Evidence-Based Practice Recommendations for Working with Individuals with Dementia: Spaced-Retrieval Training

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The Academy of Neurologic Communication Disorders and Sciences (ANCDS), the American Speech-Language-Hearing Association (ASHA), its Special Interest Division 2 (SID-2, Neurophysiology and Neurogenic Speech and Language Disorders), and the Veterans Administration (VA) collaborated to establish evidence-based practice guidelines for speech-language pathologists (SLPs) who work with individuals who have Alzheimer type dementia. A writing committee was formed and a technical report with evidence tables was developed based on a systematic review and classification of the literature related to assessment and management of individuals with dementia of the Alzheimer type. In this clinical report, scientific evidence related to clinical interventions using spaced-retrieval training is summarized. The 15 studies reviewed were judged to provide Class II and Class III scientific evidence to support the use of spaced-retrieval training for individuals with dementia. Participant characteristics, the nature of the training programs, outcomes of the training, methodological concerns, trends across studies, practice recommendations, and directions for future research are provided.

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The Dementia Practice Guidelines Writing Committee was formed to develop practice guidelines for speech-language pathologists (SLPs) working with individuals with dementia of the Alzheimer's type. This committee performed an exhaustive and systematic review of the literature related to assessment and management of individuals with dementia, evaluated and classified the literature based on pre-determined criteria (see Frattali, et al. 2003 for a detailed discussion of best practice guidelines in speech-language pathology). In this article, which is one in a series of reports, evidence related to spaced-retrieval training for individuals with dementia is reviewed.

Dementia is defined by deficits in cognitive function that are sufficient to adversely affect everyday life. Irreversible dementia is most commonly caused by Alzheimer's disease (AD) and vascular disease, and although pharmaceutical options are available for management of symptoms, no cure exists. As the population ages and the number of older adults increases, more people are being diagnosed and are living with AD or related dementias. Commensurate with this growth is the need for effective assessment and behavioral management techniques. SLPs typically design management programs that are focused either directly on the individual who has the dementia or indirectly on training that individual's caregivers. Spaced-retrieval training is considered a direct intervention for persons with dementia.

SPACED-RETRIEVAL TRAINING

Spaced-retrieval (SR) training was first described by Landauer and Bjork (1978) as a memory intervention for teaching face-name associations to persons with explicit memory impairments. Later, Camp (1989) reported on adapting SR training for individuals with dementia. In SR training, the clinician asks a question and requires an immediate response from the client. The interval between recall opportunities is systematically lengthened during training sessions until the client demonstrates recall of information in everyday situations. For example, the clinician may ask the client "How can you find out what to do today?" and the client has to answer "Look at my calendar." The client then must recall this information over increasingly longer time intervals. In some cases, the verbal response is paired with the demonstration of a procedure or skill; in this case, the procedure of checking a calendar.

SR training is thought to rely on nondeclarative memory systems, such as motor procedural memory, and capacity for stimulus-response conditioning. Importantly, these systems tend to be more resilient to the effects of AD than do working and declarative memory systems. Thus, SR training has been increasingly used with individuals who have AD and other types of dementia as a means to teach important information and/or skills to ultimately improve functioning in everyday life activities.

PROCEDURES

Systematic Review of the Literature

A general search was conducted in several electronic databases: Medline (1966-August 2002), CINAHL (1982-August 2002), HealthSTAR (1975-August 2002), PsychINFO (1967-August 2002), EBM Reviews, Cochrane Database of Systematic Reviews, ACP Journal Club, Database of Abstracts of Reviews of Effectiveness, Cochrane Controlled Trials Register, AMED (1985-September 2002), and Academic Search Elite (1980-September 2002). Additionally, hand searches were conducted of relevant edited books and studies cited in articles and chapters. The following search terms were used: *spaced-retrieval training, spaced-retrieval, dementia, dementia of the Alzheimer's type*, and *Alzheimer's/Alzheimer disease*. Eighteen articles were identified as being related to the search terms. After excluding studies in which participants were not individuals with AD or a related dementia, and those in which the investigators used cognitive stimulation other than spaced-retrieval training, 13 articles (with a total of 15 studies) were selected for this review (two of the articles contained two studies, see Bird & Kinsella, 1996, and Camp, Foss, Stevens, & O'Hanlon, 1996).

Classifying the Evidence

The writing committee developed an "evidence table" for classification of all research evidence related to assessment and intervention by SLPs working with individuals with dementia. Each study was classified based on several parameters, including the focus/purpose of the study, subject characteristics, internal validity, external validity, construct validity, and dose-response characteristics (frequency, intensity, duration) of the intervention.

To ensure reliability of coding, at least two committee members rated the studies independently on all the parameters listed in the evidence table. The results of the classification for studies related to

screening, assessment, and direct and indirect interventions are available in a technical report on the website of the ANCDS (www.ancds.duq.edu). In the current clinical report, evidence for SR training as a direct intervention for individuals with dementia is discussed. Consistent with Sohlberg et al. (2003) five questions are used to guide the discussion: (1) Who are the participants who received the SR intervention? (2) What comprises the SR intervention? (3) What are the outcomes of the SR intervention? (4) What are key methodological concerns related to the SR intervention studies? (5) Are there clinically applicable trends across SR intervention studies?

SUMMARY OF EVIDENCE FOR SR TRAINING STUDIES

Who Are the Participants Who Received SR Intervention?

In all studies, participants were individuals with probable AD, vascular dementia, or an unspecified progressive dementia. In 4 of the studies (Abrahams & Camp, 1993; Bird, 2001; Bird, Alexopoulos, & Adamowicz, 1995; Brush & Camp, 1998), investigators reported single-subject results for individuals with dementia in conjunction with reports on individuals with other diagnoses (i.e., CVA, anoxic/hypoxic brain damage). In this review, only the results for individuals with AD or a related dementia (e.g., vascular dementia) were reviewed. Fourteen of the 15 studies contained information on severity of cognitive decline (with the exception of Camp, 1989), which was most often judged on the basis of scores on the *Mini-Mental State Examination* (MMSE; Folstein, Folstein, & McHugh, 1975). Participants' scores ranged from 27/30–6/30, indicating very mild to severe cognitive impairment.

All of the studies contained *information* on the age of the participants, which ranged from 52–96 years. Eleven of the studies included information on the sex of the participants (65% were female), and only two studies (Abrahams & Camp, 1993; Vanhalle, Van der Linden, Belleville, & Gilbert, 1998) included information on the ethnicity of the participants. No investigators reported evaluation of hearing, and only one study involved a vision screening (McKitrick, Camp, & Black, 1992). Only five studies included information about depression, which is a common comorbidity in dementia (Bird & Kinsella, 1996, Studies 1 and 2; Cherry & Simmons-D'Gerolamo, 1999; Cherry, Simmons, & Camp,1999; McKitrick et al., 1992). In summary, the sample of participants from these studies is heterogeneous, and much specific information about demographic characteristics and factors that might affect response to a treatment program was lacking.

What Comprises the SR Intervention?

The primary purpose of the 15 studies was to investigate the effects of SR training on learning of information and/or behaviors by people with dementia. However, the studies varied with regard to type of associations trained, the format of the SR training, and the dose-response characteristics of the treatment.

Generally, associations trained using the SR paradigm could be classified into two types: cue-behavior associations and *face/object*-name associations. The cue-behavior associations included verbal cues to use external memory aids (Camp et al., 1996, Experiment 2; Stevens, O'Hanlon, & Camp, 1993), and to perform experimentally controlled tasks such as handing the experimenter a colored coupon (Camp et al., 1996, Experiment 1; McKitrick et al., 1992), associating a verbal and then an auditory cue (alarm) with the procedure of opening and reading task instructions in a book or box and performing the task written there (Bird & Kinsella, 1996, Study 1), and putting glasses in a case or a lid on a jar (Bird & Kinsella, 1996, Study 2). Other researchers also focused on teaching positive alternatives to problem behaviors associated with dementia (Bird 2001; Bird, et al., 1995). Specifically, in Bird's (2001) study, a woman with dementia was verbally aggressive with long-term care staff, accusing them of stealing her personal belongings. SR training was used to teach her to check a large-sized poster that listed the location of her possessions and, as a result, she soon stopped accusing the staff, and they were no longer exasperated with the situation.

Face-name associations were taught by Vanhalle et al. (1998) and Camp (1989) and object-name associations were chosen *for training* by Cherry and Simmons-D'Gerolamo (1999), Cherry et al. (1999), Abrahams and Camp (1993), and McKitrick and Camp (1993). Brush and Camp (1998) incorporated face-name associations, a piece of important information, and a compensatory strategy for each participant in their study.

The format of the SR training varied only slightly across studies because SR training is a standard procedure in which individuals are asked to recall information over increasing intervals of time. Variations did exist, however, in factors such as the length of the recall intervals and descriptions of

who administered the treatment. For example, the length of recall intervals was increased in a systematic way (exponentially or by some other fixed increment) in the majority of the studies (Bird & Kinsella, 1996, Studies 1 and 2; Camp, 1989; Camp et al., 1996, Experiments 1 and 2; Cherry & Simmons-D'Gerolamo, 1999; Cherry et al., 1999; McKitrick et al., 1992; Stevens et al., 1993; Vanhalle et al., 1998), whereas flexible intervals were used by Brush and Camp (1998) who utilized "natural pauses" in the conversation or other therapy tasks that were taking place during the intervals. In other studies, no mention was made of the length of recall intervals used during training (Abrahams & Camp, 1993; Bird, 2001; Bird et al., 1995; McKitrick & Camp, 1993).

Treatment providers were most commonly research personnel, although their training and expertise were not detailed in any study. For example, some investigators described the SR training as carried out by the "experimenter" (Camp et al., 1996, Experiments 1 and 2; Cherry & Simmons-D'Gerolamo, 1999; Cherry et al., 1999; McKitrick et al., 1992; McKitrick & Camp, 1993; Stevens et al., 1993) or "trainer" (McKitrick & Camp, 1993). Brush and Camp (1998) reported that SLPs implemented the SR training within the context of a speech-language therapy session. Finally, several investigators made no mention of who administered the treatment to the participants (Bird, 2001; Bird & Kinsella, 1996, Studies 1 and 2; Bird et al., 1995; Camp, 1989; Vanhalle et al., 1998).

Dose-response characteristics, such as frequency, intensity, and duration of the intervention also varied across studies. In one study (Bird, 2001), no details were provided except for a statement that the "initial training phase" lasted 90 minutes (p. 366). Session length in the other 14 studies ranged from 30 minutes (e.g., Abrahams & Camp, 1993; Camp, 1989) to 90 minutes (Cherry & Simmons-D'Gerolamo, 1999; Cherry et al., 1999). Sessions occurred one time (Abrahams & Camp, 1993; Bird et al., 1995; Camp, 1989; Camp et al., 1996; McKitrick & Camp, 1993; McKitrick et al., 1992; Stevens et al., 1993; Vanhalle et al., 1998) to three times a week (Brush & Camp, 1998; Cherry & Simmons-D'Gerolamo, 1999; Cherry et al., 1999). Duration of treatment lasted from one session for the training of each of two tasks (Bird & Kinsella, 1996, Study 1) to 20 sessions (Brush & Camp, 1998).

What Are the Outcomes of the SR Intervention?

Outcome measures are intended to assess change in health condition, functional status, or behavior that occurs as a result of an intervention. The selection of appropriate outcome measures for individuals with dementia is complicated by the degenerative nature of the syndrome; that is, individuals with irreversible dementia have an underlying disease that is progressive, and cognitive-communication function inevitably worsens over time. However, measurement of treatment outcomes need not be focused solely on this level of function. Using the World Health Organization's International Classification of Functioning, Disability and Health (ICF; WHO, 2001), clinicians and researchers can choose assessments that reflect measurement not only of impairment in body structures and functions, but of limitations in activity/participation in daily life and contextual/environmental factors that may be barriers or facilitators to optimal functioning. For example, memory is a significantly impaired psychological function in dementia. As a result of this impairment, individuals with dementia may experience difficulty initiating and engaging in conversation (activity/participation). In addition, environmental factors may act as barriers to communication. If the person lives alone and has reduced physical mobility, then the physical environment may be contributing to decreased opportunities for social interaction. If the individual lives in a long-term care facility, communication partners' negative attitudes and lack of knowledge about how to interact with someone who has dementia may result in impoverished communication (Lubinski, 1995). SR training may be implemented to teach a specific skill (e.g., checking the activities calendar to find out what to do during the day) that facilitates participation in daily life activities where conversation is likely to occur. In this situation, the level of memory impairment would not be expected to change as a result of the intervention, but the activity/participation restriction and the environmental barrier of isolation would be expected to lessen.

Each intervention has anticipated benefits for the person with dementia. With SR training, the goal is to alleviate specific problems in activities/participation associated with the memory impairment rather than to restore memory processes or improve general memory functioning (Sohlberg & Mateer, 2001). Thus, outcome measures of global cognitive functioning typically will not be sensitive to the "domain-specific" learning (Sohlberg & Mateer, 2001) that is the focus of SR training.

Consistent with this philosophy, researchers used several types of outcome measures in the 15 reviewed studies that were related to the information and behaviors being taught using SR training.

These measures included length of time taken to learn information and behaviors being trained, the type and number of cues needed to recall trained information, frequency of spontaneous and prompted production of information and behaviors, and maintenance and generalization of the learned response across appropriate situations and stimuli.

Maintenance and generalization are particularly important to consider as outcomes of SR training. Maintenance of the trained behavior was reported in 12 studies. Individuals with dementia demonstrated retention of the information when tested 1 day after training (Bird & Kinsella, 1996, Studies 1 and 2) and as long as 3 months (Bird et al., 1995) after the SR intervention.

Generalization of the trained response was reported in six articles. For example, Abrahams and Camp (1993) reported generalization of the correct name of two target training items, from the line drawings used during treatment sessions, to colored drawings and actual exemplars of each item (i.e., racket, harmonica), and Camp et al. (1996, Study 2) stated that some of their participants with dementia were able to use the trained strategy of checking a calendar in the context of daily life.

What Are Key Methodological Concerns Related to the SR Intervention Studies?

The methodological concerns relate to internal validity, or the ability to make causal inferences from the study, and external validity, or generalizability of the findings. With regard to internal validity, none of the studies involved randomization of subjects, and most of the investigators used small sample sizes. Eleven studies were single-subject experiments or case studies, and 4 were group studies. Cherry and Simmons-D'Gerolamo (1999), Cherry et al. (1999), and McKitrick et al. (1992) used a single-subject design with replications across participants. Other investigators used designs best characterized as case reports either in isolation (Abrahams & Camp, 1993; Bird, 2001; McKitrick & Camp, 1993; Stevens et al., 1993; Vanhalle et al., 1998) or in series (Bird et al., 1995; Brush & Camp, 1998; Camp, 1989). Bird and Kinsella (1996) employed a single group, pre- and posttest design in their two investigations ($n = 24$ in each study; of the 24 participants in the second study, 5 had participated in the first study). Camp et al. (1996, Experiments 1 and 2) also used single group design ($n = 30$, $n = 23$, respectively).

Issues related to external validity arose on review of the 15 studies. Sample generalizability, or the ability to generalize from the study sample to the population of interest, was judged as variable as a result of differing inclusionary and exclusionary criteria for subject selection and the presence of individuals with mixed dementia etiologies in study samples. For example, in Cherry et al. (1999) and Cherry and Simmons-D'Gerolamo (1999) participants were carefully selected to meet strict inclusionary criteria. Thus, these individuals may be a select subgroup that is not representative of the general population of individuals with AD. In several of the studies, little information was provided about the neuropsychological profile of the sample participants, leaving the reader with questions about the types of individuals in clinical settings who might benefit from the treatments described. In addition, there was a surprising lack of information provided on the cultural and ethnic characteristics of the participants.

With regard to measurement and procedural reliability, there was a general lack of specific information provided by the researchers. Interrater reliability estimates for data collection procedures were not mentioned by any of the investigators. As well, interrater reliability judgments related to treatment implementation were not reported in any study. In fact, manipulation checks (in which an investigator ensures that the treatment was carried out as described) were reported in only 2 of the 15 articles reviewed (Bird & Kinsella, 1996, Studies 1 and 2).

Are There Clinically Applicable Trends Across SR Intervention Studies?

The results of the 13 articles reviewed for this report were generally positive in that the large majority of the participants learned some or all of the target information and behaviors being taught. In the Bird (2001) case study, the participant learned a compensatory behavior to replace an existing negative one. Bird et al. (1995) also reported that the one of the two individuals in their case studies learned the association between a cue and behavior to reduce disruptive vocalizations. Stevens et al. (1993) and Camp et al. (1996) reported that participants learned to use a calendar as an external memory aid in less than 3 weeks. In the Cherry et al. (1999) and Cherry and Simmons-D'Gerolamo (1999) studies, all subjects learned the object-name associations. Abrahams and Camp (1993) and McKitrick and Camp (1993) also reported positive results of the object-name SR training. Camp (1989) reported that individuals acquired target face-name associations in fewer than five sessions and retained them for varying intervals of time, and Vanhalle et al.

(1998) showed that the individual in their case study learned face-name associations, although one type of instruction (implicit) was superior to another (explicit) for their participant. Many, though not all of the participants in the Bird and Kinsella studies (1996), learned the cue-behavior associations, and McKitrick et al. (1992) and Camp et al. (1996, Experiment 1) reported that their subjects learned to correctly perform the task of handing the experimenter a colored coupon. Results from Brush and Camp (1998) were variable, with all participants learning some information, but with two participants not completing the study.

WHAT HAVE WE LEARNED FROM THIS REVIEW?

All of the studies reviewed were classified as either Class III (Abrahams & Camp, 1993; Bird, 2001; Bird et al., 1995; Brush & Camp, 1998; Camp, 1989; Cherry et al., 1999; McKitrick & Camp, 1993; Stevens et al., 1993; Vanhalle et al., 1998;) or Class II (Bird & Kinsella, 1996, Studies 1 and 2; Camp et al., 1996, Experiments 1 and 2; Cherry & Simmons-D'Gerolamo, 1999; McKitrick et al., 1993) evidence for the use of SR training as a cognitive-linguistic intervention for individuals with dementia.

Although the results of the reviewed studies were overwhelmingly positive, methodological shortcomings warrant cautious interpretation of the findings. Lack of specification of participant characteristics decreases generalizability of the findings. Also, more attention must be paid to including interrater reliability judgments in the research examining the efficacy and effectiveness of SR training. These judgments are particularly important in treatment studies in which dependent measures are based solely on behavioral observations. Treatment fidelity is also of the utmost importance in intervention studies, and thus more information on procedural reliability should be provided. Based on these findings, recommendations for clinical practice are outlined below.

Appropriate candidates for spaced-retrieval training:

- Individuals with declarative memory impairments resulting from a progressive dementia and with cognitive severity ranging from mild to severe and the ability to engage in structured training tasks
- Hearing loss, visual impairments, and other co-morbid conditions may affect response to treatment, although insufficient evidence exists to make recommendations based on the presence of these conditions.

Implementation of spaced-retrieval training in dementia:

- Administer training sessions weekly but more frequently as needed depending on the nature of the association being learned and the individual characteristics of the client.
- Teach verbal responses and/or skills that are individualized based on client needs.
- Train caregivers in expected responses and behaviors to facilitate generalization to everyday contexts.

Expected outcomes of spaced-retrieval training in dementia:

- Improvement in the acquisition, retention, and generalization of trained information and/or skills
- Retention of learned information and/or skills from one day to several months following training
- Generalization of learned information and/or skills to specific contexts and situations
- No change in global cognitive functioning or general memory function as a result of training.

CURRENT AND FUTURE RESEARCH DIRECTIONS

After collecting the relevant literature and during the completion of this systematic review and classification, several new SR intervention studies were published. These studies could not be included in the evidence table of the technical report; however, they will be briefly reviewed here as they contribute to the body of evidence to support SR training with individuals who have dementia.

Bourgeois et al. (2003) compared the effectiveness of SR training and a hierarchy of cues for teaching 25 individuals with mild to moderate Alzheimer's dementia to use an external memory aid for a specific purpose. The external aids included memory books, written steps to perform activities of daily living, activity reminder cards, and physical cues such as name tags. Twenty-three of the participants mastered their goals in the SR training condition,

and 18/25 mastered their goals in the cueing hierarchy condition (mastery was defined as the correct response to the prompt question over three sessions with a minimum of 24 hours between each session). Maintenance also was demonstrated by some participants at 1 week and 4 months following goal mastery.

Cherry and Simmons-D'Gerolamo (2004) extended their previous work in the area of SR training to investigate the long-term effectiveness of training for individuals with probable AD and to assess the effect on learning of increasing the frequency of training sessions. Four individuals with probable AD participated in the intervention, which involved selecting a designated object from an array of distractor objects and handing it to the experimenter when a beeper sounded. Six 1-hour SR training sessions were conducted on alternate days during a 2-week period (in previous studies using the same task, only three, 1-hour sessions had been conducted).

Two of the individuals had participated in a related study (Cherry et al., 1999) 2 years prior to the current study. The authors hypothesized that the long-term effectiveness of SR training would be exhibited in a "savings in relearning" by these two participants. They were expected to have fewer recall failures and longer retention intervals across trials compared to their original performance 2 years before and compared to the two participants who had not been previously exposed to SR training and the experimental task. In general, the results did not support the "savings in relearning" hypothesis. However, the increase in the number of training sessions from three to six appeared to have a positive effect on learning. All participants produced fewer failed recall trials and longer retention intervals in the later sessions compared to the earlier ones.

Hawley and Cherry (2004) applied this same treatment schedule (six sessions over a 2-week period) in their study of SR training for face-name recognition and generalization of the target name to the actual person. Six adults with probable AD participated in the study. All six participants learned the target face-name association, and three of them demonstrated the ability to call the live person by his or her correct name in a transfer task.

Hochhalter, Bakke, Holum, and Overmier (2004) compared learning of a pill name by five individuals with AD (the sample also included five individuals with alcohol-induced memory impairment) in two conditions: using "*uniform*" SR training in which the intervals between recall were the same after each trial and using "adjusted" SR training (the intervals are expanded systematically, based on the accuracy of the participant's response, which is the standard use of SR training with individuals with dementia). None of the five participants with AD learned the pill name in the "uniform" SR training condition. However, four of the five participants with AD learned the pill name in the "adjusted" SR *training* condition.

Finally, Joltin, Camp, and McMahon (2003) investigated the effects of implementing SR training over the telephone with three individuals with dementia. Information to be learned included the correct time of day to take medications and a family member's name. Though successful learning of the information varied among the participants, the authors reported that SR training was delivered effectively over the phone.

These recent studies are examples of the growing literature in this area, but continued investigations are necessary. Additional studies with larger samples and experimental control are needed to investigate many questions related to SR training with individuals with dementia. One important question relates to the generalization of learned associations to the situations in which they should be used by persons with dementia. A second important question relates to the length of time learned associations are maintained before additional "booster" training sessions are needed. Also of interest are factors that may affect response to SR training. For example, patient characteristics, including dementia severity and type, information practiced during recall intervals, and modifications of the protocol (e.g., length and number of intervals, recall versus recognition, inclusion of other approaches) may affect learning, retention, and generalization. Other training-related variables that warrant investigation are the type of information that can best be trained using SR, the optimal frequency and duration of treatment sessions, who can be trained to carry out SR training and what this training should consist of, the perspectives of caregivers and patients regarding SR training, and the cost-effectiveness of various types of SR training.

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