined with neurodiagnostic techniques, such as CT or PET scans, and MRIs, provides the basis for establishing a treatment program which may be carried out in conjunction with speech and language professionals, physical rehabilitation specialists, cognitive neuropsychologists, nurses, occupational therapists, social workers and psychologists.

The diagnosis and treatment of aphasia necessitates an understanding of the patient’s medical, neurological, and psychological status.

Clinicians must be aware of the possibility that factors other than aphasia might be interfering with recovery of function. ²⁴

Assessment ranges from the “bedside language examination,” ²⁵ nonstandard and qualitative, to a battery of standardized language tests (for example, the Boston Aphasic Examination and the Western Aphasia Battery) to isolate the nature of the pathology.

Tests are administered throughout the course of therapies conducted by speech and language pathologists.

Even as a variety of tests have been developed over the years, some

²¹ Albert, ML. “Treatment of aphasia.” *Archives of Neurology* 1998; 55:1417-1419.

²² Robey R. “The efficacy of treatment for aphasic persons: a meta-analysis.” *Brain and Language*. 1994; 47:582-608.

²³ Holland A, Fromm D, DeRuyter F, Stein M. “Treatment efficacy: aphasia.” *Journal of Speech and Hearing Research*. 1996; 39: S27-S36.

²⁴ Helm-Estabrooks N and Albert ML. *Manual of Aphasia Therapy*. Austin: Pro-Ed. 1991.

²⁵ Kirshner, HS. “Introduction to aphasia.” In: *Handbook of Neurological Speech and Language Disorders*. Ed. Howard S. Kirshner. New York: Marcel Dekker. 1995.

researchers are questioning whether they actually provide “culturally appropriate measures for aphasia.”²⁶ Being unable to diagnose aphasia accurately impacts the efficacy of treatment.

The problem of applying research results from languages other than English has also attracted attention (International Aphasia Project):

“Researchers at the Center for Research in Language at the University of California-San Diego and other colleagues are conducting an international research project on aphasia to study the effects of unilateral brain injury (usually due to strokes) on language and communication abilities. The research is being conducted in seven different languages at the present time.

Since so much research on aphasia has been carried out in English, it is difficult to separate universal mechanisms (discoveries that ought to hold for every language in the world) from language-specific content (results that are only true for native speakers of English).

By doing crosslinguistic comparisons, they allow us to disentangle these differences while we address one of the most important issues in cognitive neurobiology, the issue of behavioral and neural plasticity: How many different forms can the language processor take under a range of normal and abnormal conditions? The focus is on patients with forms of aphasia that are known to affect the processing of words and grammar

(Broca’s, Wernicke’s aphasia and variation of anomia).”²⁷

Although the aphasia does demand the intervention of multiple specialists, both in research and treatment, for many patients the ideal of the interdisciplinary team may not be a reality except in major research hospitals or clinics that specialize in post-stroke rehabilitation.

After a stroke the patient may be referred to several rehabilitation specialists without any one in particular overseeing his or her recovery. The family doctor may get reports, the neurosurgeon almost certainly steps back once surgical issues have been resolved, and the neurologist may not remain in active (interactive) contact with the patient during the long process of rehabilitation.

A survey conducted at the Royal Free London Hospital²⁸ in the UK (the results would probably be similar in the U.S.) examined how health care professionals regarded their work with stroke patients. The observations from the study point to the inherent difficulty of treating the whole patient in a fragmented, time and resource limited health care system.

- occupational therapists reported that they theoretically had lots to contribute but the lack of resources and staff shortages prevented them from fulfilling their potential

²⁶ Wertz RT, Chapman SB, Ulatowska HK. *Cultural Influence on Aphasia in African-Americans*. Research is ongoing. Audiology and Speech Pathology, VA Medical Center, Nashville TN and University of Texas-Dallas, Dallas TX.

²⁷ Center for Research in Language (UC-San Diego). <http://crl.ucsd.edu/aphasia/>

²⁸ Pound P, Ebrahim S. Abstract: “Redefining ‘doing something:’ health professionals’ views on their role in the care of stroke patients.” *Physiother Res International*. 1997; 2(2): 12-28.

- nurses and physiotherapists reported they had much to offer and many rewards to gain from their work
- speech therapists reported scarce resources, lack of recognition of their specialty, but felt they contributed to patients' quality of life
- psychologists reported their work to be satisfying and stimulating
- doctors felt they had little to offer and little to gain from working with people with stroke.

A study of speech therapists in Scotland revealed that they had concerns about the effectiveness of their treatments and about other factors that might influence therapy effectiveness.²⁹

If a therapist has doubts about treatment efficacy, how will that impact the outcome?

Research on placebo effects and health care professional's attitudes in pain management raises some significant issues that are worth considering.

In some ways, handling patients with chronic pain conditions and those with aphasia present similar kinds of challenges: there is no accurate gauge for how much pain a person is experiencing nor is there an accurate gauge of how much actual language function remains after a stroke nor how capable of rebuilding language function an individual is (taking into account all the factors influencing recovery, as discussed earlier.)

²⁹ Greener J, Grant A. Abstract: "Beliefs about effectiveness of treatment for aphasia after stroke." *Int J Lang Commun Disord.* 1998; 33 Suppl. 162-3.

How and why some patients learn to handle chronic pain is as difficult to quantify as how and why some patients can regain their use of language.

No one can say, "Based on such and such a test, you ought to be pain-free or chattering like a magpie."

The effect of intangibles cannot be underestimated on the outcome of therapy, especially therapies administered with a great deal of person-to-person contact.

"The provider's warmth, friendliness, interest, sympathy, empathy prestige, and positive attitude toward the patient and toward the treatment are associated with positive effects of placebos as well as of active treatments."³⁰

The lack of results, or results that do not satisfy the patient's own important, internal measure of 'success' leads to an enormous amount of frustration for all concerned.

When expectations are unclear and a health care provider appears dubious or lacks confidence, this has a negative affect on outcomes in pain treatment.

If speech and language pathologists as well as doctors are not completely engaged in the notion that rehabilitation is valuable and that they have a genuine helpful role to play, it could certainly undermine treatment interventions.

Aphasia therapy generally concentrates on improving com-

³⁰ Turner JA, Deyo RA, Loeser JD, et al. "The importance of placebo effects in pain treatment and research." Grant HS 06344 from the Agency for Health Care Policy and Research and the Health Services Research and Development Field Program, Seattle WA VA Medical Center. <http://www.muhealth.org/~shrp/ptwww/courses/assign/turner.html>.

munication. It has not yet set the goal of “curing” patients. Patient and family expectations usually mirror the expectations of those providing expert medical advice. As in many other catastrophic illnesses, only a small percentage of families will seek the top specialists in the field. This is partially due to limited financial resources, but also because if your expert has low expectations, it may seem futile to look elsewhere.

For areas in which research is rapidly changing what specialists know, it can be almost impossible for the specialist, much less the layperson, to keep up. So if a patient is told he or she will regain only limited use of the voice or of language skills, that is, sadly, accepted as true.

In some cases, regaining speech may not be possible. Other methods of communication can be introduced. For some patients, the ability to point to pictures may enable them to communicate basic needs.

Assistive technologies such as software with exercises for speech practice are becoming more widely available for the home computer as well as in therapeutic settings. Their value is still questioned.³¹

If patients and their families set a goal to use assistive technologies in order to maximize communication, progress can be made toward basic communication.

For most patients and families, however, settling for an abbreviated form of verbal interaction is far from satisfactory.

³¹ Ruiz A. “Aphasia treatment: on drugs, machines, and therapies: what will the future be?” *Brain and Language*. 71, 200-203 (2000).

Steven Small³² asks a significant question, “How are therapeutic goals for aphasia treatment too modest?”

He continues:

“The best of modern aphasia treatments try to make small restorative or compensatory changes in language behavior, without ever aspiring actually to *cure* aphasia. The main reason that we limit our aspirations in this way is that it has been inconceivable to make more than modest gains in linguistic or communicative performance after large left hemispheric infarcts. So, while aphasia treatment helps, it does not do enough, and its aspirations are generally too modest for families and patients, and the rapidity and extent of gains from existing approaches keep patients frustrated and disappointed.”

What do we know?

Aphasia therapy remains a difficult challenge even with the marvelous insights provided by functional magnetic resonance imaging (fMRI), x-ray computed tomography (CT), and positron tomography (PET.)

Brain imaging studies have demonstrated the importance of brain regions other than the ‘classical’ language cortex in both normal language and aphasia.

“Language requires the interaction of a number of highly integrated systems of the brain...subcortical and prefrontal areas associated with various aspects of arousal, attention, and sequenced planning

³² Small S. “The future of aphasia treatment.” *Brain and Language*. 71: 227-232 (2000).

of response seem particularly important in language and speech.”³³

A hint of the difficulties and sources of frustration for patient and therapist alike because of the fragmented knowledge about aphasia can be found in the *Manual for Aphasia Therapy*.³⁴

“It is the clinician’s duty to discover the best way to help an aphasic patient. If a patient does not respond to a particular treatment program, other methods must be explored. If all best attempts to treat the patient fail, then the clinician must explore ways in which communicative factors external to the patient can be manipulated. Aphasic patients who seek our help do not fail us, but we sometimes fail them because our methods for treating brain damage are limited.”

Speech and language pathologists have a variety of exercises and techniques at their disposal. For patients struggling to put their communication skills back together, it may seem as if they are participating in a seemingly random and often simplistic series of tasks.

As with other kinds of medical intervention, the patient’s need to understand why and what the therapies are is often overlooked. The current atmosphere of cost-cutting in medicine contributes to the sense of frustration felt by patients and their families.

For many years, aphasia therapies were based on early neuroanatomic concepts developed in the 19th century.

“This part of the brain does that,” in other words.

Our understanding of the brain and of language has led to a less structure-driven approach.

Both hemispheres of the brain do contribute to language function. Although the left-hemisphere seems to be the primary regulator of language, researchers now recognize that the right-hemisphere also contributes to language production.

The brains of some patients have demonstrated surprising plasticity in language recovery after strokes (which is the good news) but seem to involve a variety of neural mechanisms which have yet to be clearly identified (which is the bad news.)³⁵ Reorganization of the speech networks many possibly occur for more than one year after the stroke.³⁶

However, “...results stress the inferior role of the right hemisphere language-related network for recovery from post-stroke aphasia; i.e., it contributes to improvement to some extent, if the more important left hemispheric areas are destroyed....”³⁷

We are still learning about the brain mechanisms for human language, considered the most complex of human cognitive functions. Language uses a large amount of the cerebral cortex, but does

³³ Metter EJ. “PET in aphasia and language.” In: *Handbook of Neurological Speech and Language Disorders*. Ed. Howard S. Kirshner. New York Marcel Dekker. 1995.

³⁴ Helm-Estabrooks Nand Albert ML. *Manual of Aphasia Therapy*. Austin: Pro-Ed. 1991.

³⁵ Thompson CK. “Neuroplasticity: evidence from aphasia.” *Communication Disorders*. 33 (2000), 357 - 366.

³⁶ Karbe HS. “Brain repairs, reorganizes itself to regain speech after stroke.” Presented at the Academy of Neurology Annual Meeting, April 1998. <http://www.plsgroup.com/dg/6FCOA.htm>

³⁷ Heiss WD, Kessler J, Thiel A, Ghaemi M, Karbe H. “Differential capacity of left and right hemispheric areas for compensation of poststroke aphasia.” *Annals of Neurology*. 1999; 45: 430-438.

not map directly to regions in a straightforward fashion.

Brain imaging now points to three neural correlates of language: widely distributed; regional; and highly localized.³⁸

Thus we know that language is not confined to one or two discrete areas but aren't yet able to capitalize on this knowledge.

As imaging techniques continue to improve, the diagnostic and treatment value of brain imaging will certainly increase the chances of reasonable recovery of language after strokes. At the moment, however, it is not clear exactly what we need to know from imaging studies that would improve the outcome of speech and language, or even pharmacotherapeutic interventions.

An additional challenge is the question of how available brain imaging would be for the average patient. Until there is a clear connection demonstrated for how the results of brain imaging could enhance aphasia therapy, it is unlikely that insurance companies or Medicare would reimburse for functional MRI's or other scans.

Summary of current treatment approaches for aphasia

"Until World War I, the majority of techniques used in aphasia rehabilitation were 'borrowed' from the field of childhood education. The years following

³⁸ Helm-Estabrooks N and Albert ML. *Manual of Aphasia Therapy*. Austin: Pro-Ed. 1991.

World War I witnessed an increase in aphasia treatment studies because of the large numbers of patients with penetration cranial injuries returning from the war."³⁹

Research in the past fifteen years has largely focused on resolving the question of whether therapy can produce measurable gains over that observed in spontaneous language recovery.

"Although different aphasia therapies are usually considered to be either effective or ineffective in particular settings, they have not generally been thought of as having the potential for harm. Thus, it is perfectly reasonable to try one approach, and if it doesn't work, to try another, without ever facing a risk of detriment to the patient (other than prolonging recovery.) This may not be correct. If aphasia treatments have the potential to change the brain, then they have the potential to change it both for better or for worse."⁴⁰

Stimulus-response approach (most common)

"First the aphasic deficit is identified and, then, repetitive drill through several modalities (e.g., reading or repetition) is encouraged. An endless array of sophisticated modifications of this traditional approach has been developed."⁴¹

A promising modification of the stimulus-response model is Melodic Intonation Therapy. "Based on the assumption that the stress, intonation, and melodic patterns of language output are

³⁹ Gonzalez Rothi LJ, Nadeau SE, Ennis MR. "Aphasia treatment: a key issue for research into the twenty-first century." *Brain and Language*. 71, 78-81 (2000).

⁴⁰ Small S. "The future of aphasia treatment." *Brain and Language*. 71: 227-232 (2000).

⁴¹ Albert, ML. "Treatment of aphasia." *Archives of Neurology* 1998; 55:1417-1419.

controlled by the right hemisphere and, thus, are available for use in the individual with left hemisphere damage.”⁴²

MIT “is a hierarchically structured program that is divided into three levels....multisyllabic words and short, high-probability phrases are musically intoned....then, longer more phonologically complex sentences are intoned ...and finally spoken normally.”⁴³

Not all patients are suitable candidates for MIT.

The drill basis for speech therapy is widely used. Doubtless, even with newer therapies, it will be found that repetition of some kind will continue to be important component of therapy.

Psycholinguistic approach

Combining both the psychologist’s and linguist’s approaches to the study of language as it is learned and used by people, psycholinguistics has proven more helpful with anomia and agrammaticism than aphasia.

Psycholinguists “ask questions about what information is in the ‘mental dictionary’ and how it is organized so it can be accessed in ‘real time’ (i.e., while we are listening or speaking), and used to assemble multi-word phrases and sentence structure into coherent discourse.”⁴⁴

“The premise underlying this approach is that a specific aphasic sign of symptom may be the surface clinical manifestation of different underlying deficits in within the cognitive structure of language. Only by uncovering the precise

underlying psycholinguistic deficit can therapy be properly targeted.”⁴⁵

Cognitive neurorehabilitation

Treating neurobehavioral deficits such as inattention and memory loss is at the core of cognitive neurorehabilitation.

Some researchers are finding that treating perseveration or attentional dysfunctions can help improve language function.⁴⁶

The neuropsychological exam can uncover many problems with cognition: such as level of self-awareness; attention/concentration difficulties; visual and perceptual abilities; memory and learning abilities; planning and organizing abilities; and perseveration.⁴⁷

Each of these deficits may require a different set of tasks or exercises, which cognitive neuroscientists are developing.

Brain imaging studies support the involvement of “subcortical and pre-frontal areas associated with various aspects of arousal, attention, and sequenced planning of response seem particularly important in language and speech.”⁴⁸

Computer aided therapy

“Technology has also entered the scenario of aphasia therapy, with computers and mechanical devices that can potentially help aphasic persons to communicate more efficiently. The

⁴² Albert, ML. “Treatment of aphasia.” *Archives of Neurology* 1998; 55:1417-1419.

⁴³ Helm-Estabrooks N and Albert ML. *Manual of Aphasia Therapy*. Austin: Pro-Ed. 1991.

⁴⁴ Garrett MF.

<http://w3.arizona.edu/~psych/facsfls/gmri.html>

⁴⁵ Albert, ML. “Treatment of aphasia.” *Archives of Neurology* 1998; 55:1417-1419.

⁴⁶ Albert, ML. “Treatment of aphasia.” *Archives of Neurology* 1998; 55:1417-1419.

⁴⁷ Helm-Estabrooks N and Albert ML. *Manual of Aphasia Therapy*. Austin: Pro-Ed. 1991.

⁴⁸ Metter EJ. “PET in aphasia and language.” In: *Handbook of Neurological Speech and Language Disorders*. Ed. Howard S. Kirshner. New York Marcel Dekker. 1995.

development of various programs for computerized language training opened new expectation on aphasia treatment. These programs were considered either as a way for improving cost effectiveness in aphasia treatment, or as a potential tool for developing new therapeutic approaches.

Despite the initial enthusiasm, most programs consist of repetitive drills with lack of flexibility and proved to be no good substitutes for a trained speech pathologist...Hopes for the future lay on an increasingly thoughtful use of technology.”⁴⁹

The use of computers for some patients with severe aphasia can be almost life-saving. Icons, pictures and even simple words are represented on a screen and patients learn to point or manipulate them in order to express basic concepts.⁵⁰

Treating the whole patient

Dr. Martha T. Sarno was one of the early pioneers in recognizing the loss of language had vast implications on the individual and his or her community. One of the methods for dealing with the various social and community issues, as well as individual and family difficulties, was to encourage the formation of aphasia support groups.

Group treatment for patients with aphasia has a great deal of support. There are community based groups. Major research centers for aphasia have support

groups associated with them, as do many out-patient clinics. Most universities with speech and language pathology graduate programs also have communication disorder clinics associated with them which may include aphasia support groups.

The idea is to help aphasics recover functional communication using all available techniques in a comprehensive manner.

As with other groups recovering from major illness or disability, groups can form a powerful social support network as well as opportunity to practice skills and share knowledge.

The Dalhousie School of Human Communication Disorders in Halifax, Nova Scotia has an intensive residential rehabilitation effort. This service, which is unique in Canada, is based on two main principles: research in aphasia has indicated that improved communication skills can be best facilitated through intensive treatment; and, communication does not occur in isolation, therefore partners must be actively involved in any communication intervention program.

The National Aphasia Association founded in 1987 is the first national association in the United States to focus on the person with aphasia and his or her family.

Aphasia support groups are now found in almost state in the US.⁵¹ The NAA lists the groups on its web site and points out: that the list “represents a wide variety of group types and structures. Some consist only of persons with aphasia and their significant others and some are

⁴⁹ Ruiz A. “Aphasia treatment: on drugs, machines, and therapies: what will the future be?” *Brain and Language*. 71, 200-203 (2000).

⁵⁰ Albert, ML. “Treatment of aphasia.” *Archives of Neurology* 1998; 55:1417-1419.

⁵¹ *Aphasia Community*. National Aphasia Association.
<http://www.aphasia.org/NAAcommunity.html>

more inclusive. Some are free and some are not.”

Pharmacotherapy

The use of drugs in stroke has been largely limited either to stroke preventative measures or acute post-stroke therapies administered to reduce damage.

Using adjunct drug therapies to improve communication has a sound theoretical basis, but the experimental evidence of real benefit remains unconvincing to some researchers.

“Pharmacotherapy has not yet fulfilled its promise, despite many decades of effort.”⁵²

The drugs are utilized in conjunction with speech therapy and some promising work is being done in Germany with piracetam to facilitate rehabilitation of post-stroke aphasic patients.⁵³ Other drugs that have been tried include bromocriptine^{54, 55} which was found helpful in high doses. Vasopressin used in Russia resulted in improvement in speech in 79% of cases.⁵⁶ Other promising work

has been done using amphetamines⁵⁷ and agents that influence specific neurotransmitter systems.⁵⁸

“Selected linguistic capacities, including verbal fluency and verbal memory, appear to be influenced by specific neurotransmitter systems...At this moment, we are aware of no neurochemical agent that has yet been rigorously proven to ameliorate specific language signs or symptoms...The purpose of pharmacotherapy would not be to replace traditional language therapy.”⁵⁹

Future directions of therapy

- “Further development of mechanisms to promote neural plasticity in adult humans;” and further development of behavioral techniques that optimize the re-laying of new neural networks within a more plastic cerebrum.⁶⁰
- “Information gained from functional neuroimaging, in combination with behavioral assessment, could direct the therapist to target relatively left or right hemisphere language processes

⁵² Small S. “The future of aphasia treatment.” *Brain and Language*. 71: 227-232 (2000).

⁵³ Kessler J, Thiel A, Karbe H, Heiss WD. “Piracetam improves activated blood flow and facilitates rehabilitation of poststroke aphasic patients.” *Stroke*. 2000; 31: 2112-2116.

⁵⁴ Gold M, VanDam D, Silliman ER. “An open-label trial of bromocriptine in nonfluent aphasia: a qualitative analysis of word storage and retrieval.” *Brain and Language*. 74, 141-156 (2000.)

⁵⁵ Bragoni A, Altieri M, Di Piero V, Padovani A, et al. Abstract: “Bromocriptine and speech therapy in non-fluent aphasia after stroke.” *Neurolog Sci*. 2000; 21 (1); 19-22.

⁵⁶ Belokoskova SG, Dorofeeva SA, Klemen'ev BI, Ba'unov OA. Abstract: “The clinical evaluation of vasopressin in the treatment of aphasias.” *Zh Nevrol Psikhiatr Im SS Korsakova*. 1998; 98 (7): 25-8.

⁵⁷ Batson-Walker D. “Use of pharmacotherapy in the treatment of aphasia.” *Brain and Language*. 71, 252-254 (2000.)

⁵⁸ Hughes JD, Jacobs DH, Heilman KM. “Neuropharmacology and linguistic neuroplasticity.” *Brain and Language*. 71, 96-101 (2000.)

⁵⁹ Mimura M, Albet ML, McNamara P. “Toward a pharmacotherapy for aphasia.” In: *Handbook of Neurological Speech and Language Disorders*. Ed. Howard S. Kirshner. New York Marcel Dekker. 1995.

⁶⁰ Gonzalez Rothi LJ, Nadeau SE, Ennis MR. “Aphasia treatment: a key issue for research into the twenty-first century.” *Brain and Language*. 71, 78-81 (2000).

for treatment in a particular individual.”⁶¹

- “Refinement of cognitive processing models so that they more closely approximate real brain mechanisms...envison candidate treatment approaches specified for a patient might be tested in simulation.”⁶²
- “Use novel biological therapies, including stem cell infusion, neuronal transplantation, and pharmacotherapy to make the brain more amenable to dramatic change in function... This will put new responsibilities on therapists, requiring a shift from ‘effective therapy’ (by comparison with no therapy) to ‘beneficial therapies’ to achieve certain particular biological and behavioral goals.”⁶³
- Increased understanding of role of specific neuro-transmitters; defining optimal amount of drug treatment and timing effects on the recovery process...based on the increasing body of literature exploring the use of pharmacotherapy in aphasia therapy.⁶⁴

About dysarthria

The dysarthrias are a group of diverse, chronic motor speech disorders in which patients are unable to speak with normal muscular speed, strength, pre-

cision, or timing. Dysarthria is a frequent symptom found in conditions such as Parkinson’s disease, cerebral palsy, amyotrophic lateral sclerosis, as well as being a complication of stroke.

The location of the lesion or damage corresponds to a specific pattern of abnormal speech. The Mayo Clinic developed a classification system for six groups of dysarthria.

The type of dysarthria determines the treatment.

“Speech scientists have argued that the instrumental assessment of speech physiology provides more accurate and comprehensive information in neurological cases than do clinical speech tests....(researchers have described) a sophisticated instrumental model for assessment of the dysarthric speaker. However, such a well-equipped speech laboratory is not available to many speech pathologists in the field...it appears that a combination of perceptual measures, nonspeech maneuvers, and instrumental measures provides the most reliable and valid assessment of dysarthria.”⁶⁵

In the treatment of dysarthrias, “the roles played by speech-language pathologists include participation in differential diagnosis, provision of speech treatment, staging of treatment, and timely education so that clients and families can make informed decisions about communication alternatives.”⁶⁶

⁶¹ Beeson PM, Rapcsak SZ. “Toward a theory of aphasia.” *Brain and Language*. 71, 22-25 (2000.)

⁶² Beeson PM, Rapcsak SZ. “Toward a theory of aphasia.” *Brain and Language*. 71, 22-25 (2000.)

⁶³ Small S. “The future of aphasia treatment.” *Brain and Language*. 71: 227-232 (2000).

⁶⁴ Batson-Walker D. “Use of pharmacotherapy in the treatment of aphasia.” *Brain and Language*. 71, 252-254 (2000.)

⁶⁵ Love RJ. “Motor speech disorders.” In: *Handbook of Neurological Speech and Language Disorders*. Ed. Howard S. Kirshner. New York Marcel Dekker. 1995.

⁶⁶ Yorkston KM. Abstract: “Treatment efficacy: dyarthrias.” *J Speech Hear Res*. 1996; Oct 39 (4): S46-57.

Clinical guidelines for treatment of aphasia

United States

Current United States clinical guidelines⁶⁷ for post-stroke speech and language therapy recommend:

“Patients with aphasia should be offered treatment targeted at the identified language retrieval or comprehension deficits and aimed at improving functional communication.”

This recommendation was a “consensus” recommendation, which means that 75 to 89 % of the reviewers agreed with it. (Strong consensus means that 90 % of the reviewers agree.)

The research evidence was “C” which means that the recommendation was supported by a single, non-randomized controlled trial by studies using historical controls or studies using quasi-experimental designs such as pre- and post- treatment comparisons.

Further comments:

“Treatment for aphasia can be integrated with treatments for sensorimotor or cognitive deficits or can be provided separately. Treatment should involve family and caregivers so that effective communication can be reestablished....”

“Evidence from controlled trials on the effectiveness of treatment for aphasia is not conclusive....Some studies indicate benefit...while other studies fail to document sustained benefits....Treatment by trained volunteers appears to be equally effective as that by speech and language professionals, and results appear to be unaffected by delaying treatment.”

In addition, the guidelines have the following recommendations:

- identify characteristics of patients most likely to benefit from rehabilitative interventions
- determine optimal type of rehabilitation program for different types of patient
- identify factors that affect optimal timing, intensity, and duration of rehabilitation
- determining effectiveness of specific treatments or combinations thereof, in reducing impairments
- develop and validate standardized tests for monitoring post-stroke rehabilitation.

Scotland

Scottish guidelines⁶⁸ state explicitly:

“All patients with a communication problem resulting from a stroke

⁶⁷ Gresham GE, Duncan PW, Stason WB, et al. *Post-Stroke Rehabilitation*, Clinical Practice Guideline, No. 16. Rockville, MD: U.S. Department of Health and Human Services, Public Health Service, Agency for Health Care Policy and Research. AHCPR Publication No. 95-0662. May 1995.

⁶⁸ *Management of Patients with Stroke*. A National Clinical Guideline recommended for use in Scotland by the Scottish Intercollegiate Guidelines Network. Pilot Edition. April 1998.

should be referred to a speech and language therapist for assessment and treatment.”

Further, the guidelines state:

“Family therapy involving aphasic patients and other family members improves handicap of the aphasic handicap and reduces depression and emotional isolation in patients.”

“The efficacy of treatment for dysarthria has rarely been addressed, but benefits of early intervention are indicated.”

United Kingdom

Guidelines issued in the United Kingdom⁶⁹ state:

“Stroke can affect communication in different ways. The patient may have impaired motor speech production (dysarthria) resulting in unnatural or unintelligible speech; they may have impaired language skills (aphasia or dysphasia); or they may have impaired planning and execution of motor speech (articulatory dyspraxia). The patient may have subtle communication problems due to higher level language impairment associated with non-dominant hemisphere stroke. Untrained clinicians may misdiagnose the cause of abnormal communication. Accurate diagnosis is essential to guide and inform the team and the family. A speech and language therapist is the most competent person to assess a patient with abnormal communication.

⁶⁹ *National Clinical Guidelines for Stroke.*

Intercollegiate Working Party for Stroke, coordinated by the Clinical Effectiveness and Evaluation Unit of the Royal College of Physicians. London. 2000.

http://www.rcplondon.ac.uk/pubs/ceeu_stroke_background.htm

- Every patient with a dominant hemisphere stroke should be assessed for dysphasia using a reliable and valid method
- Every patient with difficulties in communication should be assessed fully by a speech and language therapist (SLT)
- If the patient has communication difficulties, the staff and relatives should be informed by the SLT of communication techniques appropriate to the impairment
- Where achievable goals can be identified, and continuing progress demonstrated, patients with communication difficulties should be offered appropriate treatment, with monitoring of progress
- Patients with specific communication difficulties should be assessed by a SLT as to their suitability for intensive speech and language therapy treatment which the trials suggest should be for a 4–8 week period
- For patients with long-term language difficulties, especially with reading, a period of reading retraining should be considered
- Any patient with severe communication disability but reasonable cognition and language should be assessed for and provided with appropriate alternative or augmentative communication aids.”

Tables of evidence supporting the recommendations appear for the guidelines. The criteria for recommendations are modeled on those used by the United States.

Glossary of terms

This information is derived from the National Aphasia Association website.⁷⁰

Aphasia is an impairment of language, affecting the production or comprehension of speech and the ability to read or write. Aphasia can be so severe as to make communication with the patient almost impossible, or it can be very mild. It may affect mainly a single aspect of language use, such as the ability to retrieve the names of objects, or the ability to put words together into sentences, or the ability to read. More commonly, however, multiple aspects of communication are impaired, while some channels remain accessible for a limited exchange of information.

Global aphasia is the most severe form of aphasia, and is applied to patients who can produce few recognizable words and understand little or no spoken language. Global aphasics can neither read nor write. Global aphasia may often be seen immediately after the patient has suffered a stroke and it may rapidly improve if the damage has not been too extensive. However, with greater brain damage, severe and lasting disability may result.

Broca's aphasia is a form of aphasia in which speech output is severely reduced and is limited mainly to short utterances, of less than four words. Vocabulary access is limited in persons with Broca's aphasia, and their formation of sounds is often laborious and clumsy. The person may understand speech relatively well and be able to read, but be limited in writing. Broca's aphasia is often referred to as a 'non fluent aphasia' because of the halting and effortful quality of speech.

Mixed non-fluent aphasia is applied to patients who have sparse and effortful speech, resembling severe Broca's aphasia. However, unlike persons with Broca's aphasia, they remain limited in their comprehension of speech and do not read or write beyond an elementary level.

In **Wernicke's aphasia** the ability to grasp the meaning of spoken words is chiefly impaired, while the ease of producing connected speech is not much affected. Therefore Wernicke's aphasia is referred to as a 'fluent aphasia.' However, speech is far from normal. Sentences do not hang together and irrelevant words intrude-sometimes to the point of jargon, in severe cases. Reading and writing are often severely impaired.

Anomic aphasia is applied to persons who are left with a persistent inability to supply the words for the very things they want to talk about-particularly the significant nouns and verbs. As a result their speech, while fluent in grammatical form and output is full of vague circumlocutions and expressions of frustration. They understand speech well, and in most cases, read adequately.

⁷⁰ *Aphasia Fact Sheet*. National Aphasia Association.
<http://www.aphasia.org/NAAfactsheet.html>

Difficulty finding words is as evident in writing as in speech.

Perseveration is susceptibility to interference from previous stimuli. In some cases this shows up as being unable to shift to a new category or activity. Behavior may also be continue inappropriately, for example, drawing extra loops when copying a multi-loop design. It may result from difficulty in disengaging attention from a stimuli.

In addition to the foregoing syndromes that are seen repeatedly by speech clinicians, there are many other possible combinations of deficits that do not exactly fit into these categories. Some of the components of a complex aphasia syndrome may also occur in isolation.

This may be the case for disorders of reading (alexia) or disorders affecting both reading and writing (alexia and agraphia), following a stroke. Severe impairments of calculation often accompany aphasia, yet in some instances patients retain excellent calculation in spite of the loss of language.

There are a variety of disorders of communication that may be due to paralysis, weakness, or incoordination of the speech musculature or to cognitive impairment. Such impairment may accompany aphasia or occur independently and be confused with aphasia. It is important to distinguish these disorders from aphasia because the treatment(s) and prognosis of each disorder are different.

Apraxia is a collective term used to describe impairment in carrying out purposeful movements. People with severe aphasia are usually extremely limited in explaining themselves by pantomime or gesture,

except for expressions of emotion. Commonly they will show you something in their wallet, or lead you to show you something, but this is the extent of their non-verbal communication. Specific examination usually shows that they are unable to perform common expressive gestures on request, such as waving good-bye, beckoning, or saluting, or to pantomime drinking, brushing teeth, etc. (limb apraxia). Apraxia may also primarily affect oral, non-speech movements, like pretending to cough or blow out a candle (facial apraxia). This disorder may even extend to the inability to manipulate real objects. More often, however, apraxia is not very apparent unless one asks the patient to perform or imitate a pretended action. For this reason it is almost never presented as a complaint by the patient or the family. Nevertheless it may underlie the very limited ability of people with aphasia to compensate for the speech impairment by using informative gestures.

Apraxia of speech is a term frequently used by speech pathologists to designate an impairment in the voluntary production of articulation and prosody (the rhythm and timing) of speech. It is characterized by highly inconsistent errors.

Dysarthria refers to a group of speech disorders resulting from weakness, slowness, or incoordination of the speech mechanism due to damage to any of a variety of points in the nervous system. Dysarthria may involve disorders to some or all of the basic speech processes: respiration, phonation, resonance, articulation, and prosody. Dysarthria is a disorder of speech production not language (e.g., use of vocabulary and/or grammar). Unlike apraxia of speech, the speech errors that occur in dysarthria are

highly consistent from one occasion to the next.

Dementia is a condition of impairment of memory, intellect, personality, and insight resulting from brain injury or disease. Some forms of dementia are progressive, such as Alzheimer's disease, Picks disease, or some forms of Parkinson's disease. Language impairments are more or less prominent in different forms of dementia, but these are usually overshadowed by more widespread intellectual loss. Since dementia is so often a progressive disorder, the prognosis is quite different from aphasia.
