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Experimental Comparison of Efficacy for Three Handfeeding Techniques in Dementia

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All 9 listed authors (MBM, EM, EA, RA, CB, SS, AB, CB, CCE) have made: 1) substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data; 2) assisted with drafting the article and/or revising it critically for important intellectual content; and 3) have given final approval of the version to be published.

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Abstract

BACKGROUND—Nursing home (NH) residents who require assistance during mealtimes are at risk for malnutrition. Supportive handfeeding is recommended, yet there is limited evidence supporting use of a specific handfeeding technique to increase meal intake.

OBJECTIVES—To compare efficacy of three handfeeding techniques for assisting NH residents with dementia with meals: Direct Hand (DH), Over Hand (OH), and Under Hand (UH).

DESIGN—A prospective pilot study using a within-subjects experimental Latin square design with randomization to one of three handfeeding technique sequences.

SETTING AND PARTICIPANTS—30 residents living with advanced dementia in 11 U.S. NHs.

MEASUREMENTS—Time required for assistance; meal intake (% eaten); and feeding behaviors, measured by the Edinburgh Feeding Evaluation in Dementia (EdFED) scale.

INTERVENTION—Research Assistants provided feeding assistance for 18 video-recorded meals per resident (N=540 meals). Residents were assisted with one designated technique for 6 consecutive meals, changing technique every two days.

RESULTS—Mean time spent providing meal assistance did not differ significantly between techniques. Mean meal intake was greater for DH (67±15.2%) and UH (65±15.0%) with both significantly greater than OH (60±15.1%). Feeding behaviors were more frequent with OH (8.3±1.8%), relative to DH (8.0±1.8) and UH (7.7±1.8).

CONCLUSION—All three techniques are time neutral. UH & DH are viable options to increase meal intake among NH residents with advanced dementia and reduce feeding behaviors relative to OH feeding.

Keywords

handfeeding; dementia; feeding behaviors; mealtime difficulties; nursing home

Introduction

Malnutrition is a serious problem encountered by nursing home (NH) residents with dementia.¹⁻⁴ These residents commonly experience difficulty with food intake including feeding behaviors such as eating/drinking refusal, chewing/swallowing problems, apraxia related to the mechanics of eating, and/or persistently reduced oral intake.^{5,6} Current approaches include using appetite stimulants, modifying food textures, providing high-calorie protein supplements, offering handfeeding assistance, or tube feeding.⁷ The use of feeding tubes in dementia is discouraged by current guidelines due to lack of benefit and substantial risk for harm.⁸ Providing supportive handfeeding assistance to residents with dementia is currently recommended to ensure adequate nutritional intake.⁹⁻¹¹ To date, only

one study specified use of a particular handfeeding technique (Over Hand) for providing meal assistance.^{7,12-16}

Achieving successful mealtimes for a resident with dementia requires a unique set of skills: (1) managing dysphagia and risk for aspiration; (2) interpreting and managing feeding behaviors (e.g., turning the head away, clamping the mouth shut); and (3) promoting independence in eating while providing adequate supportive handfeeding assistance to maintain nutritional intake. Current training standards do not address effectiveness for specific handfeeding techniques and/or how a handfeeding technique may impact feeding behavior (Table 1). Practice guidelines recommend two handfeeding techniques: Direct Hand (DH) and Over Hand (OH). A third technique exists, Under Hand (UH), and is theorized to elicit fewer feeding behaviors.¹⁷⁻¹⁹ The purpose of this study was to compare efficacy of three handfeeding techniques (DH, OH, and UH) for residents with dementia in the NH setting.

Methods

Study Overview

This was a prospective pilot study using a within-subjects experimental design to evaluate the effects of the DH, OH, and UH handfeeding techniques on time spent providing feeding assistance, percent of meal intake, and feeding behaviors in 30 NH residents with dementia. To limit sequence and carry over effects, each resident was randomly assigned to one sequence: (1) DH, OH, UH; (2) OH, UH, DH; or (3) UH, DH, OH. Regardless of sequence, residents received each of the 3 techniques during 6 consecutive meals, changing technique every two days. All 18 meal interactions were video-recorded. Data were collected from June 2012 through October 2014.

Intervention Description

Each of the three handfeeding techniques is distinguished by where the feeding assistant places his/her hand and the extent to which the person with dementia is engaged in the eating event (Table 1).²⁰ The DH technique is the most commonly used in practice, and is a passive process for the resident. With the OH technique, the resident may perceive that the feeding assistant is pushing the resident's hand towards her/his mouth; thus, we hypothesized that OH was more likely to elicit feeding behaviors. In the UH technique, residents may feel engaged in the movement and have more opportunity to control both the direction and pace of movement.²¹ In contrast to the other feeding techniques, the UH technique may also provide a motor cue to residents for eating. For these reasons, UH was hypothesized to decrease feeding behaviors.

Setting

Eleven southeastern U. S. NHs participated; all accepted Medicare/Medicaid, and three were non-profit.

Participants and Recruitment

Inclusion criteria were residents with a minimum 6-week length of stay who were aged 60 and older; were diagnosed with Alzheimer's Disease or related dementia; scored 0–12 on the Brief Interview for Mental Status (BIMS) (lower scores indicate greater cognitive impairment) or 99 (resident could not complete);²² required limited assistance, extensive assistance, or were totally dependent for feeding; and had a legally authorized representative (LAR) willing to provide informed consent.

We excluded residents with a diagnosis of Human Immunodeficiency Virus Infection, Parkinson's Disease, Traumatic Brain Injury, swallowing disorder, parenteral/ IV feedings and/or feeding tube feedings. As residents needed to see/hear non-verbal and verbal cues provided during the intervention, those who were blind and/or deaf were also excluded. Institutional Review Board approval was obtained from the first author's University.

After an initial cross-reference screening for a diagnosis of dementia and feeding assistance, 248 residents were identified as potentially eligible. Of those, 120 (48%) did not meet all study criteria, 30 (12%) LARs declined to participate, and 45 (18%) LARs could not be contacted.²³ Fifty-three residents were enrolled in the study, but 23 (45%) were not included in data collection due to a change in condition after enrollment, withdrawal from the study, death prior to data collection, or resolution of feeding dependency by time of data collection. Prior to study onset, a table with the randomized order of assigned handfeeding techniques was generated, and residents were added as they enrolled.

Research Assistants Training

Over the two year data collection period, 50 Research Assistants (RAs) were hired specifically for the study; all were educated at or above the level of a certified nursing assistant. RAs worked in pairs, alternating provision of 1:1 feeding assistance to enrolled residents. Each RA was cross-trained to alternate between 2 roles (real-time RA and video-rater). Real-time RAs served as the feeding assistant using the three handfeeding techniques and the evidence-based protocol for managing mealtime difficulties, and completed real-time coding during the meal. Following meal completion, the video-rater coded the videotaped meal.¹⁷ A third RA also coded the videos at a later time to assess coding inter-rater reliability of the videotaped meals. All RAs kept field notes to document when/ why an assigned technique could not be administered.

Outcome Measures

Time spent providing feeding assistance—Stop watches were used to measure meal start/ stop times. The meal began when either the resident or RA first picked up a food item or utensil, and ended when the resident indicated an unwillingness to eat more or had consumed 100% of the meal.

Meal intake—The two meal intake outcomes were: (1) percent meal intake based on the tray weights (real-time only), and (2) percent overall meal intake. The food tray and all accompanying meal assistance items (bib, napkins, utensils, etc.) were weighed on a scale by the real-time RA before and after each meal. All RAs estimated an overall meal intake

percentage as is customary in clinical practice. Video-raters were able to estimate overall meal intake from before- and after-photographs taken of trays.

Feeding behaviors—The Edinburgh Feeding Evaluation in Dementia (EdFED) was used to measure feeding behaviors. Seven items relate to resident behaviors observed during meals: refuses to eat, turns head away, refuses to open mouth, spits food out, leaves mouth open allowing food to fall out, leaves food on the plate at the end of meal, or refuses to swallow.²⁴ Three items relate to the level of assistance required during meals.²⁵ The items were scored using 0 = “never” (observed during the meal); 1 = “sometimes”; and 2 = “often”.²⁵ To standardize ratings among RAs, a behavior observed once was scored as 1 and those observed more than once were scored as 2. Total EdFED scores range from 0 to 20, with higher score indicating more observed feeding behaviors and greater assistance required for meals.

Field Notes—RA field notes documented the resident’s response to the handfeeding techniques, and a rationale was provided if the assigned technique could not be used.

Data Analysis

Descriptive statistics were used to summarize the characteristics and primary outcomes for the 30 residents. Non-directional statistical tests were conducted with the level of significance set at 0.05. Inter-rater reliability for the three primary outcomes (time spent providing feeding assistance, percent meal intake based on percent estimation, and EdFED total score) among the three raters was assessed with intraclass correlation coefficients (ICCs).

Efficacy analyses were conducted with the intention-to-treat principle. Random coefficients regression models were conducted to compare the effects of the designated handfeeding technique on the primary outcomes over the six meal observation period using outcome data from the real-time rater.^{26,27} The initial model included the fixed effects of handfeeding technique (DH, UH, OH), type of meal (Breakfast, Lunch, Dinner), day (Day 1 vs 2) and their interactions. The random effects of residents, resident-by-meal, resident-by-day, meal-by-day, and resident-by-meal-by-day were included in the model. There were no significant two or three way fixed effect interactions in the initial models so interaction terms were omitted from the final model. Thus, the final models evaluated the main effects of technique, meal, and day. *A posteriori* t-tests were conducted when a significant main effect of technique and/or meal was detected ($p < .05$). To address clinical significance, Cohen *d* effect sizes were calculated from the adjusted scores for each primary outcome to examine the magnitude of effect between each handfeeding technique.

Field Notes were transcribed verbatim and analyzed using Atlas.ti. Frequencies of deviations from the designated handfeeding technique were tabulated, and categories for deviation rationale(s) were identified.

Inter-rater Reliability

Inter-rater reliability for the three raters ranged from 0.93 and 0.97 for time spent providing feeding assistance, and 0.87 to 0.91 for the estimation of meal intake. The ICCs were lower (0.43 to 0.59) for the EdFED. Given its high reliability scores and for clarity, the real-time results were used in the primary analysis.

Results

Resident Characteristics

The sample included 30 residents from 11 NHs. The median age was 88.5 years (range = 68 to 99). Among the 30 residents, 27 (90%) were female; 26 (87%) were Caucasian, and 4 (13%) were African American/Black.

Efficacy Outcomes

Table 2 presents the adjusted means and standard deviations (SD) for each handfeeding technique and meal type for the three primary outcomes. There was no significant effect of technique on mean time spent providing feeding assistance. The meal type significantly affected the time spent providing feeding assistance ($p = .014$), with slightly less time spent on average during breakfast ($M = 41.5$ minutes) compared to lunch ($M = 45.8$ minutes, $P < .001$), and dinner ($M = 44.4$ minutes, $p = .002$).

Handfeeding technique had a significant effect on percent meal intake per meal based on tray weight ($p = 0.023$), with the mean percent meal intake significantly higher for DH (67%) and UH (65%) when compared to OH (60%, $P < 0.001$ and 0.001 , respectively). Mean percent overall meal intake based on estimation was not significantly associated with technique, meal type, or day. On average, subjective percentage estimations of meal intake by the feeding assistant (customary in clinical practice) consistently overestimated meal intake by 10% when compared to objective tray weights.

Handfeeding technique had a significant effect on feeding behaviors as measured by EdFED total scores per meal ($p = 0.025$). The mean total score per meal for OH (8.3) was significantly higher relative to DH (8.0, $p = 0.041$, Cohen $d = 0.17$, small effect) and UH (7.7, $p = 0.001$, Cohen $d = 0.33$, medium effect), indicating slightly more feeding behaviors occurred with the overhand technique.

Deviations from assigned handfeeding techniques

Of the 540 meals, study RAs completed 98.5% of meals, with logistical/ family issues causing 8 missed meals. Table 3 details the rates of deviations by handfeeding technique and by meal. DH required the fewest deviations (2.9%) followed by UH (19.7%) and OH (27.1%). Rationales for deviation from the assigned technique were grouped into three categories: limited functional ability of the resident (e.g., “limited upper extremity range of motion”, “inability to hold utensils”); resident energy level (having necessary “strength” and “endurance” to participate in meal); individual resident preferences indicated through verbal or nonverbal resident behavior (e.g., “resident likes the UH technique”, “resident seems most used to and prefers DH”) and/or resident was able to self-feed part of the meal. Self-feeding

and provision of supportive handfeeding were too frequently intermixed to delineate as separate events.

Discussion

This rigorously-designed efficacy study provides the first evidence comparing three handfeeding techniques. The UH feeding technique reduces feeding behaviors and promotes meal intake at the same level as DH, while requiring no additional time to implement. In a previous study focused on training NH staff, content was included on the three handfeeding techniques and, while all NH staff were observed to use DH, OH was used at least once in 25–33% and UH was never used.¹⁸ For the present study, we used dedicated study staff to ensure adherence to the study protocol. In the analysis of the small number (16.7%) of meals where a deviation from the assigned handfeeding technique occurred, the largest number of deviations occurred with OH, primarily due to functional limitations of the residents' upper extremity and hands and/or the resident pushing assistance away. These findings suggest that use of each handfeeding technique should be considered within context of the residents' functional ability, energy level, and individual preferences, any of which may vary on a day-to-day, meal-to-meal basis.

Our findings are consistent with other studies using dedicated study staff, in which time spent providing feeding assistance ranged from 35 to 40 minutes.^{16,28} Importantly, residents' ability to feed themselves part of the meal did not make an impact on the total time required for feeding assistance. When residents were able to feed themselves any part of the meal, the time to finish was almost the same as when the RA provided complete assistance (44.4 minutes and 45.8 minutes respectively). All of the residents in our study were provided 1:1 feeding assistance, but typically a feeding assistant in a nursing home will be assisting multiple residents simultaneously, with time pressure to complete other tasks. The issue of providing adequate time for meals, and how to assist multiple residents during the same meal, remains an unresolved clinical challenge worthy of investigation.

The inter-rater reliability of 0.43 to 0.59 for the total EdFED scores in this study is much lower than previous reports of 0.95 inter- and intra-rater reliability.²⁹ This difference is hypothesized to be due the EdFED being developed for 10-minute real-time observation/coding conditions and our study used the EdFED for the entire meal time. RAs reported difficulty judging from a video whether a resident “refused to swallow” or “refused to open their mouth.” These differences in perception are often found when behaviors of persons with dementia are observed by multiple people and likely contributed to a lower IRR for the instrument in this study.³⁰

Although the feeding behaviors measured by the EdFED are commonly interpreted as resisting or refusing care, our study RAs reported the behaviors as a form of communication about preferences (e.g., “when the resident was offered peas and they refused to open their mouth, I offered a different food, and the meal continued.”) This insight has important implications for future training programs. Currently, feeding assistants may not view feeding behaviors as communication and may stop feeding attempts, thereby perpetuating weight loss and physical decline.

Conclusions

No handfeeding technique was found to be superior in time saved during meals, but DH and UH each produced greater intake with less feeding behaviors observed. Our findings demonstrate that there are three viable supportive handfeeding techniques that can be used when providing meal assistance to residents with advanced dementia. Future work is needed to determine the conditions under which each handfeeding technique is most appropriate; and as feeding behaviors are reframed as communication, determine the interventions most likely to promote meal intake when these behaviors occur.

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Appendix

Conflict of Interest Disclosures:

Elements of Financial/Personal Conflicts	Author:								
	*1	2	3	3	5	6	7	8	9
Employment or Affiliation	No	No	No	No	No	No	No	No	No
Grants/Funds	No	No	No	No	No	No	No	No	No
Honoraria	No	No	No	No	No	No	No	No	No
Speaker Forum	No	No	No	No	No	No	No	No	No
Consultant	No	No	No	No	No	No	No	No	No
Stocks	No	No	No	No	No	No	No	No	No
Royalties	No	No	No	No	No	No	No	No	No
Expert Testimony	No	No	No	No	No	No	No	No	No
Board Member	No	No	No	No	No	No	No	No	No
Patents	No	No	No	No	No	No	No	No	No
Personal Relationship	No	No	No	No	No	No	No	No	No

* Authors can be listed by abbreviations of their names.

For all "Yes" responses, provide a brief explanation here:

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Table 1

Definition of Handfeeding Techniques & Demonstration Video

Handfeeding Technique	Definition	Video Demonstration of three techniques ²⁰
<i>***Each technique is from the perspective of the caregiver's hand placement</i>		
Direct Hand (DH)	The caregiver holds the object (e.g., fork, spoon, cup) intended to provide food or fluids to the resident without any active involvement on the part of the resident	Video may also be accessed at: https://youtu.be/NYzH_B7XfjY 
Over Hand (OH)	The caregiver puts his/her hand over the resident's hand in an effort to guide/support/assist the resident with the activity.	
Under Hand (UH)	The caregiver holds the object (e.g., fork, spoon, and/or cup) and places his/her hand under the resident's hand. This technique theoretically allows the resident to feel as though he/she initiated the movement, and are in control.	

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Table 2

Outcomes by Handfeeding Technique and Meal Type

Outcome: Handfeeding Technique	Direct Hand (DH) Mean (SD)	Over Hand (OH) Mean (SD)	Under Hand (UH) Mean (SD)	P value	Multiple Comparisons
Time spent providing assistance (min)	42.4 (9.2)	45.2 (9.2)	44.1 (9.3)	0.1654	
Percent meal intake (by rater weights)	67.0 (15.2)	59.9 (15.1)	65.0 (15.0)	0.0239	DH vs OH; p < .0001 DH vs UH; p = 0.1937 OH vs UH; p = .0016
Percent meal intake (by rater estimation)	78.0 (15.5)	75.0 (15.4)	75.8 (15.3)	0.5546	
EdFED total score (feeding behaviors)	8.0 (1.8)	8.3 (1.8)	7.7 (1.8)	0.0255	DH vs OH; p = .0412 DH vs UH; p = 0.2390 OH vs UH; p = .0014

Outcome: Meal Type	Breakfast (B) Mean (SD)	Lunch (L) Mean (SD)	Dinner (D) Mean (SD)	P value	Multiple Comparisons
Time spent providing assistance (min)	41.5 (9.1)	45.8 (9.1)	44.4 (9.2)	0.0147	B vs L; p < .0001 B vs D; p = 0.0026 L vs D; p = 0.1594
Percent meal intake (by rater weights)	61.9% (15.2)	67.1% (15.2)	62.9% (15.3)	0.1261	
Percent meal intake (by rater estimation)	75.2% (15.4)	78.5% (15.3)	75.0% (15.4)	0.3465	
EdFED total score (feeding behaviors)	7.7 (1.8)	8.0 (1.8)	8.2 (1.8)	0.0873	

Note: P value for Random coefficients regression model for repeated measurements (RRM); Multiple comparison = *A posteriori* least squares t-tests calculated by the RRM. EdFED scores could range from 0–20, with higher scores indicative of more feeding behaviors observed and greater feeding assistance needed by resident with dementia.

Table 3

Meals completed by designated handfeeding technique & deviation rates

Measure	Meals Assigned	Meals Completed (%)	*Resident able to self-feed part of the meal (%)	*Deviations from designated technique (%)
All Meals	N = 540	532 (98.5%)	95 (17.9%)	89 (16.7%)
Direct Hand (DH)	180	173 (96.1%)	36 (20.8%)	5 (2.9%)
Over Hand (OH)	180	181* (100.5%)	29 (16.0%)	49 (27.1%)
Under Hand (UH)	180	178* (99.8%)	30 (16.8%)	35 (19.6%)
Designated Technique	Total Deviations	Deviated from Direct Hand to (%)	Deviated from Over Hand to (%)	Deviated from Under Hand to (%)
Direct Hand (DH)	5 (2.9%)	-	2 (40%)	3 (60%)
Over Hand (OH)	49 (27.1%)	41 (82.0%)	-	8 (16%)
Under Hand (UH)	35 (19.7%)	33 (94.3%)	2 (5.7%)	-
Meal Type	Total Deviations	Deviated from Direct Hand to (%)	Deviated from Over Hand to (%)	Deviated from Under Hand to (%)
Breakfast	25 (14.0%)	OH 1 (2.5%) UH 0 (0.0%)	DH 14 (35.0%) UH 1 (2.5%)	DH 8 (20.0%) OH 1 (2.5%)
Lunch	31 (17.3%)	OH 1 (3.2%) UH 0 (0.0%)	DH 13 (41.9%) UH 4 (12.9%)	DH 13 (41.9%) OH 0 (0.0%)
Dinner	33 (18.4%)	OH 0 (0.0%) UH 3 (9.0%)	DH 14 (42.4%) UH 3 (9.1%)	DH 12 (36.4%) OH 1 (3.0%)

Note:

* Data from Research Assistant Field Notes; Goal N = 180 per handfeeding technique. Some meals may have had more than one deviation in addition to the resident being able to self-feed part of the meal. DH = Direct Hand; OH = Over Hand; UH = Under Hand