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The Effectiveness of Spaced Retrieval on Improving Self-Feeding and Use of Compensatory Swallowing Strategies in Individuals With Dementia Residing in a Long-Term Care Facility

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Structured Abstract

Clinical Question: Do adults with dementia living in a long-term care facility who receive spaced retrieval training show improvement in self-feeding and/or use of swallowing compensations compared to those who do not receive spaced retrieval training?

Method: Systematic Review

Study Sources: EBSCOhost databases: CINAHL, MEDLINE, and PsycINFO; Google Scholar; American Speech-Language-Hearing Association (ASHA) journals

Search Terms: spaced retrieval AND dementia OR long-term care AND dysphagia OR eating difficulty OR feeding difficulty OR swallowing compensations

Number of Included Studies: 6

Primary Results:

Several controlled studies investigated the effectiveness of spaced retrieval on improving self-feeding and/or using compensatory swallowing strategies in individuals with dementia living in a long-term care facility.

Most of the applicable research examined the impact of spaced retrieval on improving self-feeding skills in participants with dementia residing in a long-term care facility. Only one controlled study provided evidence on the use of compensatory swallowing strategies in elderly adults with dementia residing in a long-term care facility.

Conclusion: Current evidence suggests that spaced retrieval is an effective means for improving a variety of mealtime difficulties in residents with dementia living in a long-term care facility. The effects of spaced retrieval are augmented by incorporating external memory aids or other memory strategies in therapy.

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Clinical Scenario

Autumn recently graduated from a Communication Sciences and Disorders program and is working in a long-term care facility. On several occasions during lunch, Autumn noticed that many of the residents with dementia have trouble feeding themselves and exhibit signs and symptoms of aspiration. One observation was of Archie, an 87-year-old male resident with moderate dementia, who coughed frequently during meals and required assistance with feeding. This warranted a clinical bedside evaluation that revealed Archie takes large bites of regular solids leaving residue in the oral cavity, doesn't drink until the end of his meal, and coughs when drinking thin liquids. Based on these results, a modified barium swallow (MBS) was ordered to examine Archie's swallowing physiology and risk of aspiration with his current diet consistencies. The MBS indicated moderate diffuse pharyngeal residue with solids and aspiration of thin liquids during the swallow when drinking from a straw or taking large sips from a cup. A synthesis of the findings from the clinical bedside evaluation and the MBS led Autumn to recommend no straws, small bites and sips, and a liquid wash; Archie's swallowing therapy integrated these recommendations. Treatment occurred during mealtime and involved an external memory aid of the compensatory swallowing strategies. After five treatment sessions, health care providers reported that Archie was not following the compensatory swallowing strategies in the absence of the therapist and continued to cough during meals. Recognizing that her current approach was not effective, Autumn searched for an appropriate treatment to improve independence in self-feeding and using compensatory swallowing strategies in the presence of cognitive deficits.

She searched through two dysphagia textbooks but did not locate a relevant treatment. Then, Autumn consulted a previous professor who encouraged her to search the literature for evidence on spaced retrieval (SR) as an intervention for improving self-feeding and using swallowing compensations in adults with dementia; Autumn recalled learning about SR training in her adult cognitive rehabilitation course. She learned that SR training was associated with positive outcomes in learning semantic information, but did not know that the treatment was applicable to improving procedural tasks as well, such as getting out of a chair safely and using a phone (Hunter, Ward, & Camp, 2012; Lekeu, Wojtasik, Van der Linden, & Salmon, 2002). She was eager to discover whether current evidence supports the use of SR as an intervention for treating individuals with dementia who experience difficulties with self-feeding or remembering to use swallowing compensations so she could better serve Archie and other residents at her facility.

Background Information

Dementia is a condition characterized by a progressive decline in cognitive abilities that affect daily life activities (American Psychiatric Association, 2013). An estimated 22% of residents living in long-term care facilities demonstrate functional decline in self-feeding due to cognitive impairments (Zimmerman, Sloane, & Reed, 2014). Symptoms of impaired self-feeding secondary to dementia include difficulty attending to mealtime tasks and pocketing food in the oral cavity, requiring reminders from other people to swallow the bolus (Priefer & Robbins, 1997). Changes in sensory and motor systems associated with the neuropathological processes of dementia can also impact the pharyngeal phase of swallowing and increase the risk of aspiration (Easterling & Robbins, 2008; Rogus-Pulia, Malandraki, Johnson, & Robbins, 2015).

Speech-language pathologists working in long-term care facilities often find treating the feeding and swallowing impairments of individuals with dementia challenging because the patient may have trouble remembering to follow clinical recommendations, including diet modifications and postural changes (Alagiakrishnan, Bhanji, & Kurian, 2013). One treatment that has been shown to enhance learning and retention of information in people with dementia is spaced retrieval (SR). SR is a memory-training strategy that targets implicit memory through repetitive rehearsal of a target response over increasing intervals of time. Time intervals are measured in seconds or minutes and are gradually increased in length after a target response is provided (e.g., 30 seconds, 1 minute, 2 minutes, 4 minutes, 8 minutes, etc.). When a response is recalled incorrectly, the person is given the correct answer and returned to the previous time interval for the next trial. Findings from the clinical treatment literature show that SR can facilitate recall of information and performance of functional tasks by individuals with dementia (Brush & Camp, 1998b; Hopper et al., 2005; Lekeu et al., 2002; Oren, Willerton, & Small, 2014; Thivierge, Simard, Jean, & Grandmaison, 2008). In a systematic review of cognitive interventions for individuals with dementia, Hopper et al. (2013) concluded that "SR training is a promising technique to facilitate recall of facts and procedures" (p.142).

Brush and Camp (1998a) reported the results of a case study of a male with dementia who was taught to alternate bites of food and sips of liquids using SR techniques. After approximately 25 treatment sessions, the participant required a verbal reminder to use the compensatory strategy just once during meals, and in an 8-week follow-up, he remembered to use the strategy 95% of the time without any cues. Recently, additional studies published in the clinical research literature examined the effectiveness of SR as an intervention for improving self-feeding and use of compensatory swallowing strategies in residents with dementia living in a long-term care facility. No known effort has been made to synthesize findings from these studies. A review of the current evidence on the effectiveness of SR for improving self-feeding and using swallowing compensations is needed to guide clinical decision making by speech-language pathologists serving residents in long-term care facilities.

Clinical Question

Autumn adopted the PICO format to formulate the clinical question and guide the search for evidence. The PICO format defines **P** as the population, **I** the intervention, **C** the comparison treatment (or no-treatment control), and **O** the outcome (Dollaghan, 2007). Using the PICO format, Autumn asked, "Do adults with dementia living in a long-term care facility (P) who receive SR training (I) compared to adults with dementia living in a long-term care facility who do not receive SR training (C) show improvement in self-feeding and/or using swallowing compensations (O)?"

Search for the Evidence

Inclusion Criteria

Studies were included in Autumn's review if they met the following criteria: (1) included participants with a diagnosis of dementia residing in a long-term care facility, (2) included participants with dysphagia and/or problems with self-feeding due to cognitive impairments, (3) investigated the effects of SR on improving using swallowing compensations and/or self-feeding, (4) included an experimental design with a comparison treatment or a no-treatment control, (5) provided original data, and (6) were published in English between January 1, 1998 and December 31, 2016 in a peer-reviewed journal.

Search Strategy

Autumn searched for evidence in three electronic databases via EBSCOhost (CINAHL, MEDLINE, and PsycINFO) as well as Google Scholar and the American Speech-Language-Hearing Association (ASHA) journals. Autumn used these key terms in both isolation and combination related to the PICO question to guide her search: spaced retrieval, dementia, long-term care, dysphagia, eating difficulty, feeding difficulty, and swallowing compensations. She also checked the references of all relevant articles to identify any other applicable studies.

Results

The literature search yielded 135 potentially relevant citations; six were duplicates and 10 were not written in English. Autumn reviewed the titles and/or abstracts of the 119 studies and rejected 109 of them because they did not meet the inclusion criteria for two primary reasons: (1) participants did not have dementia or (2) treatment did not

involve spaced retrieval training. The remaining 10 articles were read to determine eligibility; four additional studies were excluded because studies did not provide data related to self-feeding and swallowing behaviors or did not have a comparison-control group (e.g., Brush & Camp, 1998a). No additional studies were identified in the manual search of the reference lists. Autumn's search for evidence resulted in a corpus of six studies that met the eligibility criteria and were retained for inclusion in the review.

Participants

Four hundred and seventy-six participants were represented in the six retrieved studies; the mean age of the participants in these six studies ranged from 71.2 to 82.9 years. Participants had dementia as well as self-feeding and/or swallowing impairments and lived in a long-term care facility. Participants' cognitive impairments ranged from mild to severe based on scores from the Mini-Mental State Examination (MMSE; Folstein, Folstein, & McHugh, 1975) in five of the studies. All participants in the study by Benigas and Bourgeois (2016) had mild cognitive impairments.

Treatment Program

The duration of the interventions ranged from 2 to 12 weeks. Therapy was provided three to five times a week usually in 30- to 45-minute sessions and a total of 302 participants were assigned to receive treatment. One hundred and seventy-four participants were assigned to a routine care control group; these participants engaged in the daily routine activities followed by their institution's schedule, but did not receive any treatment directed at improving self-feeding or using swallowing compensations.

Of the five studies conducted in Taiwan, two focused on improving hyperphagic behaviors, including rapid and excessive eating and pica (Hsu, Lin, & Wu, 2017; Kao, Lin, Wu, Lin, & Liu, 2016). These studies used SR alone or SR combined with Montessori-based activities to train participants to chew food slowly and before swallowing it, as well as not to eat inedible items or food from other people's tray.

The other three studies conducted in Taiwan addressed a wide variety of feeding and swallowing behaviors disrupted by impaired cognitive skills (Lin et al., 2010; Wu, Lin, Su, & Wu, 2014; Wu, Lin, Wu, Lin, & Liu, 2014). Examples of the behaviors trained in these studies included recognizing it is mealtime, using utensils, putting food into the mouth, masticating a bolus, and swallowing a bolus after mastication. In Lin et al. (2010), the treatment outcome of participants assigned to receive SR were compared to those who received Montessori-based activities. Wu, Lin, Wu, et al. (2014) examined whether a standardized or individualized approach was more effective at improving self-feeding in participants assigned to receive SR combined with Montessori-based activities. Wu, Lin, Su, et al. (2014) assessed whether SR training combined with errorless learning procedures, involving pictures, gestures, and forced choices related to target behaviors improved recall of trained feeding behaviors better than SR training alone.

One study conducted in the United States trained participants to employ compensatory strategies to reduce the risk of aspiration (Benigas & Bourgeois, 2016). The strategies included performing a finger or lingual sweep, chin tuck, supraglottic swallow, liquid wash, swallow-cough-swallow again, and double swallow. Visual cues containing written instructions of the specific swallowing strategies were used to enhance learning and retention of the techniques addressed in SR training.

Outcome Measurement

Two studies evaluated self-feeding abilities with the Edinburgh Feeding Evaluation in Dementia (EdFED) scale (Watson, MacDonald, & McReady, 2001). The measure was administered by a trained research assistant who observed the participants individually eating a meal prior to and after the treatment period. The scale was also used to assess maintenance of self-feeding abilities up to six months posttreatment in Wu, Lin, Su, et al. (2014). Hsu et al. (2017) and Kao et al. (2016) employed an unpublished scale designed to rate the severity of hyperphagia in people with dementia. In these studies, participants were observed eating a minimum of 10 meals. Data collected for scoring the hyperphagia scale included frequency of rapid eating, excessive eating, and other difficult mealtime behaviors.

Two studies measured participants' learning and retention of trained self-feeding behaviors and/or swallowing compensations. Benigas and Bourgeois (2016) collected baseline data on five participants' ability to remember to use two or three recommended swallowing strategies. After demonstrating a stable baseline, participants were trained to use the swallowing strategies one at a time. A new swallowing strategy was introduced after the participant demonstrated mastery of the current strategy with 100% accuracy across three consecutive sessions. Wu, Lin, Su, et al. (2014) selected eight self-feeding behaviors and measured

participants' ability to recall each of the behaviors following a 32-minute interval.

Other outcome measures were reported in some of the studies; however, they are not discussed in this brief because the outcomes did not evaluate feeding and/or compensatory swallowing behaviors, but measured symptoms frequently associated with feeding and swallowing difficulties including body mass index (BMI), body weight, nutritional status, amount of food intake, and mealtime duration.

Effects of Intervention

Effect size estimates were calculated to evaluate the impact of SR training in all studies that reported pre- and posttreatment mean scores and standard deviations on relevant outcome measures. Effect sizes measure the magnitude of the treatment effect; larger effect sizes represent a greater magnitude of change caused by the intervention. Autumn used the Cohen's *d* indexes (Cohen, 1992) to judge the size of the treatment effect: $d = 0.20$ (small), $d = 0.50$ (medium), and $d = 0.80$ (large).

Hsu et al. (2017) identified a large SR treatment effect ($d = 0.85$) over routine care for reducing hyperphagic behaviors. Lin et al. (2010) found a medium treatment effect ($d = 0.41$) for the use of SR compared to residents assigned to receive routine care. A small improvement in favor of Montessori-based methods ($d = 0.24$) was identified when compared to SR training (Lin et al., 2010). Wu, Lin, Wu, et al. (2014) found large effect sizes immediately and six months after treatment in two groups that received SR training combined with Montessori-based activities when compared to a routine care control group (see Table 1).

Effect sizes were not calculable for Wu, Lin, Su, et al. (2014) because no pretreatment data were reported; therefore, the magnitude of change from pretreatment to posttreatment could not be estimated. Instead, participants from four residential facilities were assigned to receive SR only or SR combined with errorless learning (SR/EL). Participants in the two groups did not differ on any initial demographic characteristic ($p > 0.05$). Participants who received SR/EL had significantly ($p < 0.0031$) better overall recall on eight trained feeding and swallowing behaviors than participants in the SR-only group. The authors reported that 75% of the participants in the SR/EL group remembered to perform all eight feeding and swallowing behaviors following a 32-minute testing interval, compared to 17.2% in the SR-only group after eight weeks of treatment.

Kao et al. (2016) investigated the effects of SR and SR combined with Montessori-activities in residents with hyperphagia. Both treatment conditions significantly outperformed the control group ($p < 0.000$) immediately following treatment. At six months posttreatment, only the group that received SR combined with Montessori-based activities demonstrated a significant improvement ($p < 0.038$) over the control.

Effect sizes could not be estimated for the participants in Benigas and Bourgeois (2016) because variation in the participants' performance during baseline measurements is needed to calculate effect sizes in single-subject design studies (Beeson & Robey, 2006). None of the participants ever demonstrated use of the recommended swallowing strategies during baseline measurements. A treatment effect was demonstrated when participants met a mastery criterion by providing a correct response to the first prompt in a treatment session across three consecutive sessions. Participants 3 and 5 met the mastery criterion for all trained compensatory swallowing strategies without any cues. Participant 1 demonstrated mastery of two strategies without cues, but required a written cue to meet the mastery criterion for the third trained strategy. Participants 2 and 4 met the mastery criterion for two of the three trained behaviors. Of note, Participant 4 became ill during treatment of the third strategy and was discharged to a hospital. Follow-up data were collected at one week and four weeks posttreatment. Participants 1, 2, and 5 provided correct responses on both follow-up visits for all behaviors that met the mastery criterion during the treatment phase. Participant 3 was only available for the one week follow-up session and provided a correct response for all strategies mastered in therapy. Follow-up data could not be collected on Participant 4 due to discharge following an illness.

Evaluating the Evidence

Since publication in a peer-reviewed journal does not ensure that a study is high quality (Schiavetti, Metz, & Orlikoff, 2011), Autumn decided to evaluate each of the studies with respect to level of evidence and methodological quality.

Level of Evidence

Autumn used the ASHA-adopted standards of level of evidence to categorize the retrieved studies (American Speech-Language-Hearing Association, n.d.). Level Ia and Ib evidence include meta-analyses and randomized

control trials, respectively, and are regarded as the highest level of evidence. Level IIa and IIb evidence involve well-designed quasi- and nonrandomized controlled studies and well-designed single-subject studies, respectively. Level III evidence includes correlational and case studies and level IV evidence consists of reports by experts. All studies retrieved in the literature search were classified as level I or II evidence. Hsu et al. (2017) and Kao et al. (2016) randomly assigned participants to groups and were classified as level Ib evidence. Three studies were classified as level IIa evidence (Lin et al., 2010; Wu, Lin, Su, et al., 2014; Wu, Lin, Wu, et al., 2014). These studies used a group-comparison design, but did not randomly allocate participants to groups; instead, residential facilities were assigned to a treatment condition and participants were allocated into groups based on their residential facility. Benigas and Bourgeois (2016) used a single-subject multiple-baseline across behaviors design and was classified as level IIb evidence.

Study Quality

Autumn and the professor independently evaluated the methodological quality of the retrieved studies using the Physiotherapy Evidence Database (PEDro) scale (Maher, Sherrington, Herbert, Moseley, & Elkins, 2003) for the five group studies and the Single-Case Experimental Design (SCED) scale (Tate et al., 2008) for the single-subject design study. The PEDro scale is a widely used measure for assessing the internal and external validity of randomized and nonrandomized controlled trials and the SCED is a reliable measure for evaluating the strength of single-subject design research. Both scales contain 11 items and except for the first item of the scales, each item contributes one point to the final score. The methodological quality scores for the measures range from 0 to 10, with higher scores indicating higher methodological quality. After appraising the four studies, Autumn and the professor compared their results and resolved any discrepancies by consensus.

Studies appraised with the PEDro and SCED scales are presented in Tables 2 and 3, respectively. A plus sign (+) in the table cell indicates that a point was awarded to the study for providing explicit evidence of satisfying the item's criterion. A negative sign (–) denotes that the study failed to provide evidence that it met the item's criterion and thus did not earn a point for the item.

Kao et al. (2016) and Hsu et al. (2017) received a final PEDro score of six, indicating the studies were high quality (Cherney, Simmons-Mackie, Raymer, Armstrong, & Holland, 2013). Wu, Lin, Su, et al. (2014) received a final PEDro score of five and Lin et al. (2010) and Wu, Lin, Wu, et al. (2014) received scores of four, indicating that the studies were moderate quality. The single-subject study by Benigas and Bourgeois (2016) received a final SCED score of eight and was considered high quality.

The Evidence-Based Decision

Six studies were retrieved in the search for evidence. The review findings showed promising outcomes for improving a variety of mealtime difficulties in individuals with dementia residing in a long-term care facility. Overall, studies demonstrated positive outcomes when SR was used to improve self-feeding and retention of trained compensatory swallowing strategies. Moreover, the effects of SR were enhanced by incorporating external memory aids, such as written cues and other memory strategies into the treatment program.

Based on the findings from this review, Autumn decided to implement SR techniques in her therapy sessions with Archie to facilitate retention of recommended swallowing strategies. She plans to begin therapy in a quiet dining environment (e.g., Archie's room) using SR procedures and written cues. At the beginning of each session, she will ask Archie, "How do you eat safely?" The target response is, "Take small bites and sips, take a drink after every bite, and don't drink from a straw." Next, she will write one compensatory swallowing strategy on a piece of paper and train over increasing intervals of time. Once Archie is able to recall the trained strategy at the beginning of the next treatment session and use the strategy only with the written cue during a therapeutic meal, Autumn will commence training on the next strategy. After Archie is able to recall the target response and demonstrate use of all three trained compensatory strategies in this setting, she will transition training to a distracting environment (e.g., dining room). Gradually, Autumn will reduce the use of the external memory aids to enhance independent retention of compensatory swallowing strategies within Archie's natural dining environment.

In addition to reducing Archie's risk of aspiration, a positive response to treatment will lessen the work for the nursing staff and family by increasing Archie's independence in using the swallowing strategies. In order to socially validate the effects of treatment, Autumn will ask caregivers and nursing staff members about Archie's progress during

meals when she is not present and how the treatment has impacted them.

One challenge that may exist in applying SR to residents with dementia involves making decisions regarding treatment candidacy. Much of the research in this review was based on group analysis. Although the participants in these groups represented a wide range of cognitive functioning, the relationship between levels of cognitive functioning and response to treatment was not described. In other reviews, investigators reported limited evidence for the effectiveness of using SR with clients with moderately severe and severe dementia (e.g., Hopper et al., 2013; Oren et al., 2014). Therefore, in making decisions regarding treatment candidacy, Autumn will apply the evidence from this review in conjunction with her best clinical judgment and also closely monitor the progress of her clients and seek other options for clients who do not respond to the treatment.

This study systematically reviewed evidence on the application of a cognitive intervention for improving self-feeding or using swallowing strategies in older adults with dementia. Although teaching new swallowing strategies or using behavioral interventions to improve self-feeding in adults with dementia can be challenging because of memory deficits, the review found positive findings for the use of SR as a treatment option to improve self-feeding and/or using swallowing compensations in adults with dementia residing in a long-term care facility. Level I and II evidence from six moderate- to high-quality studies was found in the literature search. Results from these studies showed statistically significant gains and medium to large treatment effects in favor of SR when compared to a control group receiving routine care. Moreover, treatment effects were greater when other memory strategies, such as external memory aids, were combined with the SR training. More research is warranted to determine the effectiveness of SR in treating mealtime difficulties in individuals with moderate to severe and severe dementia.

Authors' Note

Ryan S. Husak is a practicing SLP and a PhD candidate in the department of Rehabilitation Sciences at the University of Kentucky. He has worked in acute care and rehabilitation hospitals and skilled nursing facilities. His research interests include aphasia and related neurogenic communication disorders.

Christen G. Page is a practicing SLP and received a PhD in Rehabilitation Sciences from the University of Kentucky in 2015. She has worked in adult rehabilitation for 11 years in a variety of settings including inpatient and outpatient rehabilitation and skilled nursing facilities. Her research interests include interprofessional education, qualitative methods, and quality of life for residents in long-term care.

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Table 1. Study Characteristics, Intervention Variables, Findings, and Levels of Evidence of Included Studies

Study	Country	Design	Intervention/ Comparison	Intensity/ duration	Relevant outcome measure(s)	Major findings
Level Ib evidence (ASHA)						
Hsu et al. (2017)	Taiwan	Controlled/ randomized	Tx group: Spaced retrieval (n = 49) Control group: Routine care (n = 46)	30 sessions, 40 minutes duration, 5 times a week for 6 weeks	Hyperphagic behaviors in dementia scale (unpublished)	A large treatment effect (d = 0.85 [95% CI = 0.43–1.27]) in favor of spaced retrieval was identified when compared to the control group.
Kao et al. (2016)	Taiwan	Controlled/ randomized	Tx groups: Spaced retrieval (n = 46) Spaced retrieval combined with Montessori-based activities (n = 49) Control group: Routine care (n = 45)	30 sessions, > 40 minutes duration for 6 weeks	Hyperphagic behaviors in dementia scale (unpublished)	Both treatment groups performed significantly better than the control immediately following treatment (p < 0.000). Significant gains in the spaced retrieval group over the control were maintained at one month (p < 0.002) and three months (p < 0.0014) posttreatment. Significant improvement over the control was maintained in the spaced retrieval combined with Montessori-based activities group at one month (p < 0.000), three months (p < 0.002), and six months (p < 0.038) posttreatment.
Level IIa evidence (ASHA)						
Lin et al. (2010)	Taiwan	Controlled/ not randomized	Tx groups: Spaced retrieval (n=32) Montessori-based activities (n=29) Control group: Routine care (n=24)	24 sessions, 30–40 minutes duration, 3 times a week for 8 weeks	EdFED	The spaced retrieval group outperformed the control group (d = 0.41 [95% CI = -0.13–0.94]). The effect size was medium. A small improvement over the spaced retrieval group was seen for the Montessori-based activities group (d = 0.21 [95% CI = -0.27–0.74]).
Wu, Lin, Su et al. (2014)	Taiwan	Cross-sectional	Tx groups: Spaced retrieval (n=29) Spaced retrieval combined with errorless learning principles (n=32)	24 sessions, 35–40 minutes duration, 3 times a week for 8 weeks	Recall of eight trained eating behaviors	Participants in the spaced retrieval combined with errorless learning group demonstrated significantly (p < 0.0031) better overall recall on 6 of 8 trained eating behaviors, compared to the spaced retrieval-only group. Seventy-five percent of participants in the spaced retrieval combined with errorless learning group remembered to perform each of the eating behaviors following a 32-minute testing interval, compared to 17.2% in the spaced retrieval-only group.

Table 1. Study Characteristics, Intervention Variables, Findings, and Levels of Evidence of Included Studies (continued)

Study	Country	Design	Intervention/ Comparison	Intensity/ duration	Relevant outcome measure(s)	Major findings
Wu, Lin, Wu et al. (2014)	Taiwan	Controlled/ not randomized	Tx groups: Individualized spaced retrieval combined with Montessori-based activities (*n* = 38) Standardized spaced retrieval combined with Montessori-based activities (*n* = 25) Control group: Routine care (*n* = 27)	10–35 sessions, 35–40 minute sessions, 3 times a week for 3–12 weeks. 24 sessions, 35–40 minutes duration, 3 times a week for 8 weeks	EdFED	Large effect sizes were found when comparing the individualized treatment group to the control group immediately following treatment (*d* = 1.87 [95% CI = 1.26–2.43]) and six months later (*d* =0.91 [95% CI = 0.38–1.41]) and when comparing the standardized treatment group to the control group immediately (*d* = 1.51 [95% CI = 0.87–2.10]) and six months (*d* = 1.44 [CI = 0.81–2.03]) posttreatment.
Level IIb evidence (ASHA)						
Benigas & Bourgeois (2016)	United States	Single-subject multiple-baseline across behaviors	Spaced retrieval combined with visual aid (*n*-of-1 x 5)	12–31 sessions; 30–45 minutes, 5 times a week for 2–6 weeks	Recall of individualized trained behaviors: P1: liquid wash; finger sweep P2: liquid wash; chin tuck; cough and swallow P3: liquid wash; lingual sweep; double swallow P4: steps of the super supraglottic swallow trained in three phrases P5: double swallow; liquid wash; finger sweep	P1 demonstrated mastery of 2 of 2 strategies. Training with a visual aid was needed for mastery of the finger sweep. P2 demonstrated mastery of 2 of 3 strategies. The cough-and-swallow technique was discontinued because the participant had difficulty producing a cough and replaced it with a sign. P3 demonstrated mastery of 3 of 3 strategies without a visual aid. P4 demonstrated mastery of 2 of 3 strategies, but was hospitalized prior to completing training on the third strategy. P5 demonstrated mastery of 3 of 3 strategies without a visual aid. P1, P2, and P5 demonstrated mastery of learned strategies with the use of a visual aid at one and four week follow-up sessions. P3 demonstrated mastery of learned strategies one week posttreatment.

EdFED = Edinburgh Feeding Evaluation in Dementia (Watson, MacDonald, & McReady, 2001)

Table 2. Quality Rating of Group Studies Using the PEDro Scale

	Hsu et al. (2017)	Kao et al. (2016)	Lin et al. (2010)	Wu, Lin, Su et al. (2014)	Wu, Lin, Wu et al. (2014)
Eligibility criteria specified*	+	+	+	+	+
Random allocation	+	+	–	–	–
Concealed allocation	–	–	–	–	–
Group similar at baseline	+	+	–	+	–
Subject blinding	–	–	–	–	–
Therapist blinding	–	–	–	–	–
Assessor blinding	+	+	+	+	+
Less than 15% dropout	+	+	+	+	+
Intention-to-treat analysis	–	–	–	–	–
Between-group statistical comparison	+	+	+	+	+
Point measure and variability data	+	+	+	+	+
Total PEDro score	**6/10**	**6/10**	**4/10**	**5/10**	**4/10**

*Not factored into the PEDro score.

Table 3. Quality Rating of Single-Subject Design Study Using the SCED Scale

	Benigas & Bourgeois (2016)
Clinical history*	+
Target behavior specification	+
Design	+
Stability of baseline	+
Sample behavior during treatment	+
Raw data record	+
Inter-rater reliability	+
Independence of assessor	–
Statistical analyses	–
Replication	+
Generalization	+
Total SCED score	**8/10**

*Not factored into the SCED score.