Factors that relate to activity engagement in nursing home residents

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Abstract

Many nursing home residents are unoccupied and at risk for poor health outcomes because of inactivity. The purpose of this study was to identify characteristics of residents with dementia that predict engagement in activities when activities are implemented under ideal conditions. Data from a clinical trial that tested the efficacy of individually prescribed activities were used to address the study aim. Thirty subjects were videotaped daily for 12 days during 20-minute activity sessions. Measures of engagement (time on task and level of participation) were taken from these videotapes. Univariate logistic regression analyses indicated that cognitive status and physical function explained a significant amount of variance in engagement. Efforts to promote function may facilitate even greater benefits from prescribed activities by improving capacity for engagement.

Key words: nursing home residents, dementia, activities, engagement, participation

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Introduction

One indicator of nursing home quality is the extent to which residents engage in meaningful activities. Data from a number of studies indicate that residents are frequently unoccupied in these settings. It is not unusual to find residents who are capable of independent activity to be sitting or lying down for long periods of time.[1] In a recent study of 15 nursing homes, researchers reported that most of the 451 residents they observed spent at least 17 hours a day in bed.[2] Inactivity and low levels of engagement contribute to loss of physical function, social isolation, behavioral symptoms, and poor quality of life.[3,4] Conversely, when nursing home residents are more actively engaged, they report greater well-being and less depression and have lower rates of mortality than unengaged residents.[5,6]

A number of factors influence resident engagement in the nursing home. Residents who displayed agitation and/or apathy were more likely to be excluded from activity programs.[7] Newly admitted nursing home residents with depression were found to have low social engagement, independent of other risk factors.[8] Cognitive impairment and deficits in physical function, as well as visual and hearing deficits, also predicted low engagement.[9,10] Psychoactive drug use often causes sedation and has been associated with withdrawal behavior in nursing home residents.[11] Finally, the availability and quality of activity programs contributed to resident engagement.[12] A limitation of this literature is that few studies used direct observation of resident engagement behavior during activity programs. For the most part, retrospective data extracted from the Minimum Data Set (MDS) or the Resident Assessment

Instrument (RAI) were used for measuring resident characteristics and engagement. It has also been noted that several studies indicate that MDS data are less reliable among cognitively impaired than cognitively intact residents.[13,14]

This study identifies baseline resident characteristics (behavioral symptoms of agitation and passivity, medication profile, cognitive status, and physical function) that predict engagement when activities are prescribed using an efficacious method and implemented in a manner that affords active participation under ideal conditions. Data were obtained from a recently completed clinical trial in which the efficacy of three different recreational activities for reducing behavioral symptoms in persons with dementia were tested.[15] We found that when activities were tailored to each resident's cognitive status and physical function (skill level) and his/her style of interest, this reduced passivity and improved positive affect and engagement to a greater extent than when activities were tailored to only one of those factors or baseline. The methods used in the study included videotaped observations of each resident's baseline and intervention sessions, allowing us to report the relationship of baseline resident characteristics to engagement in activities matched to skill level and style of interest. The aim of this study addresses a gap in knowledge by identifying factors that may continue to impede engagement (measured using direct observation as opposed to retrospective staff reports) despite using state-of-the-art approaches to prescription and implementation. This information can be used in the refinement of interventions targeted at improving engagement and also assist in the evaluation of activity engagement as a quality indicator for the nursing home.

Methods

The methods used to address the aim of this study have been described in detail elsewhere.[15] Briefly, a crossover experimental design was used to test the efficacy of three different activity conditions for responding to behavioral symptoms exhibited by nursing home residents with dementia: activities matched to skill level (cognitive status and physical function) only, activities matched to interest only, and activities matched to both skill level and interest. After a baseline period, each subject was randomly assigned to one of six possible order-of-condition presentations. For this study, the resident characteristics included in analyses as independent variables (behavioral symptoms of agitation and passivity, medications, cognitive status, and physical function) were taken during baseline; the dependent measures of engagement were taken from the condition found to be most efficacious in the trial (activities matched to skill level and style of interest). We selected this condition to determine which resident characteristics impact engagement in activities when those activities are prescribed in the most efficacious manner and implemented under ideal conditions.

Subjects and setting

The sample was composed of 30 nursing home residents with dementia who met strict enrollment criteria, recruited from four sites in central and northeast Pennsylvania. Subjects were primarily female (77 percent), white (100 percent), and widowed (71 percent), with a mean age of 82.3 years and a mean educational level of 10.9 years.

Instruments

Independent variables

Agitation was measured during baseline using the Cohen-Mansfield Agitation Inventory (CMAI),[16] modified for direct observation.[17] The CMAI is a caregiver-rating questionnaire that consists of 29 agitated behaviors that are rated on a 7-point scale of frequency. The rater indicates which of the 29 dementia behaviors occur in five-minute blocks of time, and a sum score is obtained. Interrater reliabilities for the CMAI have ranged from 0.92 to 0.95; the scale has reported convergent validity with the Ward Behavior Inventory.[18]

Passivity was measured during baseline using the Passivity in Dementia Scale (PDS).[19] The PDS is an observer rating scale of 42 behaviors: 12 passive behavior items scored in the negative, and 30 active behavior items scored in the positive. Lower scores indicate greater passivity. Five subscale scores are obtained: thinking, emotions, interaction with the environment, interaction with people, and activities. The rater indicates which of the 42 behaviors occurred in five-minute blocks of time, and a sum score is obtained. Internal consistencies (Cronbach's alpha) of 0.71 to 0.94 for the subscales and interrater reliability of 0.80 for the total scale have been obtained.

The medication profile was obtained during baseline using a medical chart review and included a count of the total number of medications prescribed on a regular administration schedule, the total number of psychoactive drugs prescribed, and the total number of prn antipsychotic drugs administered during the treatment period. Psychoactive drugs were identified using the World Health Organization classification scheme and included sedative-hypnotics, behavioral stimulants and

convulsants, narcotic analgesics, antipsychotic agents, and psychedelics and hallucinogens.[20]

Cognitive status was assessed during baseline using the Mini-Mental State Examination (MMSE), a brief standardized cognitive screen that includes items on orientation, registration, memory, attention, and concentration.[21] The score is the sum of correct responses and ranges from 0 to 30. Scores below 24 indicate global cognitive impairment.

Physical function was assessed during baseline using the physical capacity subscale of the Psychogeriatric Dependency Rating Scale (PGDRS).[22] Seven items on hearing, vision, speech, mobility, dressing, personal hygiene, and toileting are rated on a Likert-type scale. Scores range from 0 to 34, with higher scores indicating greater dependency.

Dependent variables

Two measures were used to assess engagement during the intervention period: time on task and participation. Time on task was the length of time (in minutes and seconds) that the subject participated in each activity session. This was measured using a stopwatch, starting from the initiation of engagement in activity and ending at 20 minutes, or when the subject disengaged from the activity. Participation was the intensity of engagement and was measured using a scale of 0 to 3 (0 = dozing; 1= null; 2= passively engaged; 3 = actively engaged) developed by Kovach and Magliocco.[23] Participation was measured once at the completion of each intervention session and was the level of participation the subject exhibited for 50 percent or more of the time during activity implementation.

Procedure

A trained geriatric nurse practitioner assessed each subject's cognitive status (MMSE) and physical function (PGDRS) and extracted the medication profile using a medical chart review at the start of baseline. During the 12-day baseline period, each subject was observed and videotaped for 20 minutes each day at a time point when he/she exhibited the greatest amount of agitation or passivity as reported by staff and verified by research personnel in a five-day prebaseline observation period. Measures of agitation (CMAI) and passivity (PDS) were obtained from video recordings of baseline sessions by undergraduate and graduate psychology students who were trained in video rating and who achieved 80 percent agreement with the first author (A.K.) on the instruments used to rate these variables. Video raters were blind to condition and study hypotheses.

After baseline, treatment activities were prescribed by the first (A.K.) and second (L.B.) authors based on each subject's cognitive status, physical function, and style of interest as assessed by knowledgeable informants (usually an adult child or spouse of the resident) using the extraversion and openness scales of the NEO Five-Factor Inventory.[24] An earlier project[25] describes in detail how activities were classified by style of interest so that their selection matched subjects' long-standing preference for social stimulation (extraversion score) and novelty (openness score). Descriptors for the traits of extraversion and openness were used to classify personality-appropriate activities in one of four style of interest categories developed by Costa and McCrae.[26] The trait of extroversion was used to prescribe the context of the activity (small group vs. one-on-one), and the trait of openness was used to prescribe the content of the activity (artistic pursuits, expression of feelings, and curiosity vs. the more prosaic, familiar, and conventional). Trained interventionists, blind to condition and study hypotheses, implemented activities for up to 20 minutes at each session for 12 consecutive days. Each of these activity sessions was videotaped. Measures of engagement were taken from these video recordings by trained video raters blind to condition and study hypotheses.

Analysis

The SAS software system, release 9.1.3 (SAS Institute, Inc., Cary, NC), was used for all analyses. Baseline values of agitation, passivity, medication profile, cognitive status, and physical function were used to predict engagement while receiving treatment activities. Baseline values of agitation and passivity were averaged for each subject for this analysis, due to low or no variability being observed for these variables. Time on task and participation were used as the dependent variables. The primary analyses used the multiple observations that were made on each subject to reflect the observed variability in engagement. Due to a large proportion of these variables having the maximum value (time on task = 20 or participation = 3), these variables were dichotomized as time on task equal to 20 versus time on task equal to less than 20; participation equal to 3 versus participation equal to less than 3. Dichotomization of the engagement variables resulted in very little loss of information because of the asymmetry of observed distributions of these variables in the sample. Observations tended to be near the ends of the scales, with many having the minimum or maximum possible value of the measurement. Thus, dichotomization recognized the discontinuity of these distributions and alleviated difficulties with the distributional assumptions of the statistical technique.

Table 1. Descriptive statistics for independent variables						
Variable	**N**	**Mean**	**SD**	**Minimum**	**Median**	**Maximum**
CMAI	30	2.2116	2.4237	0.0000	1.0833	9.0000
PDS subscales						
Thinking	30	3.8477	2.8306	0.0833	3.2083	12.0833
Emotions	30	4.8727	7.2478	-7.0833	2.0069	24.5833
Interact with environment	30	5.5106	2.4146	1.6667	5.7083	12.5833
Interact with people	30	7.7042	5.5525	-0.2500	5.7500	19.8333
Activities	30	-3.1000	3.7352	-8.0000	-3.5000	4.0000
Medication profile						
Regular	30	7.7000	4.3004	0.0000	7.5000	19.0000
Psychoactive	30	1.6000	1.1626	0.0000	1.5000	4.0000
Antipsychotic	30	1.2000	4.6118	0.0000	0.0000	24.0000
MMSE	29	8.7931	7.3503	0.0000	10.0000	26.0000
PGDRS	29	16.0345	6.9718	1.0000	17.0000	26.0000

CMAI, Cohen-Mansfield Agitation Inventory; MMSE, Mini-Mental State Examination; PDGRS, Psychogeriatric dependency rating scales; PDS, Passivity in Dementia Scale; SD, standard deviation.

The primary analysis method was logistic regression modeling, accounting for repeated measurements on the same subjects by including a term representing the individual subject as a random effect in the model. The logistic regression models were implemented using generalized estimating equations (GEE), using a logit link function and the binomial distribution. Odds ratios and 95 percent confidence intervals were calculated for each of the independent variables. Univariate logistic regression models were performed for each of the potential predictor variables. Variables that were significant in the univariate models were included together in a multiple logistic regression model to evaluate their separate contributions to prediction of the categorized dependent variables of time on task and participation.

Results

Data for 30 subjects were available for analysis. Descriptive statistics for the averaged baseline independent variables are presented in Table 1. This group of residents was quite frail, with moderate to severe cognitive impairments and low physical function, exhibiting primarily passive behaviors with some agitation, and taking a large number of medications prescribed on a regular administration schedule including routinely prescribed psychoactive drugs. Most subjects (25 of 30) did not receive prn antipsychotic drugs during the treatment condition; this likely reflects the success of legislation that restricts prescription of these medications in nursing homes.

There were 329 observations of the engagement variables. For the dependent variable time on task, 204 observations (62.01 percent) had the maximum value of 20. Six subjects had no variability in observed time on task, with all observed values equal to 20. For two subjects, all values were less than 20. All other subjects had some observations equal to 20 and some less than 20. Of the 329 observations of participation, 239 observations (72.64 percent) had the maximum possible value of 3. For four subjects, all observations of participation were equal to 3. No subject had participation less than 3 for all observations.

Tables 2 and 3 list the results of univariate logistic regression analysis for the dichotomized time on task and participation variables, respectively. The odds ratios in the tables may be interpreted as the multiplicative increase in the odds of having time on task equal to 20, or participation equal to 3, for a one-unit increase in the value of the predictor variable. A positive direction of association (equivalent to odds ratio > 1) means that having time on task equal to 20 is associated with higher levels of the predictor variables. Time on task was categorized as equal to 20 versus less than 20. Only

Table 2. Univariate logistic regression for time on task				
Variable	**p-value**	**Odds ratio**	**95 percent confidence interval for odds ratio**	**Direction for association**
MMSE	0.0130	1.08	(1.02, 1.15)	Positive
PGDRS	0.1423	0.92	(0.88, 1.02)	Negative
CMAI	0.0793	0.82	(1.02, 0.58)	Negative
PDS subscales				
Thinking	0.2835	1.11	(0.89, 1.29)	Positive
Emotions	0.5289	1.02	(0.95, 1.09)	Positive
Interact with environment	0.7875	1.03	(0.78, 1.23)	Positive
Interact with people	0.0880	1.09	(0.99, 1.18)	Positive
Activities	0.4669	1.06	(0.90, 1.19)	Positive
Medication profile				
Regular	0.3701	1.05	(0.94, 1.15)	Positive
Psychoactive	0.8545	1.04	(0.53, 1.37)	Positive
Antipsychotic	0.6687	0.099	(0.96, 1.02)	Negative
CMAI, Cohen-Mansfield Agitation Inventory; MMSE, Mini-Mental State Examination; PDGRS, Psychogeriatric dependency rating scales; PDS, Passivity in Dementia Scale.				

MMSE was significantly associated with time on task. The negative direction for PGDRS indicates that as physical function declined (i.e., higher score on the PGDRS) time on task also decreased. Participation was categorized as equal to 3 versus less than 3. Both MMSE and PGDRS were significantly associated with participation.

When both MMSE and PGDRS are included in a multiple logistic regression model, neither is significantly associated with participation (MMSE p = 0.1908, PGDRS p = 0.1297). That these two variables do not contribute independently to predicting participation equal to 3 is consistent with the observed crude correlation of -0.56 between MMSE and PGDRS.

Discussion

In this study of frail nursing home residents, our univariate analyses indicated that under ideal activity conditions designed to improve engagement, cognitive status and physical function continued to explain a significant amount of variance in time on task and participation. This was in spite of activities being tailored to each resident's level of function and indicates an understandable "limiting effect" imposed by these variables during implementation of activities. The cognitive ability of attention declines with progression of the disease, while participation requires not only the cognitive ability to attend but also the physical ability to actively partake in activities.

Tailored activities may have been successful in overcoming other factors reported to place residents "at risk" for low activity engagement, however (i.e., behavioral symptoms of agitation and passivity, and medication use), because none of these factors was found to be a significant predictor of engagement while receiving the intervention. The data indicate that well-designed and implemented activities may help to overcome behavioral symptoms that are frequently reported reasons for excluding residents from activity programs. Additionally, most subjects (26 of 30) were receiving routinely prescribed psychoactive medications which, like behavioral symptoms, did not seem to effect engagement in this sample. An important outcome of psychoactive drug use should be a demonstrated improvement in quality of life. This is especially true for nursing home residents who are vulnerable to the adverse effects of these drugs. Whether psychoactive drug use facilitates or impedes engagement in therapies that promote quality of life is not known. There is a need for further research to determine what incremental benefits, if any, appropriately prescribed psychoactive drugs add to nonpharmacologic interventions for nursing home residents.

Table 3. Univariate logistic regression for participation				
Variable	**p-value**	**Odds ratio**	**95 percent confidence interval for odds ratio**	**Direction for association**
MMSE	0.0057	1.12	(1.04, 1.20)	Positive
PGDRS	0.0038	0.89	(0.84, 0.96)	Negative
CMAI	0.1757	0.81	(0.47, 1.08)	Negative
PDS subscales				
Thinking	0.2026	1.18	(0.83, 1.40)	Positive
Emotions	0.4995	1.03	(0.96, 1.11)	Positive
Interact with environment	0.7519	1.04	(0.86, 1.26)	Positive
Interact with people	0.1721	1.10	(0.95, 1.22)	Positive
Activities	0.5904	1.06	(0.88, 1.26)	Positive
Medication profile				
Regular	0.4193	1.06	(0.91, 1.19)	Positive
Psychoactive	0.4226	1.21	(0.59, 1.57)	Positive
Antipsychotic	0.1600	1.04	(0.98, 1.09)	Positive

CMAI, Cohen-Mansfield Agitation Inventory; MMSE, Mini-Mental State Examination; PDGRS, Psychogeriatric dependency rating scales; PDS, Passivity in Dementia Scale.

The finding that cognitive status and physical function are moderately correlated (r = -0.56) is similar to what others have reported.[27-29] Cognitive status and physical function, while not contributing independently to either measure of engagement in this study, have been shown to be two distinct aspects of dementia in other work.[30] Using data from the Canadian Study of Health and Aging, Thomas[31] found that after controlling for comorbidities that limit physical function, persons with dementia showed attenuated but still higher rates of impairment in activities of daily living compared to cognitively intact and benignly cognitively impaired individuals. These data point to the need to assess cognitive and physical abilities separately.

The univariate analyses in this study suggest that more cognitively and physically impaired residents have less stamina to engage in activities. Because of this limitation, we suggest the following approaches to care and its evaluation. First, efforts to improve physical function and to delay or slow the decline of cognitive abilities might facilitate resident accrual of even greater benefits from prescribed activities by improving capacity for engagement. Obviously, residents who retain their cognitive abilities and physical function would be better able to more actively participate in activities that are made available to them, other factors being equal. One problem in the nursing home is that well-meaning staff promote frailty by "doing for" residents to save time,[32] or by restricting activities to prevent fall injury.[33] These approaches to care set up a vicious cycle of frailty, which is hard to reverse.

Most physical activity programs in nursing homes involve seated range-of-motion exercises only.[34] Randomized trials have demonstrated that strength, flexibility, and endurance training for frail institutionalized elders results in dramatic increases in physical function.[35,36] In addition, less vigorous programs that were integrated into daily care have also led to significant improvements in physical function.[37] Recent literature suggests that aerobic exercise programs also have stabilizing effects on cognition, particularly executive function.[38-40] Integrating programs that improve strength, flexibility, and endurance within the context of engaging recreational activities has advantages from both time management and exercise science perspectives and may be especially appropriate for frail nursing home residents. Work using the Neurodevelopmental Sequencing Program (NDSP) demonstrated that significant improvements in strength, flexibility, and ambulation were attained by integrating specific exercises in the context of recreational activities.[41,42] The NDSP matches the recreation therapy approach to the functional level of the

resident in a developmental sequence to improve engagement and success during the recreational activity. Given this evidence and the results of these studies, we recommend that activity programs incorporate exercises designed to improve physical function and cognitive status into daily recreational activities. This approach has the potential to maximize engagement so residents can more fully benefit from the positive effects of activities.

Second, in practice, the evaluation of resident engagement as a quality indicator in the nursing home might be more reliably assessed using direct observation of activity sessions as opposed to a count of the number of activity programs offered residents or attendance counts. Attendance at programs does not guarantee engagement. Buettner and Fitzsimmons[43] examined activity calendar offerings for residents with dementia in five long-term care facilities and found that only 6.5 percent of residents received appropriate activities despite high reported attendance at these programs. With these low levels of engagement, functional improvement is impossible. Nursing home surveys might be more fruitful if the focus of assessment were direct observation of engagement rather than reports of activities offered.

There are a number of acknowledged limitations to this study. First, the sample size is small, so findings from similar-sized samples may be unstable. However, subjects were evaluated on approximately 12 days of baseline and 12 days of treatment, which provided approximately 720 total observations, giving more than adequate degrees of freedom to use the logistic regression analysis. Additionally, the demographic characteristics of our sample mirror the typical resident in nursing homes today. Our findings are consistent with retrospective reports regarding engagement, cognitive status, and physical function,[9,10] and will be used to guide the design of a larger clinical trial. Second, we had no data on depression to assess its impact on engagement. The passivity scale we used, however, does include behaviors that are typically associated with depression. Despite these limitations, the study does add a dimension to the recreation literature by virtue of its use of direct observation during activity implementation. Given the extent of inactivity observed in nursing homes and its documented relation to poor physical and cognitive function, our findings support the need to break the cycle between these factors. By instituting methods that preserve and improve ability to engage, residents can more fully benefit from the positive effects of therapeutic activity. It is also important to develop evaluation methods that capture the therapeutic utility of nursing home activity programs for improving resident engagement.

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