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REVIEW

A systematic review of nursing rehabilitation of stroke patients with aphasia

Irina E Poslawsky, Marieke J Schuurmans, Eline Lindeman and Thóra B Hafsteinsdóttir on behalf of the Rehabilitation Guideline Stroke Working Group*

Aim and objectives. To explore the evidence on rehabilitation of stroke patients with aphasia in relation to nursing care, focusing on the following themes: (1) the identification of aphasia, (2) the effectiveness of speech-language interventions.

Background. Patients with poststroke aphasia have higher mortality rates and worse functional outcome than patients without aphasia. Nurses are well aware of aphasia and the associated problems for patients with stroke because they have daily contact with them. The challenge is to provide evidence-based care directed at the aphasia. Although rehabilitation stroke guidelines are available, they do not address the caregiving of nurses to patients with aphasia.

Design. Systematic review.

Method. Published studies were reviewed, focusing on identification and treatment of aphasic patients after stroke in terms of the consequences for nursing care. Also, data concerning effective speech-language interventions were extrapolated into nursing practice with respect to the classification of nursing interventions.

Results. Intensive speech-language therapy, which was initiated in the acute stage post stroke, showed the best rehabilitation outcomes. Trained persons other than speech-language therapists provided effective speech-language interventions. Speech-language therapy included several types of intervention that met nursing intervention classifications.

Conclusion. The contribution of nursing to the rehabilitation of patients with aphasia is relevant. The use of screening instruments by nurses can increase early detection of aphasia, a precondition for initiating timely speech-language therapy. Collaboration between speech-language therapists and nurses is of the utmost importance for increasing the intensity and functionality of speech-language exercises, which may enhance the quality of treatment.

Relevance to clinical practice. The findings of this study can be used to develop nursing rehabilitation guidelines for stroke patients with aphasia. Further research is necessary to explore the feasibility of using such guidelines in clinical nursing practice and to examine the experiences of patients with nursing interventions directed at aphasia.

Authors: *Irina E Poslawsky*, MSc, RN, Clinical Nurse Specialist, Division of Neuroscience, Rudolf Magnus Institute, University Medical Center Utrecht; *Marieke J Schuurmans*, PhD, RN, Professor of Nursing Science, Department of Rehabilitation and Sportsmedicine, Rudolf Magnus Institute of Neuroscience, University Medical Center Utrecht, and Faculty Chair Care for Older People, University of Applied Science, Utrecht; *Eline Lindeman*, MD, PhD, Professor of Rehabilitation Medicine, Department of Rehabilitation and Sportsmedicine, Rudolf Magnus Institute of Neuroscience, University Medical Center Utrecht, Rehabilitation Center De Hoogstraat Utrecht; *Thóra B Hafsteinsdóttir*, PhD, RN, Associate Professor, Division of Neuroscience, Rudolf Magnus Institute, University Medical Center Utrecht, and Faculty Chair Care for Older People, University of Applied Sciences Utrecht, Utrecht, The Netherlands, and Adjunct Associate Professor, Faculty of Nursing, University of Iceland, Reykjavik, Iceland

Correspondence: Irina E Poslawsky, Clinical Nurse Specialist, Division of Neuroscience, Rudolf Magnus Institute, B01·201, University Medical Center Utrecht, PO Box 85500, 3508 GA, Utrecht, Netherlands. Telephone: +31 88 755 74 70.
E-mail: i.e.uitewaal@umcutrecht.nl

*Other members of the Rehabilitation Guideline Stroke Working Group: *Dórothea Bergs*, MN, RN, Landspítali University Hospital, Iceland; *Katrín Björgvinsdóttir*, MN, RN, Landspítali University Hospital, Reykjavík, Iceland; *Floor Gooskens*, MSc, RN, Division of Neuroscience, Rudolf Magnus Institute, University Medical Center Utrecht, The Netherlands; *Marianne Klinke*, BSc, RN, Landspítali University Hospital, Reykjavík, Iceland; *Janneke de Man*, MSc, RN, Division of Neuroscience, Rudolf Magnus Institute, University Medical Center Utrecht; *Marijke Rensink*, MD, Faculty of Nursing, Faculty Chair Care for Older People, University of Applied Sciences, Utrecht, The Netherlands; *Svanhildur Sigurjónsdóttir*, BSc, RN, Landspítali University Hospital and Reykjavík and Iceland; *Martine Vergunst*, MSc, RN, Division of Neuroscience, Rudolf Magnus Institute, University Medical Center Utrecht, The Netherlands.

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Introduction

Aphasia is the most frequent cognitive disorder in the stroke population. The risk of aphasia is 20–40% and it has serious consequences for patients and their caregivers (Hoffmann 2001, Salter *et al.* 2005). Aphasia is defined as a reduction of the patient's ability to communicate by language expression and comprehension and can affect all aspects of communication performance, such as speaking, reading (alexia) or writing (agraphia) (Salter *et al.* 2005).

The specific areas of the brain responsible for producing language are usually located in the left hemisphere. Brain damage in these areas causes aphasia of different types and severities, depending on the location and the extent of the lesion. Lesions in the right hemisphere (without language areas) can also result in language disorders because of the complex network of neurons with interactive functions between the two hemispheres (Witney 1998). These interactive functions play a role in improved language function because of compensation mechanisms in the intact hemisphere (Cappa *et al.* 1997, Rijntjes 2006). Furthermore, important areas for the comprehension and production of emotions are located in the right brain hemisphere (Harciarek *et al.* 2006). Damage in these areas can affect the emotional comprehension of language. For this reason, patients may lose their understanding of emotional expressions such as anger and joy.

Other sources of reduced communication are dysarthria and apraxia of speech. Dysarthria is a problem in speech production as a result of motor deficits (Sellars *et al.* 2002). Apraxia of speech is a problem in acting verbally and is another cognitive disorder (West *et al.* 2005). This study focuses particularly on aphasia.

Up to 40% of patients with aphasia recover completely or nearly completely within one year after stroke but recovery in the other 60% is incomplete (Salter *et al.* 2005). One year post stroke, 18–27% of all patients are faced with chronic aphasia (Paolucci *et al.* 2005).

Patients who are unable to communicate their wishes and needs are more at risk of complications such as depression (Nys *et al.* 2005a). These patients also have worse rehabilitation outcomes and higher mortality (Salter *et al.* 2005). Therefore, rehabilitation of aphasia is highly important.

On stroke units, a multidisciplinary team offers the most effective care (Langhorne & Duncan 2001). Various health-care professionals provide care and treatment focusing on the multifaceted deficits seen in stroke patients. Managing aphasia is mainly the domain of neuropsychologists and speech-language therapists. Robey (1994) conducted a meta-analysis of research findings on the effectiveness of treatments for patients with aphasia and concluded that treatment was efficacious, especially in the acute stage post stroke and was generally provided by a speech-language pathologist. There was also an attempt to calculate the effectiveness of treatment by non-professionals, but too few studies have reported interpretable quantitative information (Robey 1994). However, the question of the providers' role is of interest in nursing care. In the acute stage post stroke and during daily care, the first signs of aphasia are often noticed by close family members and nurses. Nurses' knowledge of a patient's communication patterns and problems may be relevant for the speech-language therapists conducting an individual rehabilitation plan. Concomitantly, speech-language therapists may share their expertise to enhance nurses' skills to extend the possibilities for rehabilitation. At present, no evidence-based guidelines for the management of aphasia by nurses are available. This article presents research findings concerning the potential supporting role of nurses in therapeutic management of aphasic patients after stroke.

Objective of the review

The aim of the present review was to select studies relevant to nursing care and to focus on the recognition and rehabilitation of stroke patients with aphasia. The questions addressed in this study were:

- How can nurses identify aphasia in stroke patients?
- What effective speech-language interventions are appropriate in nursing practice?

Methods

Design

This systematic review was conducted according to the method in the Cochrane Handbook for Systematic Reviews (Higgins & Green 2005) and following the steps of the Quorum statement (Moher *et al.* 1999).

Search strategy

First, the following databases were searched: Medline, CINAHL, PsycINFO and the Cochrane Database of Systematic Reviews. The search terms included the MeSH terms 'cerebrovascular accident' and 'stroke', in various combinations with communication, aphasia, nursing, assessment, intervention and rehabilitation. Finally, the reference lists of selected studies were hand searched to identify additional references. The full strategy is available by contacting the first author.

Inclusion criteria

1 *Types of participants:* patients with communication problems, specifically aphasia, during the acute, rehabilitation or chronic stage after stroke.
2 *Types of outcome measures:* the type and severity of aphasia, the functional status of communication skills and the quality of life of patients after stroke.
3 *Publication language and date:* published in English between 1994–2008, using a meta-analysis of the efficacy of treatment for patients with aphasia after stroke (Robey 1994) as a starting point.
4 *Types of studies:* meta-analyses, systematic reviews, randomised controlled trials, (quasi) experimental research, patient-control and cohort studies, qualitative research, descriptive and case studies. The authors of previous systematic reviews on the effectiveness of speech-language therapy for aphasia post stroke (Greener *et al.* 1999, Robey *et al.* 1999, Greener & Langhorne 2002) have recommended the inclusion of studies with various designs.
5 *Types of interventions:* interventions relevant to nursing practice, which describe (1) skills or tools to identify aphasia, or (2) any treatment related to maintaining or improving communication in stroke patients with aphasia. An article was judged as relevant to nursing practice independently by two of the present authors (IEP and TBH), both of them are nurses trained to masters level and have long practical experience. The methods of assessment and intervention described in the articles had to be feasible and suitable for daily nursing practice on a stroke ward in various settings, or at home and usable with minimal technical equipment. Furthermore, relevance to nursing practice required that the definitions were consistent with standardised language for nursing interventions and diagnoses. The following definition in the 'Nursing Interventions Classification (NIC)' by McCloskey and Bulechek was used: 'a nursing intervention is any treatment based upon clinical judgement and knowledge that a nurse performs to enhance patient/client outcomes' (McCloskey & Bulechek 2000, p. 19). The diagnosis of aphasia meets the nursing classification 'Communication, Impaired Verbal: decreased, delayed, or absent ability to receive, process, transmit and use a system of symbols'. This nursing diagnosis is linked to the nursing major intervention: 'Communication Enhancement: Speech Deficit' (Johnson *et al.* 2006, p. 98). A therapeutic intervention for aphasia, i.e. speech-language therapy (SLT), 'includes any intervention defined as speech and language therapy' (Greener & Langhorne 2002, p. 72). SLT is generally provided over a definite period, is clearly described and monitored and can be indicated as therapeutic when progress is seen over time as the intervention phases become more complex (Kagan & LeBlanc 2002).

Exclusion criteria

Studies were excluded if aphasia was not related to brain damage after stroke and if the treatment focus was biophysical, for example, the prescription of pharmacological therapy or the use of transcortical magnetic stimulation techniques.

Search outcome

The initial search outcome generated 1656 titles. After these titles were screened, 356 articles met the inclusion criteria. On the basis of abstracts, 103 articles were selected for further examination and the full texts of these were read (Fig. 1).

Quality appraisal

The methodological quality of each article was evaluated independently by the two authors (IEP and TBH) using criteria specific to the various study designs. Four types of critical appraisal forms were used, addressing: systematic literature reviews, randomised controlled trials (RCTs), observational and descriptive studies and qualitative studies (Oxman 1994, Verhagen *et al.* 1998, Moher *et al.* 1999, LoBiondo-Wood & Haber 2002). Decisive criteria were a transparent description of the method and a justifiable conclusion. Consensus was reached about debatable articles. Finally, 24 articles were included, seven systematic reviews and 17 studies of various designs that were not included in the reviews (Fig. 1).

Data extraction and analysis

The characteristics of the studies included were recorded on a data extraction form, comprising the following items: study design, setting and phase, sample, assessment or

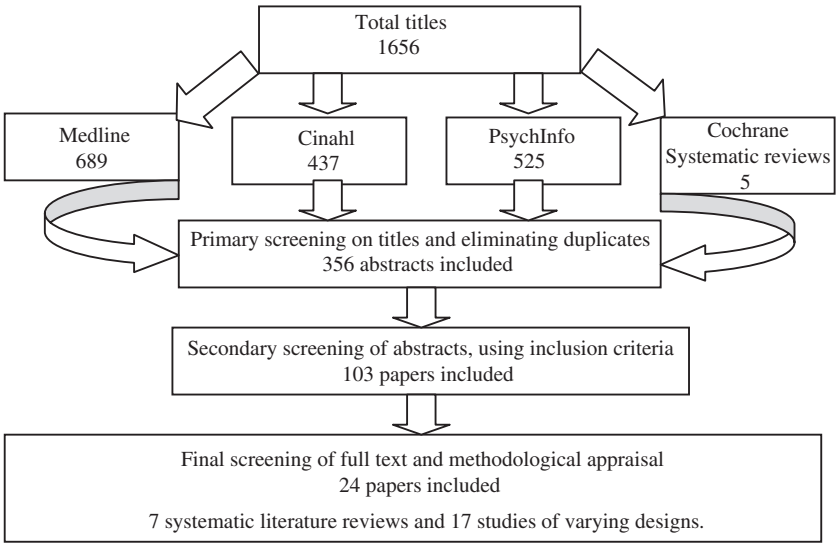

Figure 1 Research outcome.

intervention, results and conclusion (Tables 1 and 2). Items for systematic reviews were topic, database and period, number of studies included, results and conclusion (Table 3). The final data set was analysed in relation to (1) the identification of aphasia and (2) the effectiveness of speech-language interventions. In addition, if the results were consistent with the NIC definition, they were extrapolated to nursing care.

Results

Including all the available evidence resulted in a great variety of study designs, methodological qualities and study parameters. In the same study designs, huge variation was also found in types of participants, interventions and outcome measures. Furthermore, the definition of aphasia was not always consistent. Research focused on different types and phases of aphasia in different settings. RCTs of good quality were scarce. Most studies had small sample sizes. Six studies (Table 1) and one systematic review (Table 3) focused on the identification of aphasia, mainly with regard to its assessment. The other 11 studies (Table 2) and six systematic reviews (Table 3) showed results concerning the effectiveness of speech-language therapy in general or various speech-language interventions that nurses can apply. In this paper, the studies included in reviews are not presented separately and the findings of our sample are categorised according to the research questions.

Identification of aphasia

Six studies focusing on the identification of aphasia were found (Table 1). Worrall *et al.* (2002) studied everyday communication by patients with aphasia based on three sources: (1) the Activity/Participation dimensions of the World Health Organization's International Classification of Functioning, Disability and Health, (2) four assessments of functional communication–The American Speech-Language-Hearing Association Functional Assessment of Communication Skills for Adults (Frattali *et al.* 1995 in Worrall *et al.* 2002), the Communicative Effectiveness Index (Lomas *et al.* 1989 in Worrall *et al.* 2002), the Communicative Abilities in Daily Living-Revised (Holland *et al.* 1998 in Worrall *et al.* 2002) and the Functional Communication Profile (Sarno 1969 in Worrall *et al.* 2002), and (3) a qualitative, ethnographical study (n = 30). They found everyday communication to be a dynamic and unique activity depending on the communication goals, habits and culture of the individual. The recognition of aphasia was complex and also influenced by interacting factors, such as the function of communication, the role of a conversation partner and environmental circumstances. Assessment instruments and the classification system captured the broad and complex aspects of communication in a limited way. Collaborative observation by professionals and family was reported to be important in decision-making about the use of classification and assessment instruments (Worrall *et al.* 2002).

Early detection of aphasia was found to be relevant in a study by Edwards and colleagues on screening the rehabilitation needs of patients with stroke (n = 53). Clinical observation without the use of assessment tools was found to be inadequate for identifying aphasia during the acute stage. In 79% of stroke patients, mild to moderate aphasia remained undetected. The use of a brief screening instrument improved the identification of aphasia significantly (Edwards *et al.* 2006).

Table 1 Characteristics of studies included to identify aphasia

Author/year	Topic	Setting/phase	Sample	Assessments	Results/Conclusion
Edwards *et al.* 2006	Quasi experimental study on screening stroke patients for rehabilitation needs	Hospital, stroke unit Acute phase (< 15 days poststroke)	Stroke patients, without severe motor or language deficits $n = 53$ 72% right hemisphere 49% female, mean age: 65 years	The use of short screening instruments FAST for aphasia. Boston Naming Test for anomia. Compared with data on structured chart reviews	After screening, 35% of the patients had more than three undocumented sensory or cognitive problems, only 6% had no measurable impairments. Significant increase in detection of cognitive and perceptual deficits with use of systematic screening. Without screening, clinically undetected aphasia was 79% ($p < 0{\cdot}005$) and undetected anomia was 97% ($p < 0{\cdot}01$)
Enderby *et al.* 1987	Preliminary studies on the FAST, a screening test for aphasia	Acute phase (an average of 8 days poststroke)	Stroke patients $n = 50$ Normal controls $n = 123$	The FAST compared with a qualified SLT's assessment (FCP). Average assessment 8 days poststroke	The FAST was clinically useful in screening for aphasia for diagnostic reasons and in following recovery for research purposes. Scores of untrained observers were reliable. The Fast and the FCP were highly correlated ($r = 0{\cdot}90$, $p < 0{\cdot}001$)
Enderby & Crow 1996	Validation study with non-specialists who used the FAST to screen for aphasia	Speech therapy department. Rehabilitation phase (three to six weeks poststroke)	Stroke patients with dysphasia $n = 25$ 48% female, mean age: 67 years	The FAST compared with two other tests, frequently used by SLTs (FCP and MTDDA)	Positive and significant correlation between all total scores ($r < 0{\cdot}73$–$0{\cdot}91 >$, $p < 0{\cdot}001$). Shortened versions also showed significant correlation ($p < 0{\cdot}001$)
Kagan *et al.* 2004	Validation study of observational measures for rating support (MSC) and participation (MPC) in conversation with aphasic patients	Aphasia Center	Stroke patients with aphasia and their conversation partners. Study 1 (reliability): $n = 10$ (five couples). Study 2 (construct validity): $n = 20$ (10 couples)	MSC and MPC	Construct validity and inter-rater reliability of both instruments were moderate to high ($r = 0{\cdot}65$–$0{\cdot}96$, $p < 0{\cdot}001$). Conversational interaction can be measured with the MSC/MPC, simple and reliable for clinical and research purposes
Thommessen *et al.* 1999	Validation study with nurses who used the UAS to screen for aphasia as compared to the gold standard (i.e. a comprehensive assessment by a speech language therapist)	Hospital, stroke unit, Norway $n = 37$ Acute phase	Stroke patients with aphasia 60% female, mean age: 75·5 years	UAS screens for language expression, comprehension, repetition, reading, reproduction of a string of words and free communication	UAS seemed to be a valid screening instrument for aphasia in the acute stage of stroke. Predictive value of a positive test = 0·67 and negative test = 0·93. Weighted kappa = 0·83, sensitivity = 0·75, specificity = 0·90. Overall agreement = 86%

Table 1 (Continued)

Author/year	Topic	Setting/phase	Sample	Assessments	Results/Conclusion
Worrall *et al.* 2002	Descriptive study of the validity of functional assessment and activity, participation components of the ICIDH-2	Hospital, research unit and community-based locations	Stroke patients with aphasia n = 30 15 patients with aphasia 15 matched controls	Three sources: (1) WHO-classification (ICIDH-2) (2) assessments of functional communication (3) observed daily communication (ethnographic study)	The use of classification and assessment instruments had to be supported by professional observation and family participation. SLT had to be focused on functional communication and social participation

FAST, Frenchay aphasia screening test; *p*, *p*-value; *r*, Spearman's rank correlation coefficient; SLT, speech-language therapist; FCP, functional communication profile; MTDDA, Minnesota test for the differential diagnosis of aphasia; MSC, measure of skill in communication; MPC, measure of participation in communication; UAS, Ullevaal aphasia screening; WHO, World Health Organization; ICIDH, international classification of functioning and disability.

Two brief screening instruments were located that are useful for nurses: the Frenchay Aphasia Screening Test (FAST) (Enderby *et al.* 1987) and the Ullevaal Aphasia Screening (UAS) (Thommessen *et al.* 1999). The FAST is a simple instrument and a quick method (takes up to ten minutes) for healthcare professionals to screen aphasia during the acute and postacute stage of stroke. Compared with other aphasia instruments it showed good validity (r < 0·73–0·91 >) (Enderby & Crow 1996). The UAS was developed specifically for nurses and is based on the FAST (Thommessen *et al.* 1999). Its intention is to screen aphasia generally in the acute stage poststroke and it is also quick to administer (takes 5–15 minutes). In the stroke research literature, the FAST was found to be the most frequently used and investigated screening instrument (Salter *et al.* 2006). Besides screening in the diagnostic phase, nurses can identify the quality of conversation between a patient and a conversation partner, using the Measure of Skill in Supported Conversation and the Measure of Participation in Conversation (MSC/MPC) (Kagan *et al.* 2004). This observational instrument establishes the knowledge of supportive skills in the conversation partner and the participation of the patient during a 10–15 minute conversation and its validity was found to be moderate to high (r = 0·65–0·96) (Kagan *et al.* 2004). The MSC/MPC is also usable in the rehabilitation phase of aphasia.

Effectiveness of speech-language interventions

Speech-language therapy in general

Apart from the meta-analysis by Robey (1994), five systematic reviews (Greener *et al.* 1999, Cicerone *et al.* 2000, Bhogal *et al.* 2003, Salter *et al.* 2005, Jordan & Hillis 2006) and three studies (Rappaport *et al.* 1999, Paolucci *et al.* 2000, Bakheit *et al.* 2007) were found that focused on the effectiveness of SLT. In the meta-analysis conducted by Robey (1994), the average effect on recovery after SLT was provided in the acute stage after stroke was found to be twice the average effect on the recovery of untreated patients (d = 1·25 vs. d = 0·65). This effect gradually diminished during the postacute stage to a moderate or limited therapeutic effect in the chronic stage (d = 0·52 treated). The results of a case control study (n = 145) confirmed the relevance of early SLT (within 20 days poststroke), showing that treatment responsiveness after early SLT was six times greater than after delayed SLT (Paolucci *et al.* 2000). [NB: d = effect size: the difference between the groups or the strength of the relationship, e.g. for the t-test, which compares the means of two groups, 0·2 is defined as a small effect of an SD, 0·5 as a moderate effect and 0·8 as a large effect (Cohen 1987)].

Table 2 Characteristics of studies included on the effectiveness of SLT

Author/year	Study design	Setting/Phase	Sample	Intervention	Results/Conclusion
Bakheit *et al.* 2007	RCT	Hospital, rehabilitation, stroke unit, outpatient department and at home. Rehabilitation phase	First time stroke patients and WAB score < 93·8 n = 116 Intensive SLT: n = 51 Standard SLT: n = 46 National health service therapy (NHS): n = 19 47–54% female, mean age: 69·7–72·9 years	SLT over 12 weeks, starting as soon as practical. Intensive SLT: average four hours weekly. Standard SLT: average 1·6 hours weekly. NHS: 0·6 hours weekly Providers: qualified therapists of comparable experience	No effect of intensive SLT (p = 0·05). Improvement in aphasia was significantly lower in the NHS group (p = 0·002). Tolerance of intensive SLT was limited, especially in the first month
Bartolo *et al.* 2003	Single-case, pilot study	Chronic phase (greater than nine months poststroke)	Female, 66 years old, with aphasia poststroke (left hemisphere) n = 1. Healthy controls: n = 36 55% female, mean age: 68 years	Two tests sessions on two consecutive days (1) included reactive pantomimes, (2) included imitation tests	Three different routes were responsible for the different categories of gestures: the lexical route for processing meaningful gestures, the non-lexical route for meaningless gestures, performing and imitating pantomimes depended on functioning of the working memory
Beeson *et al.* 2005	Longitudinal single-case study	Outpatient unit Rehabilitation and chronic phase (22–54 weeks poststroke)	Male, 59-years-old with alexia, anomia and agraphia poststroke (left hemisphere) n = 1	Oral reading programme (weekly)	Oral reading had therapeutic value in patients with relatively intact letter processing ability and orthographic knowledge (reading rate d = 2·69 untreated vs. d = 9·21 treated, reading accuracy d = 0·82 untreated vs. d = 2·18 treated
Cherney 2004	Single-case study in a review, including a summary of treatment approaches of alexia	Chronic phase	Female, 39 years old with chronic aphasia and deep alexia poststroke n = 1	Oral reading programme provided by a speech language pathologist	Treatment effectiveness was shown on oral reading of sentences, reading comprehension and generalised improvement of aphasia. (WAB,A.Q.: 63 pretest and 68 posttest, WAB, reading: 51 pretest and 61 posttest, WAB, writing: 49 pretest and 52 posttest)
Diener & Bischof-Rosario 2004	Single-case study	Rehabilitation Center. Chronic phase	Male, 70 years old, with severe aphasia poststroke n = 1	Several AAC techniques step-wise provided by an occupational therapist and speech language therapist specialised in AAC	The use of short sentences written on cards and eye movements, showed the best results. AAC enhanced the assessment of the decision-making process

Table 2 (Continued)

Author/year	Study design	Setting/Phase	Sample	Intervention	Results/Conclusion
Paolucci *et al.* 2000	Case-control study	Hospital, rehabilitation unit. Italy Acute and rehabilitation phase	First time stroke patients *n* = 145	SLT within the first 20 days, between 20–40 days and between 40–60 days poststroke, provided by the inpatient-specific multidisciplinary treatment team	The subgroup with early SLT showed significantly higher treatment effectiveness than delayed SLT (OR = 6·11, 95% CI, 2·03–18·36)
Pedersen *et al.* 2001	Single-case studies, cross-over design and an across-functional-areas multiple-baseline design	At home. Rehabilitation phase Copenhagen and Denmark	Patients with anomia after left hemisphere stroke, *n* = 3. Male, age <57–71 years	Unsupervised computer training	All patients improved in general naming, Two patients improved for the trained words, whereas the third showed a more general effect. (Cochran's Q: 166, 99, 48, $p < 0{\cdot}001$)
Ramsberger & Basem 2007	Single case studies, cross-over and across-functional-areas multiple baseline design	At home. Rehabilitation phase	Patients with different types of aphasia poststroke (left hemisphere) *n* = 4 75% female, age <63–74 years>	Computer-based, self-administered cued naming therapy intense (5/week) and non-intense (2/week)	Naming of trained words improved (*d* = <2·08–14·68>), regardless treatment intensity. Generalisation to untrained words was weak
Rappaport *et al.* 1999	Follow-up study	Rehabilitation department. Postacute and rehabilitation phase	Patients with global aphasia poststroke (left hemisphere) *n* = 9 33% female, age <42–77 years> Length of stay <89–241 days>	Daily, intensive SLT over a period of five years with varying lengths of treatment, according to conventional inpatient treatment for all language modalities	Some patients do improve after treatment. Their outcomes varied significantly. A few patients regained functional linguistic abilities, while others showed little or no improvement
Rostron *et al.* 1996	Single case study	At home. Chronic phase	Man, 61 years old with severe aphasia and alexia poststroke (right hemisphere) *n* = 1	Computer training over four weeks with ACD (80% pictorial information and 20% text)	Improvements were found in speed and accuracy. For generative propositional communication, its effect is limited. Particularly patients with poor reading skills may benefit from the use of computerized devices
Sacchet *et al.* 1999	Pre posttest, combination of qualitative and quantitative data	Chronic phase (greater than one year poststroke)	Patients with severe aphasia *n* = 7 86% male, age: 47–66 years>	Group therapy of communicative drawing over 12 weeks, including individual and group sessions, provided by a therapist and trained carers	Factors that contributed to positive outcomes: – a structured and systematic program, – promoting drawing functionally, as a conversation strategy, – active involvement of carers, – mixed programme of group and individual sessions

RCT, randomised controlled trial; WAB, western aphasia battery; SLT, speech-language therapy; *p*, *p*-value; *d*, effect size; AQ, Aphasia Quotient; AAC, augmentative alternative communication; OR, odds ratio; CI, confidence interval; BI, Barthel Index; RMI, Rivermead Mobility Index; ADL, activities of daily living; ACD, augmentative communication device.

Table 3 Characteristics of systematic literature reviews included

Author/year	Topic	Database/period	Number of included studies	Results/Conclusion
Bhogal *et al.* 2003	Intensity of aphasia therapy	Medline, RCTs. January 1975–May 2002	10 studies *n* = 864 individual patients, varying between *n* = 10 and *n* = 327 per study)	Intense (8·8 hours a week) and short term therapy (over 2–3 months) can improve outcomes of SLT. PICA outcome positive studies (*n* = 259), 8·8 hour a week over 11·2 weeks = 15·1, vs. negative studies (*n* = 574), two hour a week over 22·9 weeks = 1·37, *p* = 0·001
Cicerone *et al.* 2000	The effectiveness of cognitive rehabilitation for speech-language problems, including interventions, focusing on comprehension, expression, reading, writing	Medline and reference lists from articles identified	41 studies in the category language and communication interventions	Several forms of cognitive rehabilitation showed effectiveness. Cognitive-linguistic therapies beyond the period of spontaneous recovery are recommended as well as cognitive interventions for specific areas of language impairment. Computer-based programmes supported the effectiveness of individualised treatment
Greener *et al.* 1999	The effectiveness of SLT for aphasia following stroke Comparing types of SLT: formal SLT, informal support and no treatment	Cochrane Stroke Group Trials Register (last search: March 1999) and reference lists of relevant articles to December 1998 Medline from 1966–1998 Cinahl from 1982–1998 International Journal of Disorders of Communication by hand from 1969–1998	12 trials, only three trials used a clear randomisation procedure. *n* = varying from 12–191 participants. The interventions varied in duration, intensity and timing	The effectiveness of SLT is not proven within a RCT. Other forms of evidence have to be used to make decisions about the management of patients with aphasia No difference was found between therapy provided by formal SLTs and by volunteers, but these results showed bias
Jordan & Hillis 2006	Studies regarding treatment of and recovery from aphasia, apraxia and dysarthria after stroke. Therapy approaches, which focused on the language problem itself or on using compensatory strategies	Special attention to clinically significant work published in the last 12 months (2005–2006)	50 references	The intensity of SLT may be more important than the method of therapy
Robey 1994	Efficacy of treatment for patients with aphasia after stroke	Meta-analysis Bibliographies and electronic literature search (e.g. Eric, Medline and PsychLit) Period: unlimited	21 studies Each study contributed no more than one effect to the meta-analysis of any null hypothesis (sometimes the effect contributed to more than one null hypothesis)	The effect of treatment beginning in the acute stage of recovery was nearly twice as large as the effect of spontaneous recovery alone (*d* = 1·25 vs. *d* = 0·65) Treatment initiated after the acute period achieved a smaller but still appreciable effect (*d* = 0·52 in the chronic phase)

Table 3 (Continued)

Author/year	Topic	Database/period	Number of included studies	Results/Conclusion
Salter *et al.* 2005	Evidence-based review of stroke rehabilitation, Aphasia	Systematic literature review Last update December 2005	80 references	Selected key conclusions of effective aphasia rehabilitation: SLT is most efficacious when provided intensely in the first three months Trained volunteers can provide SLT effectively as an adjunct to treatment by speech-language pathologists Supported conversation for patients with aphasia improves conversational skills Computer-based aphasia therapy results in improved language skills Task-specific semantic and phonological therapy improves semantic and phonological language activities, respectively
Salter *et al.* 2006	Identification of aphasia after stroke, using screening assessment instruments	PubMed, Web of Science, CINAHL and reference lists by hand 1960–2005	Six instruments with support for psychometric evaluation were identified	The FAST, is the most widely used and evaluated tool (overall sensitivity = 87%, specificity = 80%). The UAS is developed for nurses, less sensitive and more specific than the FAST (sensitivity = 75%, specificity = 90%). Further evaluation of screening tools is recommended

RCT, randomised controlled trial; SLT, speech-language therapy; PICA, Porch index of communicative ability; *p*, *p*-value; *d*, effect size; FAST, Frenchay aphasia screening test; UAS, Ullevaal aphasia screening.

In addition, three systematic reviews focused on the timing and duration of SLT (Cicerone *et al.* 2000, Bhogal *et al.* 2003, Jordan & Hillis 2006). A review of ten studies (n = 864) showed that short-term and intensive SLT, i.e. nine hours a week over 2–3 months, was effective (Bhogal *et al.* 2003). In contrast, in a randomised controlled trial (RCT) (n = 116), an average of four hours SLT each week gave the same treatment effectiveness as an average of two therapy hours per week (Bakheit *et al.* 2007). The other two systematic reviews both concluded that the intensity of treatment was positively correlated with treatment effectiveness (Cicerone *et al.* 2000, Jordan & Hillis 2006). Even in patients with extremely severe aphasia, one small follow-up study (n = 9) showed improved rehabilitation after intensive, prolonged therapy (Rappaport *et al.* 1999).

Besides the intensity of SLT, the providers' support was investigated in terms of its effectiveness on rehabilitation outcome. Two systematic reviews reported that the effectiveness of SLT did not depend on its application by a speech-language therapist or trained volunteer (Greener *et al.* 1999, Salter *et al.* 2005). Greener *et al.*, however, reported much bias in the studies included in their review, with little evidence in favour of informal support. In the other review, strong evidence was found that SLT showed the same treatment results whether it was provided by trained volunteers or speech-language therapists. Therefore informal support was evaluated as an effective adjunct to formal SLT (Salter *et al.* 2005). Together with SLT in general, specific speech-language interventions were investigated. In the present review, the research strategy revealed three types of speech-language interventions, which nurses can apply in clinical practice: task-specific interventions, augmentative alternative communication and computer-based therapy.

Task-specific interventions

Two systematic reviews (Cicerone *et al.* 2000, Salter *et al.* 2005) (Table 3) and two studies (Cherney 2004, Beeson *et al.* 2005) (Table 2) reported findings concerning task-specific interventions such as oral reading. The review by Salter *et al.* (2005) showed moderate evidence for the effect of practising phonological or semantic tasks on, respectively, phonological and semantic functional improvements in patients with aphasia. In another review (Cicerone *et al.* 2000), cognitive interventions that focused on specific language deficits such as language formulation and reading comprehension were effective. Examples of task-specific interventions were found in two single-case studies focusing on alexia as a specific aphasia deficit (Cherney 2004, Beeson *et al.* 2005). Both studies used an exercise programme of oral reading. One showed improvements in reading sentences, reading comprehension and generalised improvement in aphasia in a patient with chronic aphasia and deep alexia as indicated by pretreatment and posttreatment impairment test scores (Cherney 2004). In the other single-case study, treatment effectiveness was evident in periods of treatment as compared to periods without treatment (Beeson *et al.* 2005).

Augmentative alternative communication

Augmentative alternative communication (AAC) was described in three studies (Sacchet *et al.* 1999, Bartolo *et al.* 2003, Diener & Bischof-Rosario 2004) (Table 2). AAC includes forms of non-verbal communication, for example, gestures or devices such as an alphabet board or pictorial icons. Bartolo *et al.* (2003) showed the complexity of using gestures in a single-case study. Three categories of gestures were distinguished, namely meaningful gestures, meaningless gestures and pantomime. Different cognitive skills seemed to activate these three types of gesture. For example, to perform and imitate pantomimes, a specific 'working memory' was used (Bartolo *et al.* 2003). Diener and Bischof-Rosario (2004) studied the effectiveness of AAC on a complex decision process in a patient with severe aphasia. This single-case study supported the use of AAC, including interventions with increasing complexity. Using interventions of stepwise increasing complexity, it was possible to make a reliable statement concerning the patient's decision processes. AAC therapy provided to patients with severe aphasia (n = 7) during the chronic stage was also studied. The patients as a group appeared to benefit from a relatively short AAC therapy course (12 weeks) that included a programme of communicative drawing (Sacchet *et al.* 1999). The results presented are considered inconclusive evidence of the effectiveness of AAC because the sample sizes were small, RCTs were lacking and different AAC techniques were used.

Computer-based therapy

Although computers can be considered as AAC-devices or task-specific interventions, specific computer-based therapies have been explored for speech-language problems. Such studies were found in two systematic reviews (Cicerone *et al.* 2000, Salter *et al.* 2005) (Table 3) and three small single-case studies (Rostron *et al.* 1996, Pedersen *et al.* 2001, Ramsberger & Basem 2007) (Table 2). Cicerone *et al.* (2000) recommended the use of computers in a multimodal programme, because it was found that computer reading led to a significant effect on reading comprehension functions as well as generalisation to other language functions. In addition, Salter *et al.* (2005) reviewed six studies that focused on computer-based treatment of aphasia. They found that computer-based interventions improved speech-language skills. However, in

contrast to Cicerone's conclusion, they found limited evidence for generalisation to functional communication (Salter *et al.* 2005). Rostron *et al.* (1996) investigated the efficacy of computer training in a single-case study of a patient with alexia. The intervention replaced the reading of text with the reading of 'pictures'. The patient showed improvements in speed and accuracy of computer use, but only limited improvements in conversational communication (Rostron *et al.* 1996). In another single-case study experiment on three patients with anomia, i.e. a mild aphasic deficit in word finding, improvements in language skills were seen after a computer-based intervention. However, only one patient generalised specific tasks to functional communication (Pedersen *et al.* 2001). A self-administered, computer-based, cued naming therapy showed benefits in aphasic patients ($n = 4$) regardless of the intensity of the treatment schedule (Ramsberger & Basem 2007).

Discussion

The findings of this systematic review demonstrate the possibility of nursing support both in the detection of aphasia in patients after stroke and in their rehabilitation. Screening reduces the likelihood of missing mild to moderate aphasia in clinical practice (Edwards *et al.* 2006). After early detection, SLT needs to be started as soon as possible (Robey 1994, Paolucci *et al.* 2005) and intensive treatment is necessary (Bhogal *et al.* 2003) to optimise rehabilitation outcome. No differences in effect are apparent when SLT is provided by speech-language therapists or trained volunteers (Salter *et al.* 2005). Consistent with the nursing intervention criteria that enhance communication, task-specific exercises and the use of AAC, including computer-based therapy are identified.

Some limitations need to be addressed. First, the studies included have different designs and varying methodological qualities with mainly small sample sizes and they focus on different types and phases of aphasia. Only a few studies measured the effects of speech-language interventions in randomised controlled trials. For this reason, the effectiveness of these interventions is promising but mainly inconclusive. Moreover, consistent with the critique of Jordan and Hillis (2006), the literature reviewed did not systematically link the effect of therapies with specific aphasia diagnoses. Therefore only preliminary results were found describing the effectiveness of speech-language interventions that can be used by nurses. Second, most studies of speech-language interventions address the patient's rehabilitation outcomes and the providers of these interventions are speech-language therapists (Table 2). To extrapolate these findings to a nursing context, the classification of nursing interventions for communication deficits was used (McCloskey & Bulechek 2000, Johnson *et al.* 2006). This classification is a general list of nursing activities for enhancing communication and in particular for combating speech deficits. However, these nursing activities correspond minimally to the previously described interventions for aphasia. Examples of nursing activities that are specific for aphasia include the use of gestures and communication devices and providing task-specific interventions such as practising the repetition of words with patients. Although aphasia interventions have not been fully integrated into nursing activities, this review may be seen as a first step towards yielding evidence for speech-language interventions in nursing. Third, in the studies included in the reviews on the effectiveness of SLT by trained volunteers, the exact nature of the SLT was not clearly described and could not be linked to specific speech-language interventions such as AAC. Furthermore, the training of volunteers ranged from brief instructions to training in the same techniques as the speech-language therapist, so successful elements of training cannot be identified.

A detailed and transparent data collection procedure was followed in this systematic review, including analysis of the methodological quality of the articles. The findings of this review emphasise the relevance of early detection and treatment of aphasia in nursing practice. The recognition of aphasia is complex and needs observation of a patient's communication patterns (Worrall *et al.* 2002). In rehabilitation nursing care, observation, assessment and interpretation are identified as core activities (Pryor & Smith 2002). Nurses show effective communication with aphasic patients after stroke, using their close relationship with the patient (Sundin & Jansson 2003). To observe and assess nurse-patient conversational interactions objectively, the MSC/MPC can be used (Kagan *et al.* 2004). The outcome of nurses' conversational skills may be relevant for training and research purposes. Furthermore, to assess the presence of aphasia, the FAST (Enderby *et al.* 1987) and the UAS (Thommessen *et al.* 1999) were found to be useful screening instruments for nurses. Both instruments require limited training and have shown good validity. Decisions about which instrument to use may depend on tradition, translation and cultural aspects. Using these tools, only a preliminary identification of aphasia can be obtained. In organised inpatient multidisciplinary stroke teams, the input of various professionals is coordinated through regular meetings (Langhorne & Duncan 2001). In these teams, nurses' screening and observation outcomes can support the direction for further examination and diagnosis by specialised professionals such as neuropsychologists and speech-language therapists.

After identification of aphasia in the acute stage of stroke, intensive SLT is necessary, at least one hour a day (Bhogal *et al.* 2003). Fewer treatment hours were ineffective and may be below the threshold (Bakheit *et al.* 2007). In European rehabilitation practice, the availability of SLT ranged on average from one to one and a half hours weekly per patient (De Wit *et al.* 2005). On acute stroke units, the average intensity was 32·5 minutes per session with an average frequency of 0·31 sessions per day (Bernardt *et al.* 2007). Furthermore, most stroke patients are confronted with the overwhelming experience of multiple impairments. In the first month after stroke, patients' tolerance to intensive SLT on a schedule of four hours per week was found to be limited (Bakheit *et al.* 2007). The findings of these studies clearly indicate that aphasic patients need more intensive SLT. Nurses are challenged to integrate SLT into the daily nursing care of these patients. Indeed, they have to take each patient's energy into account. Thereby, they can enhance the amount of SLT by therapy integration, i.e. using the same therapeutic techniques as the speech-language therapist and the patient's new abilities in daily care activities such as bathing and eating. Long *et al.* (2002) identified therapy-integration as one role for nurses in the multiprofessional rehabilitation team, together with another five roles: assessment, co-ordination and communication, technical and physical care, emotional support and involving the family. However, these active roles in rehabilitation were not always valued and recognised by nurses themselves, or by other team members or management (Jones *et al.* 1997, Long *et al.* 2002). In a systematic review by Finke *et al.* (2008), disregard for the rehabilitation roles of nurses was reported as a barrier to effective nurse-patient communication, especially for patients with complex communication needs including aphasia. Together with attitudinal barriers, the lack of AAC knowledge and training were found to be limitations in nurses' communication skills (Finke *et al.* 2008). When people other than speech-language therapists provide SLT, training is important for obtaining similar treatment outcomes (Kagan *et al.* 2001). Therefore training of nurses to enhance their knowledge of SLT is needed and may result in a more active attitude to providing SLT and vice versa.

On the basis of the findings in this review, however, it is not clear in which speech-language interventions nurses should be trained. Nurses are challenged to link diagnosis with speech-language interventions and this should be performed in close collaboration with speech-language therapists. For example, when nurses use gestures, the patient with stroke may comprehend one type of gesture but not another because of specific cognitive deficits (Bartolo *et al.* 2003). Cognitive deficits after stroke have been identified as predictors of limited language recovery (Nys *et al.* 2005b, Paolucci *et al.* 2005), so recognition of these deficits is highly important. Another example is the use of computers as a promising task-specific or AAC intervention (Salter *et al.* 2005). Practising on a computer stimulates patient autonomy (Ramsberger & Basem 2007). In a qualitative study on patients' experiences of how to live successfully with aphasia poststroke, autonomy was identified as a supporting element (Hinckley 2006). However, autonomous exercising by patients was rarely seen in European stroke rehabilitation settings and patients spent more than half their time with no interaction (De Wit *et al.* 2005). Working with computers can efficiently occupy periods when the patient is not engaged in therapy or receiving care. Of course, not all stroke patients are able to perform computer tasks. A patient's capabilities and condition are major components of the effectiveness of SLT (Greener & Grant 1998). For this reason, nurses' knowledge of the patient is an ongoing process for identifying facilitators and barriers before and during the provision of SLT to support optimal rehabilitation.

Conclusion

Maximising communication in the poststroke patient with aphasia is a relevant rehabilitation outcome and nurses can contribute to this process. The continuous 24 hours per day care provided by nurses offers the opportunity to collect relevant information concerning patients' communication deficits, especially when screening instruments are used.

The key finding of this review, targeted at nursing care for patients with aphasia after stroke, is the integration of speech-language interventions and functional training into the daily care that they provide during the acute stage of stroke. In this way, the intensity of SLT that is necessary to achieve treatment effectiveness addresses the patients' tolerance of therapy and the availability of non-therapeutic time. Effective interventions that are feasible and relevant in nursing practice are the use of AAC, for example an alphabet board, task-specific interventions, such as phonological and semantic exercises, and computer-based therapy. These interventions can be provided by nurses in close collaboration with speech-language therapists and other team members. It is important that nurses place the interventions in the process of assessing, treating and evaluating language function for the individual patient.

Further research is needed on the effectiveness of speech-language interventions provided by nurses and on patients' experiences with these interventions. Evidence-based knowledge of SLT may optimise collaboration between nurses, patients and stroke team members in the future.

Relevance to clinical practice

The findings of this study show that various speech-language interventions are feasible and relevant to use by nurses in their daily care of patients with aphasia. These interventions correspond with the role of nurses in active rehabilitation. To improve the quality of rehabilitation in patients with aphasia, nursing guidelines need to be developed. The adaptation and use of stroke guidelines were found to depend on the knowledge and attitude of the professional (Heinemann *et al.* 2003). Training nurses in using speech-language interventions for aphasia is therefore of the utmost importance. In addition, nurses' support for SLT and its contribution to the multidisciplinary stroke rehabilitation team may need to be targets of future research.

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Contributions

Study design: IEP, TBH; data collection and analysis: IEP, TBH.; manuscript preparation: IEP, TBH, MJS, EL.

Conflict of interest

There are no financial, personal, political, academical or other relations that could lead to a conflict of interest.

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