


Humming as a Potential Tool for Facilitating Feeding Situations Between Persons With Dementia and Their Caregiver: A Single Case Study

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Abstract

Persons with dementia (PWDs) have a major cognitive decline in the ability to meet universal self-care needs, including self-feeding and maintaining a sufficient intake of fluids and food. The aim was to describe whether caregivers' humming during lunch situations affected eating and feeding problems in PWDs. An experimental single-case design was used, involving video observation. At baseline, PWDs were fed by their caregivers in the usual way and at intervention the PWDs were fed while a caregiver hummed. Analysis using the Edinburgh Feeding Evaluation (EdFED) showed that for Mrs Smith, the EdFED score decreased from a mean score of 14 at baseline to a mean score of 8.5 during the intervention. Mrs Green experienced a decrease in mean score from 12 at baseline to 8.5 during the intervention. This pilot study suggests that humming during lunch situations might enhance eating and feeding abilities for PWD and should be further studied.

Keywords

humming, single case, intervention, dementia

Introduction

Dementia is the fifth leading cause of death in persons aged 65 and older.¹ The global prevalence of dementia is estimated to 30 million, and by the year 2050 this figure is expected to reach 100 million.² Persons with dementia (PWDs) have a major cognitive decline in meeting universal self-care needs, which commonly include feeding one's self and maintaining a sufficient intake of fluids and food.^{3,4} Feeding difficulties increase as the dementia disease progresses; PWDs may forget to eat, forget that they have eaten, or fail to recognize food. They may also have difficulties with specific tasks involved in mealtime situations, and as such cognitive decline may lead to malnutrition for PWDs.^{5,6}

Patients who are unable to eat by themselves must rely on caregivers to help them.^{4,5,7} However, because of their cognitive, as well as communicative impairments, PWDs may not be able to tell that they are hungry or that they need help, and when caregivers try to help, some PWDs react with resistance, for example, refuse to open their mouth, spit, or push the food away.^{5,7} Being fed is commonly crucial to prevent starvation of PWDs, and the issues that have been addressed in relation to feeding activities needs to be utilized.⁸ Buhr and White⁹ argue that PWDs have difficulties in expressing and interpreting verbal and nonverbal communication, and this is a significant obstruction in communication with caregivers. Hanson et al¹⁰

argue that communication difficulties are a serious obstruction during mealtime, especially when PWDs are being fed.

Music listening^{11,12} and music therapy^{12,13} have been shown to influence PWDs positively. Appetite seems to improve when individuals listen to classical music during mealtime,^{14,15} and agitation is reduced when soothing music is played.^{16,17} During the care situation of morning routines involving caregivers singing for or together with PWDs, so-called music therapeutic caregiving (MTC),^{18,19} studies have shown that the PWDs are relaxed,^{18,20,21} express more self-confidence,²⁰⁻²² and are more active during the morning routines.²³⁻²⁷ The same studies also suggested that PWDs' communication was enhanced^{20,28} and cooperation between PWDs and caregivers was described by caregivers as easier to achieve.^{20,29} Since MTC seems to have several positive effects, and given that no such studies look to have been carried out during mealtime

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situations with PWDs, it would be interesting to implement and evaluate the technique during mealtime situations with caregivers and PWDs. However, since previous studies have found that PWDs commonly start to sing when caregivers are singing,^{18,20} the use of MTC during mealtime involves a possible risk that the PWD will start to sing, and thus not eat. One hypothesis could be that the lyrics of songs sung by the caregiver during MTC triggers the PWDs to join the singing. Hence, the present study was designed so that the caregiver only hummed songs, excluding lyrics. To elucidate how the humming might influence mealtime situations between PWDs and their caregivers, this pilot project was designed to include 2 persons with severe dementia who were fed by their caregivers.

The aim was to describe whether caregivers' humming during lunch situations affects eating and feeding problems in people with late-stage dementia.

Method

Study Design and Participants

An experimental single-case design (ABA design) with multiple baselines was used. "A" represents the baseline condition, "B" refers to intervention administration and the second "A" represents a return to the baseline condition (follow-up). A video observation (VIO) design was used during mealtime. Participants were recruited from 1 municipal nursing home in the middle part of Sweden. In total, 8 residents were living in the nursing home. All residents diagnosed with severe dementia and in need of wholly compensatory assistance with feeding and had been living at the nursing home for more than 20 weeks were eligible to participate in the study. Since one of the inclusion criteria was severe dementia, the eligible participants were unable to understand written and/or verbal information about the study. Therefore, proxy consent was obtained from their next of kin. The PWDs' confidentiality was guaranteed and the next of kin were informed that participation in the study was voluntary and they could withdraw at any time without experiencing penalties or deprivation of care or services for their relatives. The caregivers were orally informed about the aim of the study and confidentiality was assured.

Data Collection

Data for this study were collected by VIOs of the PWDs and their caregivers at noon during lunch service. To observe the mealtimes, a video camera was set up overlooking the dinner table in the dining room and for the persons who had their meal served in their personal rooms a video camera was set up to overlook the PWDs and caregiver. The camera was operated by a member of the research team who was present only for the first seconds of the filming. The camera operator had been instructed by the authors about how to perform the recordings. In order to capture the eating and feeding problems, each PWD was video observed once per week over 5 consecutive weeks during the whole mealtime situation. The first 2 weeks of VIO constituted baseline (A), which included the caregivers feeding

the PWDs as they usually do, without humming. The third and fourth week of VIO constituted the intervention (B), the caregivers were instructed to hum sing-along songs, children's songs, and popular songs from the early part of the 20th century. Finally, the fifth week of VIO constituted the follow-up of baseline (A) when the caregiver returned to a normal lunch situation without humming.

For all lunch situations, the food was preordered for every person living there, and relatives of the participants had placed this order based on what they thought their loved one would like to eat. This was a normal routine at the nursing home, and thus no extraordinary food was ordered for this study. The total eating time, counted by minutes was measured using the clock on the video camera. The time measurement began when the caregiver served the lunch in front of the PWD and ended when the person completed her lunch. During the 5 weeks of VIO, the participants were fed by the professional caregiver. Prior and after all lunches, food and liquid intake was measured in grams by one of the members of the research team. The following instruments were used to collect data.

Mini-Mental State Examination

The Mini-Mental State Examination (MMSE) was used to evaluate general cognitive functions. The MMSE is a measure of global mental status and consists of 20 questions about orientation to time and place, simple arithmetic (serial subtractions), registration and recall of 3 objects, simple language tasks, and visuoconstructional abilities. The total score ranges from 0 to a maximum score of 30, a lower score indicates more severe dementia.³⁰

Edinburgh Feeding Evaluation

Edinburgh Feeding Evaluation (EdFED) was developed in the early 1990s in an effort to address eating and feeding problems as well as to gain a better understanding of feeding difficulties in people with late-stage dementia.³¹ The EdFED scale was developed to be used in caregiver reports and observational studies.³² The instrument has an acceptable inter-rater ($r = .59, P = .013$) and intra-rater ($r = .95, P < .0001$) reliability.³³

The scale consists of 11 items and takes 5 minutes to complete. The first 10 items address mealtime behaviors and are divided into 2 groups. The first group includes 4 items that reflect the assistance the PWD already requires or might require. The items are (1) needs close supervision, (2) requires physical help, (3) spills food, and (4) leaves food on plate. The second group includes 6 behavior items that address functional or cognitive decline. The items are (1) refuses to eat, (2) turns head away, (3) refuses to open mouth, (4) spits out food, (5) leaves mouth open, and (6) refuses to swallow. All items are rated on a 3-point Likert-type scale with the response alternatives "never," "sometimes," or "often." Total scores can range from 0 to 20, with 20 representing disability in feeding. The last item in the scale indicates the level of support the

Table 1. Intake of Food and Liquid Measured in Grams for Mrs Smith and Mrs Green During Baseline, Intervention, and Follow-Up Sessions

Person	Baseline I		Baseline II		Intervention I		Intervention II		Follow-Up	
	Liquid	Meal	Liquid	Meal	Liquid	Meal	Liquid	Meal	Liquid	Meal
Mrs Smith	198	180	12	70	184	234	170	166	180	235
Mrs Green	37	113	211	100	155	23	63	53	187	22

PWD requires during the mealtime. The response alternatives are (1) supportive–educative assistance (needs cuing or help with plate setup or refocusing), (2) partly compensatory assistance (is involved with meals but requires physical assistance), and (3) wholly compensatory assistance (requires hand-feeding).

The analysis of the video films occurred after all data were collected. Initially, the first author analyzed all video films in a random order without the sound on. Second, the last author analyzed 1 film for each of the participants also with no sound on. As a third step, the authors met to discuss the coding of the instrument, inconsistencies were discussed until agreement was reached.

Ethical Considerations

The study and comparison was approved by the regional ethical review board in Sweden.

Results

Both Mrs Smith and Mrs Green had a MMSE score of 0 prior to the study. The grams of food and liquid intake at baseline, during the humming intervention and in follow-up sessions are shown in Table 1. Mrs Smith's food and liquid intake was almost the same during all sessions except during baseline II. For Mrs Green, the meal intake during humming intervention sessions was less than half of the intake during sessions without humming Table 1.

Mrs Smith's total EdFED score decreased during the lunch situations with humming. The total EdFED score was 14 both at baselines I and II and decreased to 6 and 11 during the humming intervention, indicating that Mrs Smith increased her eating and feeding abilities during the humming intervention. During the 2 weeks of humming intervention, Mrs Smith was more concentrated on the caregiver and what was happening, she never refused to eat and never turned her head away while being fed. Mrs Smith also more commonly opened her mouth when the caregiver approached her mouth with food. The first intervention with humming was the only lunch situation where Mrs Smith swallowed all her food; during all other lunch situations Mrs Smith sometimes or often refused to swallow the food offered (Table 2).

Mrs Green's total EdFED score increased from 8 points during baseline I to 16 points during baseline II indicating an increased disability in feeding. Baseline II was the only lunch situation when Mrs Green refused to eat, spit out her food, left her mouth open allowing food to drop out, and refused to

swallow the food. During the first humming intervention, the total score decreased and was almost back to the same score as during baseline I. The total EdFED score then continued to decrease during the upcoming weeks of humming intervention (6 points) and follow-up (5 points; Table 2).

Discussion

Methodological Considerations

This study was performed with VIO on PWDs living at a nursing home. The VIO can be a rich source of data and can be particularly valuable because events can be captured for careful analysis at a later point in time.³⁴ The VIO as a method has been used in several studies related to dementia care and found to be an accurate method for capturing expression in PWDs.^{24,28,35,36} As always, with VIO the researcher should keep in mind that the participants might change their behavior in the knowledge that they are being observed.³⁷ In this study, the caregiver was well aware of the presence of the video camera during all lunch servings, but to prevent this from being uncomfortable for the caregiver the video observer left the room as soon the video was operating properly. In contrast to the caregivers, the PWDs did not seem to notice the presence of the video observer.

The study results may be limited by the fact that our study was restricted to only 1 nursing home. Another limitation is the inclusion of only persons with severe dementia who needed wholly compensatory assistance with feeding and had been living at the nursing home for at least 20 weeks. However, including persons who did not need assistance with feeding would have given a study population that was more representative for nursing homes in Sweden. In this pilot study, the 2 participants represented only 25% of the nursing home population. The authors are well aware that the choice of studying lunch situations with no extraordinary food ordered may have resulted in the PWDs being served some lunches that they appreciated more resulting in their eating more, as well as the opposite that some days the food was not a favorite dish and, therefore, the food intake was less. However, we are less likely to believe that unfavorable food was served since the participants' relatives stated earlier what they thought their loved ones would like to eat.

One of the study's strengths is the use of the EdFED instrument. The instrument is one of the few instruments for which adequate psychometric testing⁸ has been reported, and in 2008, the New York University Hartford Institute of Geriatric Nursing identified the EdFED as the "best practice"

Table 2. Edinburgh Feeding Evaluation Scores for Mrs Smith and Mrs Green During Baseline, Intervention, and Follow-Up Secessions^a

	Mrs Smith					Mrs Green				
	VIO No 1	VIO No 2	VIO No 3	VIO No 4	VIO No 5	VIO No 1	VIO No 2	VIO No 3	VIO No 4	VIO No 5
Does the patient require close supervision while feeding?	2	2	2	2	2	2	2	2	2	2
Does the patient require physical help with feeding?	2	2	2	2	2	2	2	2	2	2
Is there spillage while feeding?	1	1	1	0	2	2	0	1	0	0
Does the patient tend to leave food on the plate at the end of the meal?	2	1	0	2	2	2	2	2	2	1
Does the patient ever refuse to eat?	2	1	0	0	2	0	2	0	0	0
Does the patient turn his head away while being fed?	1	2	0	0	0	0	0	0	0	0
Does the patient refuse to open his mouth?	1	0	0	0	1	0	2	2	0	0
Does the patient spit out his food?	1	1	0	1	1	0	2	0	0	0
Does the patient leave his mouth open allowing food to drop out?	1	2	1	2	2	0	2	0	0	0
Does the patient refuse to swallow?	1	2	0	2	2	0	2	0	0	0
Total score 0-20	14	14	6	11	16	8	16	9	6	5
Indicate appropriate level of assistance required by patient:	3	3	3	3	3	3	3	3	3	3
1: supportive-educative;										
2: partly compensatory;										
3: wholly compensatory										

Abbreviation: VIO, video observation.

^aScore answers to questions 1-10: *never* (0), *sometimes* (1), and *often* (2).

instrument for the assessment of “eating and feeding issues in older adults with dementia.”³² However, misclassification can occur, for example, when participants are classified as having a symptom when they do not, or are classified as not having a symptom that is present.^{38,39} In order to prevent misclassifications, the authors analyzed the video films independently of each other.

Reflections on the Results

The aim was to describe whether caregivers’ humming during lunch situations affects eating and feeding problems in people with late-stage dementia. For Mrs Smith, the total scores of the EdFED decreased during the humming, and once again increased during the follow-up. This indicated that Mrs Smith increased her eating and feeding abilities, and she increased her food and liquid intake during the intervention situations. This finding can be discussed against the backdrop of a previous single-case study of humming during mealtime that suggested that food and liquid intake increases.⁴⁰ Although it was humming that constituted the intervention in this study and the humming was not based on classical music, it can be considered alongside Ragneskog et al,¹⁵ as well as McDaniel et al⁴¹ who claim that soothing classical background music might increase food and liquid intake. For Mrs Green, the scores from the baseline observations were altogether higher in contrast to those recorded during the intervention sessions. However, this can be explained in light of the extremely high scores at baseline II, which might suggest that Mrs Green had a “bad day”

and thereby had more problems in eating. This is supported by the even lower scores on the EdFED in comparison to the intervention situations.

Another finding was that during the intervention sessions Mrs Smith never refused to eat nor did she turn her head away while being fed. This could be discussed again in light of the effects background music during mealtimes has been described as having according to Denney,⁴² as well as Goddaer and Abraham,⁴³ and Ragneskog et al,⁴⁴ who find a decrease in agitated behaviors with music interventions. Also findings from studies of caregivers’ singing during caring have shown to decrease resistant and aggressive behaviors of PWDs.^{18,23,24}

The findings of this study look on the surface to be somewhat contradictory because Mrs Smith did increase her eating and feeding skills during the humming intervention, while Mrs Green seemed to have almost the same scores at baseline, intervention and at the follow-up, and ate even less. Of course, larger studies need to be conducted but preliminarily it can be stated that the findings related to Mrs Smith agree to some extent with other studies focusing on singing during caring (MTC)^{18,23,24} or on music during mealtime.^{16,42-45} Also, the fact that Mrs Smith did increase her eating and feeding abilities, and complied more with the caregiver can be understood in light of studies of MTC that claim that PWDs might be more compliant, and more aware of the situation while caregivers’ sing.²⁰⁻²² Since the caregivers in this study did hum songs used in MTC studies (sing-along songs, children’s songs, and popular songs from the early part of the 20th century), it might be speculated that Mrs Smith preferred these types of songs.

Researchers Spiro,⁴⁶ Cuddy and Duffin,⁴⁷ as well as Cross⁴⁸ suggest that music and songs should be from the PWDs' youth to trigger memories and emotions, and as such PWDs might be more active.

Conclusions and Implications

Since the design of this study was based on previous findings of MTC, the results can be compared with those findings. However, since this is a small study with somewhat contradictory results in the 2 cases, the findings from the MTC studies seem to be preferable. It is important to bear in mind, however, that studies of MTC have not been carried out on mealtime situations. In future it might be preferable to implement singing rather than humming even though this entails a risk that the PWDs will begin singing. However, larger studies need to be conducted independently to determine whether a humming or singing intervention is more effective. Music seems nevertheless to have positive influences on PWDs during mealtimes,^{16,42-45} and researchers Watson and Green⁴ argue in their review that music seems to be a promising pathway to increasing eating abilities and the nutritional state of PWDs.

Declaration of Conflicting Interests

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