A meta-analysis of clinical outcomes in the treatment of aphasia

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Authors' objectives
To perform a meta-analysis of clinical outcomes for treatments of acquired aphasia in adulthood.

Searching
A systematic manual search was conducted in the following periodicals: Aphasiology, Brain and Language, Clinical Aphasiology, Journal of Speech and Hearing Disorders, and Journal of Speech and Hearing Research. In addition, chapters, texts, and various bibliographies likely to contain relevant references, were examined.

The databases searched included Dissertation Abstracts, EMBASE, ERIC, MEDLINE, PsycLIT and the Science Citation Index. The search terms used and the dates searched were not stated. The searches were limited to publications in the English language.

Study selection
Study designs of evaluations included in the review
The studies were quasi-experimental studies looking at within-treatment (pre-test versus post-test) effects, or between-treatment (treatment versus treatment) effects. The frequency of treatment varied from low (no more than 1.5 hours per week), to moderate (2 to 3 hours per week), to high (at least 5 hours per week).

Specific interventions included in the review
Most participants were receiving treatment from a speech language pathologist. The treatments included:

- the Schuell-Wepman-Darley Multimodal Stimulation Treatment;
- the Helm's Elicited Language Training Programme for Syntax Stimulation;
- the Sentence Level Auditory Comprehension and Language Orientated Treatment; and
- various drug treatments including pyrithioxine, amphetamine, encephabol and lucidril.

Participants included in the review
Adults with acquired aphasia, as indexed in terms of general communicative functioning. Most samples consisted of male monolingual aphasic individuals suffering a first occlusive or haemorrhagic neuropathology in the left cerebral hemisphere and receiving treatment from a speech-language pathologist.

Outcomes assessed in the review
Recovery. In most of the analysed studies, the reported outcome index was a comprehensive instrument for clinical assessment. The measures of recovery included the following: the Aachen Aphasia Test, the Boston Diagnostic Aphasia Examination, the Communicative Abilities in Daily Living test, the Functional Communication Profile, the Minnesota Test of Differential Diagnosis of Aphasia, the Porch Index of Communicative Abilities, and the Token Test. Outcomes expressed in terms of task-specific performances (e.g. selecting a target picture) or non-linguistic performance (e.g. intelligence) were excluded.

How were decisions on the relevance of primary studies made?
The author does not state how the papers were selected for the review, or how many of the reviewers performed the selection.

Assessment of study quality
The author commented on the variation in study validity but did not present any formal criteria or assessment.

**Data extraction**

All coding was conducted by the author. Two research assistants independently re-coded a randomly selected set of 15 effects (20% of the total). Agreement among the three coders occurred in 98% of all decisions. Any discrepancies were resolved by discussion.

Algorithms were used to estimate the individual values of the effect size (ES), e.g. for dependent t-tests, independent t-tests, gain-score analyses, and analyses of covariance.

**Methods of synthesis**

*How were the studies combined?*

The average ESs were calculated using appropriate algorithms, which weighted for sample size and adjusted for the effects of error variance and design bias. In part, this was accomplished by incorporating the reliabilities of outcome measures in the calculation. When the reliability of a clinical instrument could not be determined, the average reliability (0.90) was used to carry out the necessary calculations. A fixed-effect meta-analysis was used to combine the data.

The analysis was split into within- and between-treatment effects. The analysis of within-treatment effects was subdivided into the following: untreated recovery, recovery with treatment, amount of treatment, type of treatment, severity of aphasia, and type of aphasia.

A funnel plot was used to assess publication bias.

*How were differences between studies investigated?*

No tests for heterogeneity were presented.

Subgroup analyses were performed for the amount of treatment, type of treatment, severity of aphasia, and type of aphasia.

**Results of the review**

Fifty-five studies (75 estimates of treatment effects) were included. These comprised 1,491 participants in within-treatment effects, and 866 participants in between-treatment effects. Sixty of the effects were within-treatment effects, and the remaining 15 were between-treatment effects.

**Within-treatment effects (n=60),**

Untreated recovery: the average ES with a pre-test measure taken in the acute stage was 0.63 (95% confidence interval, CI: 0.31, 0.95), corresponding to the magnitude of spontaneous recovery. When the pre-test measure was taken between the third and twelfth month post-onset (i.e. the postacute stage), the average ES was 0.34 (95% CI: 0.04, 0.64). The average ES for chronic effects (those having the reference measure taken on or after the twelfth month post-onset) was 0.05 (the CI could not be calculated), reflecting the asymptote of the natural recovery function.

Recovery with treatment: when the reference measure was taken in the acute period, the average ES for recovery was 1.15 (95% CI: 0.5, 1.8), nearly twice that for untreated recovery (0.63). The average ES was 0.57 (95 CI: 0.06, 1.08) for treatment begun in the postacute period, and 0.66 (95% CI: -0.31, 1.63) for that begun in the chronic period.

Amount of treatment (n=12): the average ES for three high-intensity treatments provided by speech-language pathologists in the acute period was 1.39 (95% CI: 0.45, 2.33). The ES for moderate dosage in the acute period was 1.78 (the CI could not be calculated); however, this value represented a single effect. Overall, the more intense the treatment, the greater the change.

The ESs that were coded for amount of treatment showed a positive correlation (r) with the duration of treatment in weeks (r=0.76, p=0.004), and the total number of treatment hours at discharge (r=0.64, p=0.26).
Type of treatment: only two types of treatment were reported. The most frequently reported named treatment (5 effects), the Schuell-Wepman-Darley Multimodal Stimulation Treatment, gave an ES of 1.39 (95% CI: 0.18, 2.60). The most frequently reported treatment was that coded as 'not specified' (7 effects), giving an ES of 0.81 (95% CI: 0.28, 1.34).

Severity of aphasia: there were no studies looking at the effect on mild aphasia. The ES for treatment begun in the acute period of recovery was quite large for moderately and severely aphasic individuals: the ESs were 1.87 (95% CI: 0.91, 2.83, n=12) and 2.76 (no CI reported, n=6), respectively. Nineteen studies coded as heterogeneous (i.e. a mixture of severities among the patients in the primary study) gave an ES of 1.05 (95% CI: 0.22, 1.88). The ESs in the postacute period were considerably smaller than those obtained in the acute period.

Type of aphasia (n=6): four effects were obtained from nonfluent aphasic individuals and two from globally aphasic persons. The average ESs were 0.63 (95% CI: -0.76, 2.02) and 0.83 (95% CI: -0.04, 1.70) for nonfluent aphasic persons and variously diagnosed participants, respectively.

Between-treatment effects (n=15).

Treatment versus no treatment: two acute stage treatment versus control effects, resulting from active treatment provided by a speech-language pathologist in competition with a no treatment control, were pooled in a synthesis of effects; this gave an average ES of 0.61 (95% CI: 0.16, 1.06). In the postacute stage, the size of the treatment versus no treatment effect was 0.31 (this was a single effect, so it was possible to calculate a CI). A single mixed-stage effect of 0.23 was reported.

The validity of the meta-analysis was assessed by calculating the number of null findings that would be necessary, if they existed, to diminish the value of the ES to a critically low value. For the within-treatment effects, the critical value of ES for treated individuals was the corresponding value of ES for treated individuals. The results indicated that the findings of the meta-analysis were fairly robust.

Authors’ conclusions
The results of this meta-analysis were consistent with those published previously by the author (see Other Publications of Related Interest). The accumulated scientific evidence warrants the assertion that, on average, treatment for aphasic persons is effective.

The results for the overall analysis of the within-treatment effects indicate that when treatment is begun in the acute period, the average ES for treated individuals is 1.83 times greater than that for untreated individuals. This finding evinces the long-held belief among many clinicians that aphasic individuals should receive treatment as early in their recoveries as possible. When treatment is begun in the postacute period, the average ES for treated individuals is small but 1.68 times greater than that for untreated individuals. In the chronic stage, the average ES for treated individuals is small but exceeds that for untreated individuals by a factor of 12. These findings directly challenge payor policies that deny claims for reimbursement during the later stages of recovery.

CRD commentary
A focused review question was presented and the inclusion and exclusion criteria were appropriate.

Although the search strategy was fairly broad, the search terms used and the dates searched were not given. In addition, no attempt was made to identify unpublished material. However, a funnel plot indicated that there was no publication bias. The validity of the included studies was not formerly assessed, but was discussed in the methodology section.

Some details of the individual studies were presented. It would, however, have been useful to have also included the CIs for the individual ESs, and to provide details on the gender of the participants in each study. A test for heterogeneity was not performed before the primary studies were combined, but subgroup analyses were performed.

The author’s conclusions follow from the results.
Implications of the review for practice and research
The author suggests that more studies are required to examine the differential effects of treatments for different types of aphasia. He states that large gains are achieved by severely aphasic persons when treated by a speech-language pathologist.

Bibliographic details

Other publications of related interest

Indexing Status
Subject indexing assigned by NLM

MeSH
Acute Disease; Adult; Aged; Aged, 80 and over; Aphasia /diagnosis /rehabilitation; Chronic Disease; Middle Aged; Reproducibility of Results; Severity of Illness Index; Time Factors; Treatment Outcome

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.