

Individualized Feeding Assistance Care for Nursing Home Residents: Staffing Requirements to Implement Two Interventions

Sandra F. Simmons^{1,2} and John F. Schnelle^{1,2,3}

¹University of California, Los Angeles, School of Medicine, Department of Geriatrics, Borun Center for Gerontological Research.

²Jewish Home for the Aging, Reseda, California.

³Veterans Administration Greater Los Angeles Healthcare System, and Sepulveda Geriatric Research, Education, and Clinical Center, Sepulveda, California.

Background. Recommendations have been made to increase the number of nursing home (NH) staff available to provide feeding assistance during meals and to individualize care for residents. However, there are few data reflecting the number of residents responsive to feeding assistance during meals and what alternative interventions might be appropriate for other residents. The purpose of this study was to evaluate the effects and staffing requirements of two individualized feeding assistance interventions to improve oral food and fluid intake in NH residents.

Methods. Skilled nursing participants ($n = 134$) in 3 NHs received a 2-day trial of one-on-one feeding assistance during 6 meals. 68 participants who did not increase their oral intake in response to feeding assistance during meals received a 2-day intervention trial during which snacks were offered between meals 3 times daily. As part of both interventions, research staff provided adequate feeding assistance that enhanced the resident's self-feeding ability, social stimulation throughout the meal or snack period, and availability of choices for foods and fluids.

Results. 46% significantly increased their oral intake in response to one-on-one mealtime feeding assistance, and the staff time required to implement this intervention was $35 (\pm 8)$ minutes/meal per resident compared with usual NH care, which averaged $6 (\pm 9)$ minutes. 44% of the participants significantly increased their oral intake in response to the between-meal snack intervention, which required $12 (\pm 6)$ minutes of staff time per snack/resident compared with usual NH care (1 ± 4 minutes).

Conclusions. Most participants (90%) significantly increased their daily oral food and fluid intake in response to one of two individualized interventions. The staff time necessary to implement each intervention was significantly greater than the staff time currently being spent on feeding assistance care delivery. Suggestions are made to increase the efficiency of staff time when delivering feeding assistance.

INADEQUATE oral food and fluid intake is a common problem among nursing home (NH) residents (1–4) and one that can lead to weight loss, hospitalization, and death (5–7). Federal guidelines specify that a resident is potentially at risk for undernutrition if daily oral food and fluid intake is consistently less than 75% of that offered during meals (8). Nursing home facilities are required to provide, on average, a total of 2000 calories per day to an individual resident (9). The results of multiple studies have shown that 64% to 80% of NH residents' mealtime food and fluid consumption is less than the federal criterion (1–4). Other studies have shown that fluid intake among NH residents is also well below the recommended daily requirement, and inadequate fluid intake is significantly associated with inadequate food intake (10–13).

Despite the prevalence of low oral food and fluid intake among NH residents, few controlled intervention studies to improve residents' intake have been evaluated in the NH setting. The results of 1 recent study showed that 50% of residents with intake less than the federal criterion significantly increased their oral food and fluid intake during meals in response to a feeding assistance intervention that improved both the adequacy and quality of assistance (3). A

higher level of cognitive impairment was associated with a higher increase in oral intake in response to the feeding assistance intervention. The results of a separate intervention study showed that providing multiple opportunities for NH residents to consume fluids between meals and offering palatable beverage choices was effective in increasing the daily fluid consumption and improving the hydration status of most participants (14). The offering of palatable beverage choices was an important intervention component for participants with less severe cognitive impairment (14).

Several research groups have suggested that most NHs have insufficient staff to provide adequate feeding assistance or to ensure hydration (15,16). However, specific data are limited that delineate the number of residents who would significantly increase their oral intake in response to feeding assistance care delivery and the components of a feeding assistance protocol that are necessary to individualize care delivery (3,14). In addition, little attention has been given to the identification of barriers, beyond limitations in staffing resources, that result in poor feeding assistance care in many facilities (17,18).

The purpose of this study was to individualize feeding assistance care for NH residents, who had low oral food and

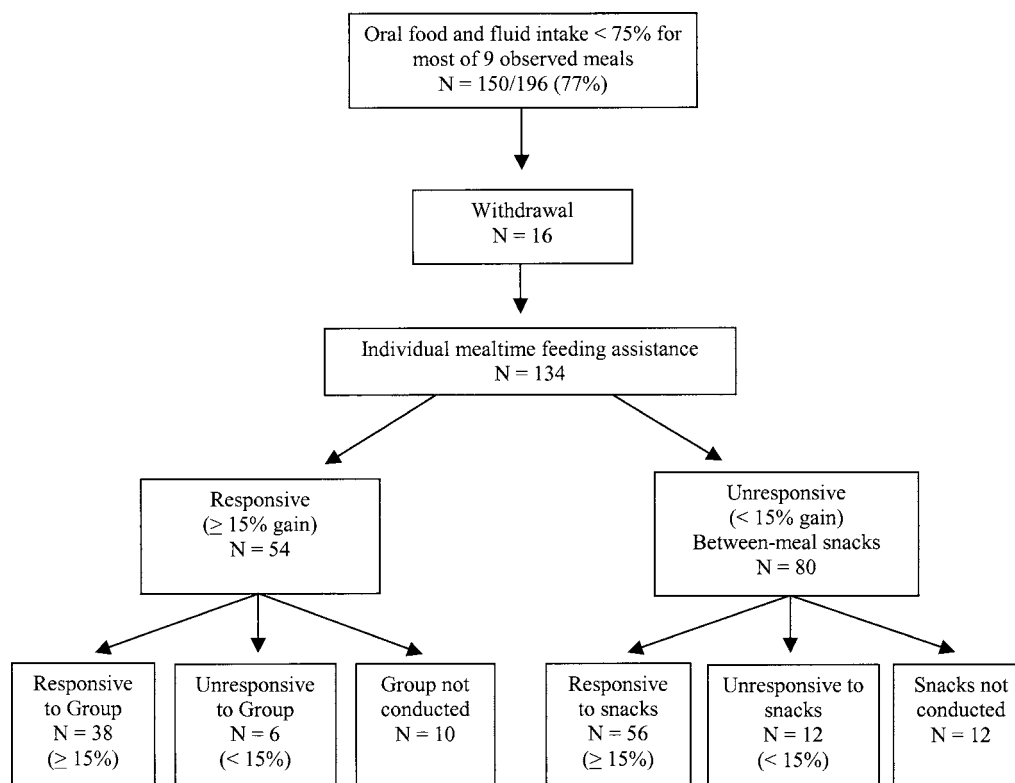


Figure 1. Intervention participants.

fluid intake, through an evaluation of two interventions: mealtime feeding assistance and between-meal snacks. These two interventions individualized feeding assistance care across three major dimensions: (a) adequacy and quality of assistance, (b) timing of assistance (during regularly scheduled meals versus between meals), (c) and availability of choices among food and fluid items. In addition, preliminary data were collected in this study relevant to the organization of staff and residents to allow the efficient delivery of feeding assistance to all residents in need. The following research questions, which are applicable to all long-stay, skilled nursing residents capable of oral food and fluid intake, were addressed. (a) How many NH residents increase their oral food and fluid intake in response to feeding assistance during meals? What are the characteristics of these residents? (b) How many NH residents increase their oral food and fluid intake in response to a between-meal snack intervention? What are the characteristics of these residents? (c) How much staff time is required to implement each intervention? How can NH staff be organized to allow for the efficient and consistent delivery of quality feeding assistance to all residents who need it?

METHODS

Setting and Recruitment

Participants were recruited from 3 NHs, 1 of them proprietary, that housed a total of 405 residents. Nurse-aide level

staff:resident ratios across the 3 NHs, as reported by the directors of nursing, ranged from 7 to 8 residents per nurse aide on the 7:00 AM to 3:00 PM shift (e.g., breakfast and lunch) and 7 to 12 residents per nurse aide on the 3:00 PM to 11:00 PM shift (dinner). A total of 354 residents met inclusion criteria for this study, which required residents to be long-stay (non-Medicare), free of a feeding tube, and not receiving palliative care (hospice) at the time of the study. Written consent was obtained from either the resident or the resident's responsible party designated in the medical record for 235 (66%) of the 354 eligible residents. After consent was given, 39 participants were lost due to transfer out of the facility or to hospice care, insertion of a feeding tube, prolonged hospitalization, or death. Baseline assessments were completed with the remaining 196 participants.

Oral Food and Fluid Intake

Research staff conducted direct observations during 3 consecutive days (9 meals) for each participant to identify residents with low oral intake, which was defined according to the Minimum Data Set criterion (leaves 25% or more of food uneaten at most meals) (8). The reliability and validity of the direct observational protocol have been described elsewhere (4). A total of 150 (77%) of the 196 participants were identified as having low intake, which is similar to the proportions of residents reported in other studies to have low intake based on the Minimum Data Set criterion (1–4). One hundred thirty-four (89%) of the 150 participants with low oral intake completed the intervention phase of this study (Figure 1).

Delivery of Foods and Fluids Between Meals

Direct observations were conducted by trained research staff according to a standardized protocol for all 134 participants during the following time periods for 2 days to capture NH staff delivery of any food or fluid items, including oral nutritional supplements, between meals: 9:00 AM to 11:00 AM, 1:00 PM to 3:00 PM, and 6:00 PM to 8:00 PM. The medication nurses were also followed during their routine medication passes (morning, afternoon, and evening) for 2 days to document NH staff delivery and resident consumption of oral nutritional supplements for those who had an order ($n = 95$).

Measures

Demographic, medical, and nutritional information, including the most recent Minimum Data Set assessment, were retrieved from each participant's medical record. Independent assessments of body weight were conducted by research staff to calculate body mass index and estimate resting energy expenditure (REE) needs (see Table 1 footnotes for formulas). Cognitive status was assessed using the standardized Mini-Mental State Examination (MMSE) for all participants (19). Interviews were attempted with all participants with an MMSE total score greater than 14 to determine the presence of depressive symptoms using the 15-item Geriatric Depression Scale (20,21). All participants were approached for interview to assess complaints about NH food quality or service (e.g., variety and choice availability, appearance, taste, temperature) using five standardized questions, all of which had a yes/no response format (2). Second interviews were attempted with each participant who completed the first interview ($n = 81$ of 134) to evaluate the consistency of food complaints ($n = 68$ of 81 completed two interviews).

Mealtime Feeding Assistance Intervention Protocol

All 134 participants received a 2-day or 6-meal (i.e., breakfast, lunch, and dinner on 2 consecutive days) trial of feeding assistance implemented by trained research staff using the same protocol applied in previous research (3). Briefly, the intervention consisted of individual assistance (1 staff member to 1 resident), proper positioning for eating, compliance with dining location preferences, and optional meal tray substitutions (3). A graduated prompting protocol that consisted of the following levels of assistance was used to enhance self-feeding ability: level 1, social stimulation and encouragement; level 2, nonverbal cueing (e.g., rearrangement of items on tray for easy access, opening containers, cutting meat); level 3, verbal cueing (e.g., why don't you try some of your soup?"); level 4, physical guidance (e.g., assist resident in holding cup or utensils); and level 5, full physical assistance (staff member physically feeds resident). Inter-rater reliability (Spearman's Rho coefficient) for the level of assistance required by participants ($n = 52$) was .932 ($p < .001$). Food and fluid intake was estimated for each of the 6 intervention meals using the same direct observation protocol used in the baseline assessment.

A subsample of 25 participants, who did not increase their oral intake by at least 15% (Figure 1) in response to the initial 2-day, 6-meal trial of one-on-one mealtime feeding

Table 1. Demographic, Medical, and Nutritional Characteristics of Participants in Three U.S. Nursing Homes ($N = 134$)

Characteristic	Percent (N) or Mean (\pm SD)
<i>Demographic</i>	
Percent female	89% (119)
Percent white	99% (133)
Age (y)	89.7 (\pm 5.7)
Length of stay in years	2.6 (\pm 2.8)
MMSE total score (0–30)	14.8 (\pm 9.0)
<i>Medical</i>	
Physician-recorded diagnosis of dementia	44% (59)
Physician-recorded diagnosis of depression	32% (43)
Geriatric Depression Scale (GDS) total score (0–15)	4.7 (\pm 3.1)
Proportion with a GDS > 5 (probable depression)	31% (27/86)
Routine medications with appetite suppressant side effects	1.0 (\pm 0.9)
Proportion with ≥ 1 routine medication with appetite suppressant side effects	63% (85)
Order for special diet	86% (115)
Food service complaints	63% (51/81)
Order for nutritional supplements	71% (95)
<i>Nutritional</i>	
BMI*	23.5 (\pm 4.8)
BMI < 20	25% (34)
Resting energy expenditure [†]	1052.0 (\pm 144.4)

Notes: *BMI formula = 0.454 weight in pounds/(0.254 height in inches)².

[†]Harris-Benedict equations for resting energy expenditure estimation.

Male = 66.5 + (13.75 \times weight in kilograms) + (5.0 \times height in centimeters) – (6.78 \times age in years).

Female = 655.1 + (9.56 \times weight in kilograms) + (1.85 \times height in centimeters) – (4.68 \times age in years).

SD = standard deviation; MMSE = Mini-Mental State Examination; BMI = body mass index.

assistance, received 2 additional intervention days to evaluate the accuracy of a 2-day intervention trial for determining a resident's responsiveness to feeding assistance. A different subsample of 44 participants, who increased their oral intake by 15% or more in response to the 2-day trial of one-on-one assistance, received a separate 4-day (12 meals) trial of the mealtime feeding assistance intervention delivered in small groups of 3 (1 staff member to 3 residents) to evaluate the feasibility and staff time efficiency of a group feeding assistance intervention (Figure 1).

Between-Meal Snack Intervention

Participants who did not increase their oral food and fluid intake by at least 15% in response to the one-on-one mealtime feeding assistance intervention received a 2-day or 6-snack (i.e., 10:00 AM, 2:00 PM, and 7:00 PM on 2 consecutive days) trial of the between-meal snack intervention (Figure 1). The between-meal snack intervention was similar to mealtime feeding assistance in that it was also implemented by trained research staff and consisted of essentially the same intervention components. A moveable cart was brought to the participant 3 times per day. The participant was offered a variety of food and fluid items from which to choose purchased from a local grocery store that included the following: assorted juices (e.g., apple,

orange, cranberry), yogurts, ice cream, fresh fruit (bananas, grapes), puddings, cookies, pastries (doughnuts, muffins), and cheese/peanut butter and crackers. Items appropriate for diabetic participants and for those who required other special diets, including added thickeners to fluids, were provided as needed according to diet specifications documented in participants' medical records. Research staff documented each food and fluid item and the amount consumed by the participant and the amount of time spent with the participant during each snack period. The total number of calories consumed from snacks was estimated based on the information printed on the package of purchased items. During the same 2-day period, the mealtime food and fluid consumption of all participants who received snacks was estimated with the same direct observational protocol used in the other conditions.

During each condition (i.e., usual NH care, mealtime feeding assistance intervention, and between-meal snack intervention), research staff recorded the frequency of verbal (e.g., "How is your lunch today?" or "Why don't you try a bite of your soup?") and physical prompts (e.g., physically guiding resident's hand to food or fluid items, feeding resident bites of food) rendered by staff, the total amount of time staff spent providing assistance, and the total time that residents had access to foods and fluids. In addition, evidence of chewing or swallowing difficulties (e.g., coughing, drooling) and a slow eating pace, defined as requiring more than 25 minutes to complete a meal, were also recorded (22).

Data Analyses

Group comparisons were conducted using *t* tests for independent samples for continuous variables (e.g., age, length of stay, assistance time, and oral food and fluid consumption) and chi-square analyses for categorical variables (sex, ethnicity, diagnoses). Total daily caloric intake was estimated during each condition (usual care, mealtime feeding assistance, between-meal snacks) based on the total percentage consumed for each meal and 2000 calorie-per-day diet served by the facilities (9). Caloric estimates of oral nutritional supplements and snack items were estimated based on the product label information.

Analyses were conducted to evaluate participants' response to the interventions in 3 ways: (a) proportion whose daily caloric intake exceeded their estimated REE needs, (b) proportion whose meal intake exceeded 75% (Minimum Data Set criterion), and (c) proportion whose oral intake increased by at least 15% (i.e., ≥ 300 calories/day). A gain of 15% or more was identified in previous research as clinically significant and reflects a gain in calories that is at least 1 standard deviation greater than variation in usual daily intake (3,4).

RESULTS

Table 1 shows the characteristics of the 134 intervention participants. The participants were predominately female (89%) and white (99%). They were moderately cognitively impaired as indicated by the prevalence of physician-recorded medical record diagnoses of dementia (44%) and

an average MMSE total score of 14.8 (± 9.0). The prevalence of physician-recorded medical record diagnoses of depression was 32%, and a comparable proportion (31%) of those with an MMSE total score greater than 14 ($n = 27$ of 86) endorsed symptoms indicative of probable depression based on the Geriatric Depression Scale. Twenty-five percent of the participants ($n = 34$) had a body mass index value indicative of undernutrition (body mass index < 20) (23), whereas estimated REE needs averaged 1052.0 (144.4) for the group (24). The average total percentage consumed by the intervention group, all of whom consumed less than 75% of most meals (refer to intervention eligibility criteria) was 48% ($\pm 15\%$); and 61% ($n = 81$) had an estimated daily caloric intake during meals that was less than their estimated REE needs under usual NH care conditions. Most (86%) participants had medical record orders for a special diet (e.g., no concentrated sugars, mechanical soft) or had orders to receive a daily oral nutritional supplement (71%). Of those who completed a satisfaction interview ($n = 81$), 63% ($n = 51$) expressed dissatisfaction with at least 1 aspect of the food service (e.g., choice availability, appearance, taste). In addition, participants' responses were consistent across two interviews ($n = 68$; $r = .649$ for the total number of complaints, $p < .001$).

Usual Nursing Home Staff Delivery of Foods and Fluids Between Meals

Participants were offered fluids (water or juice) between meals by NH staff an average of less than once per day during the 2-day observation period ($.83 \pm .88$), and participants consumed an average of 1.25 (± 1.96) fluid ounces per day between meals outside of medication passes. Food items were rarely offered at all between meals and only to a small proportion of participants (fewer than 10%). Medical record orders for daily oral nutritional supplementation required participants ($n = 95$) to receive supplements from NH staff an average of 3 times per day. Direct observations of oral nutritional supplement delivery showed that NH staff offered supplements between meals an average of 1 time per day. Only 14% ($n = 13$) of those with orders received daily oral nutritional supplementation with a frequency that matched their order. Participants consumed an average of 2.3 total ounces (± 2.9) of supplement per observation day. There were no differences in the nutritional characteristics (listed in Table 1) between those with orders who were offered supplements from NH staff at least once ($n = 51$) and those with orders who were not offered supplements between meals during either observation day ($n = 44$).

Responsiveness to Mealtime Feeding Assistance

Table 2 shows the results for the 134 participants who received a 2-day, 6-meal trial of one-on-one mealtime feeding assistance. The group of participants significantly increased their oral food and fluid intake during meals (Table 2, 48% to 62%). There was also a significant increase in the proportion of participants whose meal caloric intake exceeded their REE needs as a result of the intervention (40% to 63%, $\chi^2 = 29.14$, $p < .001$). Only 24% ($n = 32$) increased their intake to more than 75% (Minimum Data Set criterion)

for most meals. Forty percent ($n = 54$) showed at least a 15% gain (mean gain = $29\% \pm 11\%$) in oral intake in response to one-on-one mealtime feeding assistance (Figure 1). The intervention did not result in a significantly longer meal tray access time, although the amount of time staff spent providing feeding assistance did increase (Table 2). The frequency of both verbal and physical prompts increased significantly (Table 2).

A subsample of 44 participants who had a gain in oral intake of 15% or more in response to one-on-one mealtime feeding assistance (mean gain = $29\% \pm 12\%$) received a separate 4-day, 12-meal trial of assistance in small groups (1 research staff member to 3 responsive residents), and most (86%) maintained their responsiveness in the group condition (Figure 1). Group feeding assistance required 42 minutes (± 7) of staff time per meal per group and was a more efficient use of staff time (14 minutes per resident per meal) than one-on-one feeding assistance. A different subsample of 25 participants who showed a gain of less than 15% (trial 1: mean gain = $6\% \pm 11\%$) in their oral intake in response to a 2-day trial of mealtime feeding assistance received a second 2-day trial, and most (80%) remained "unresponsive" to the intervention according to the 15% criterion (trial 2: mean gain = $6\% \pm 12\%$).

Responsiveness to Between-Meal Snacks

Table 3 shows the results of the between-meal snack intervention for 68 of the 80 participants who showed less than a 15% gain (mean gain = $4\% \pm 8\%$) in their oral intake in response to mealtime feeding assistance (Figure 1). The between-meal snack intervention resulted in a significant increase in the total daily calories (meals plus snacks) consumed by the group of participants (Table 3: 1074 to 1308 calories per day). In addition, daily caloric intake from snacks (mean = 380 ± 223) was significantly higher than daily caloric intake from supplements (mean = 94 ± 96) during usual care (Table 3). There was also a significant increase in the proportion of participants with daily caloric intake that exceeded their REE needs as a result of the between-meal snack intervention (46% to 64%, $\chi^2 = 5.39$, $p < .05$). The intervention required significantly less staff time per participant per snack period compared with mealtime feeding assistance (Table 3: 12 minutes versus 34 minutes) but significantly more time than usual NH care during meals (1 minute).

Table 2. Results of the Feeding Assistance Intervention During Meals in Three U.S. Nursing Homes

Measure: Per Participant Per Meal	Usual NH Care ($N = 134$)	Mealtime Feeding Assistance ($N = 134$)
	Mean ($\pm SD$)	Mean ($\pm SD$)
Tray access time (min)	35.9 (8.9)	35.2 (7.6)
Total percent intake (0%–100%)*	48.1 (14.9)	62.1 (19.5)
Daily caloric intake from meals*	986.9 (304.4)	1242.4 (389.2)
Assistance time (min)*	5.9 (9.3)	35.6 (8.1)
Physical prompt episodes*	12.4 (21.7)	32.00 (38.9)
Verbal prompt episodes*	3.3 (7.1)	12.2 (9.7)

Notes: * $p < .001$.

NH = nursing home; SD = standard deviation.

Compliance With Snacks

Snacks were offered 3 times per day for 2 days for a total of 6 snack opportunities during the intervention, and participants accepted the snack (consumed some portion of the food and fluid items offered by staff) an average of 4.9 (± 1.4) times. Participants consumed, on average, significantly less during the evening snack period (7:00 PM: mean total calories = 102.18 ± 94.29) compared with the morning (10:00 AM: mean total calories = 138.32 ± 116.19) and afternoon (2:00 PM: mean total calories = 143.30 ± 124.33) ($t = 2.81$, $p < .01$ morning versus evening; $t = 3.06$, $p < .01$ afternoon versus evening). The amount of staff time spent providing the snacks did not differ significantly among the 3 time periods (morning, 13.29 ± 10.33 minutes; afternoon, 12.67 ± 10.50 minutes; evening, 11.68 ± 10.60 minutes).

Responsiveness to Mealtime Feeding Assistance Versus Snacks: Resident Characteristics

All characteristics shown in Table 1 were compared among participants who increased their oral intake by 15% or more in response to mealtime feeding assistance ($n = 54$) versus between-meal snacks ($n = 56$). Table 4 shows the characteristics that significantly differentiated these two groups. Participants who were responsive to mealtime feeding assistance had significantly more cognitive impairment according to physician-recorded chart diagnoses of dementia (Table 4: 61% versus 38%; $\chi^2 = 6.13$, $p < .05$) and total MMSE score (Table 4: 9 versus 18; $t = -5.94$, $p < .001$). A significantly greater proportion of the mealtime feeding assistance group required physical assistance to eat (Table 4: 89% versus 38%; $\chi^2 = 31.05$, $p < .001$), showed

Table 3. A Comparison of Usual Care, Mealtime Feeding Assistance, and Between-Meal Snacks in Three U.S. Nursing Homes

Measure: Per Participant Per Meal /Snack	Usual NH Care ($N = 68$) Mean ($\pm SD$)	Mealtime Feeding Assistance ($N = 68$) Mean ($\pm SD$)	Between-Meal Snacks ($N = 68$) Mean ($\pm SD$)
Percent consumed during meals	49% ($\pm 15\%$)	53% ($\pm 15\%$)	46% ($\pm 15\%$)
Calories consumed during meals	980 (± 301)	1052 (± 297)	928 (± 307)
Calories consumed between meals (supplements + snacks)	94 (± 96)	Not measured	380 (± 223)
Total daily calories	1074 (± 286)	Could not be determined	1308 (± 362)
Staff time (min:s)	1:13 (3:57)	34:20 (7:13)	12:35 (6:46)

Notes: All comparisons significant ($p < .001$).

SD = standard deviation.

Table 4. Characteristics That Differentiated Participants Responsive to Mealtime Feeding Assistance or Between-Meal Snacks in Three U.S. Nursing Homes

Characteristic	Mealtime Feeding Assistance (<i>N</i> = 54) Proportion or Mean (\pm <i>SD</i>)	Between-Meal Snacks (<i>N</i> = 56) Proportion or Mean (\pm <i>SD</i>)
<i>Cognitive impairment</i>		
Dementia diagnosis	61%	38%
MMSE total score	8.87 (\pm 7.26)	18.02 (\pm 8.0)
<i>Physical impairment</i>		
Proportion requiring physical assistance to eat	89%	38%
Proportion with evidence of chewing and/or swallowing difficulties	61%	32%
Proportion with a slow eating pace	72%	27%
<i>Appetite and food quality</i>		
Proportion on routine medications with appetite suppressant side effects	54%	79%
Complaints about food	44%	75%

Notes: All comparisons significant $p < .05$ (t tests for independent samples).

SD = standard deviation; MMSE = Mini-Mental State Examination.

evidence of chewing and/or swallowing difficulties during meals (Table 4: 61% versus 32%; $\chi^2 = 9.28$, $p < .01$), and required more than 25 minutes to complete most meals (Table 4: slow eating pace: 72% versus 27%; $\chi^2 = 22.97$, $p < .001$) compared with the between-meal snack intervention group. Thus, participants who were responsive to the between-meal snack intervention had significantly less cognitive and physical impairment. In addition, a significantly greater proportion of participants who were responsive to the between-meal snack intervention had at least 1 routine medication with appetite suppression as an adverse effect (Table 4: 79% versus 54%; $\chi^2 = 7.62$, $p < .01$). A greater proportion of this group also complained about at least 1 aspect of the NH food service during their interviews (Table 4: 75% versus 44%; $\chi^2 = 6.35$, $p < .05$).

DISCUSSION

This study describes two effective interventions to increase oral food and fluid intake in NH residents. These two approaches together incorporate individualized nutritional care components that have been rated as preferable by family members of NH residents (24) and resulted in an increase in the daily oral intake of most (90%) participants who received 1 or both of the interventions. However, 15% of participants who significantly increased their oral intake in response to 1 of the interventions had oral intake that remained less than their estimated REE needs. It is possible that these residents, who are likely to be at high risk for weight loss, may need both interventions simultaneously, but a dual-intervention approach was not directly evaluated in this study. The estimated REE values for participants in this study are low but consistent with values reported for NH residents with dementia based on indirect calorimetry (25). It is also notable that a separate small

group of 12 participants (10%) did not increase their oral intake in response to either intervention approach.

The between-meal snack intervention required significantly less time per participant per snack period (12 minutes) than one-on-one mealtime feeding assistance (35 minutes). However, the staff time requirement to implement the two interventions was approximately equal if mealtime feeding assistance was rendered to 3 residents simultaneously (42 minutes for the group, or 14 minutes per resident per meal). The results of this study show that group feeding assistance is feasible because most participants who were responsive to one-on-one feeding assistance were also responsive in the group condition. Although the approach used in this study was to evaluate the effects of feeding assistance during meals first, followed by an evaluation of the delivery of snacks between meals, it may be more appropriate within a given facility to evaluate the effects of between-meal snacks first if more staff are available to deliver this time-efficient intervention. However, the staff time required to implement either intervention was significantly greater than the staff time that is spent on feeding assistance care under usual NH conditions for the participants in this study. It is likely that the low amount of feeding assistance care delivery during meals and the inconsistent delivery of oral nutritional supplements and snacks, particularly fluids, between meals observed in this study under usual NH care conditions is a result of limitations in staffing resources to render these time-intensive, daily care activities (3,10–15,26,27). The problem of inadequate staffing resources is likely exacerbated by poor organization of staff and poor targeting of residents who need and are responsive to feeding assistance interventions (3,17,18).

The interventions evaluated in this study can be used to improve and individualize feeding assistance even without an increase in the number of staff. The key to organizing existing NH staff to render efficient feeding assistance is (a) to identify the residents who need intervention because of low intake (or other criteria, such as a recent weight loss or body mass index less than 20), and (b) to individualize care by determining which intervention approach is most appropriate for the resident (staff attention during meals versus between meals versus both). These two critical steps will allow for the most efficient use of limited staff resources during meals and between meals for most residents because feeding assistance care tasks are no longer limited to a narrow time period (meals) but distributed throughout the day. Furthermore, interventions are targeted toward those residents who are most in need of and responsive to that approach.

Given the differentiating characteristics of residents responsive to mealtime feeding assistance versus between-meal snacks, it is likely that the delivery of these two interventions may be divided among appropriate NH personnel. Certified nursing assistants, in conjunction with supervision by licensed nurses, should assume responsibility for the provision of feeding assistance during meals to residents in small groups of three who are likely to require physical assistance and have chewing and swallowing difficulties. Other NH personnel (e.g., administrative staff, social activities, volunteers, housekeeping) can perform

many mealtime tasks currently implemented by nursing assistants (e.g., transport of residents to and from the dining room, meal tray delivery, oral intake documentation, social stimulation, retrieval of substitute trays or items). The performance of these mealtime tasks by NH personnel other than nurse aides would greatly increase the time nurse aides had available to provide feeding assistance.

The delivery of snacks between meals is ideal for social activities personnel or volunteers, assuming that they are informed of diet orders, because most of these residents can eat independently. For example, food and fluid items could be offered between meals twice per day (morning and afternoon) by activity personnel in the context of organized, social group activities to facilitate time-efficient delivery of this intervention. It is important to note that the best approach to determine a resident's responsiveness to the delivery of feeding assistance during or between meals is to conduct a 2-day (6-meal) intervention trial. A brief "run-in" trial has been shown as the best approach to evaluate NH residents' responsiveness to other behavioral interventions as well (3,14,18,28), as opposed to reliance on cognitive status criteria or any other differentiating residents characteristics (e.g., physical dependency), which should be used only to allocate appropriate staffing resources for daily care implementation.

One notable limitation of this study is that we did not try to further individualize nutritional care by expanding the NH meal menu (restaurant style approach) or changing the food service and preparation within the NH kitchens. We do not discount the importance of food quality improvements (2,24,29), especially given the prevalence of food service complaints among participants in this study. In California, the average total dollars spent on NH food service is \$12.61 per resident per day, which potentially influences the ability of NHs to provide the effective between-meal snack intervention described in this study. However, it may be possible to offset the cost of the between-meal snack intervention if palatable food and fluid items are consistently offered to residents between meals rather than oral nutritional supplements. This study did not specifically evaluate residents' preferences for the snacks as compared with oral nutritional supplements. However, it is likely that, if given a choice, the residents would prefer the snack items because they did report a preference for variety. Furthermore, these same residents had an average estimated gain of 380 calories per day as a result of the between-meal snack intervention versus 94 calories per day as a result of supplements, which suggests that the snacks were more palatable to the participants in this study.

Finally, this study did not evaluate the clinical (e.g., weight loss) or quality-of-life outcomes that might result from maintaining the two feeding assistance interventions during a prolonged time. However, we strongly suggest that the consistent implementation of feeding assistance will significantly improve oral food and fluid consumption in most NH residents and thus represents a key daily care process to prevent unintentional weight loss. Controversy exists about the prevalence of unintentional weight loss among NH residents and the implications of high prevalence rates on the quality of NH care, particularly feeding assis-

tance (3,15–17). These issues can be resolved only after the effect of the consistent implementation of feeding assistance on weight loss is evaluated in NH residents. Based on the results of this study, immediate efforts should be made to ensure the consistent implementation of the feeding assistance interventions described here for all residents in need even before a controlled evaluation.

ACKNOWLEDGMENTS

Supported by the Commonwealth Fund (grant 20010121) and the University of California, Los Angeles Older Americans Independence Center (grant AG 10415-11). The views expressed in this article are those of the authors and may not reflect those of the funding agencies.

Address correspondence to Sandra F. Simmons, PhD, Jewish Home for the Aging/UCLA, Borun Center for Gerontological Research, 7150 Tampa Ave., Reseda, CA 91335. E-mail: ssimmons@ucla.edu

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Received February 18, 2003

Accepted April 30, 2003