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Feasibility of providing computer activities for nursing home residents with dementia

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Abstract

Introduction—Nursing home residents with dementia need cognitively stimulating and enjoyable activities, and computer technology offers them a means of engaging in such activities. This study therefore examined the feasibility of providing a 12-week computer activity program (CAP) for nursing homes residents with dementia.

Methods—Fourteen participants completed the CAP, and 462 observational logs of CAP sessions were analyzed.

Results—On average, participants completed 33 sessions amounting to 936.5 minutes over 12 weeks. Participants with mild and moderate dementia preferred playing a cognitively challenging game such as solitaire, while those with severe dementia enjoyed watching slideshows with music.

Conclusion—The findings suggest that it is important to match computer activities to interests and cognitive ability in order to increase participation and satisfaction of NH residents with dementia.

Keywords

Activity; Computer; Intervention; Stimulation; Nursing home; Dementia

Cognitive and social stimulation for persons with dementia are limited in nursing homes (NH). Residents spend excessive time either in bed or doing nothing (Logsdon, 2000; Bates-Jensen et al., 2004; CMS, 2011). Engaging in meaningful activities is critical for these NH residents, both to meet psychosocial needs and to improve quality of life. Research has

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shown that activities such as games, arts and crafts, and music can fill unoccupied time, increase engagement in cognitive tasks, elicit positive affect, and significantly decrease agitation among NH residents with dementia (Kolanowski, Litaker, & Buettner, 2005; Smith et al., 2009). Thus, current activity regulations and guidelines for NHs issued by the Department of Health and Human Services (DHHS) Center for Medicare and Medicaid Services (CMS) (DHHS, 2006) emphasize ongoing activity programs that accommodate residents' interests and enhances their physical, mental and psychosocial well-being.

Yet it is challenging to individualize activities for NH residents with cognitive and physical impairment. Unless activities are tailored to their abilities and needs, these residents are not likely to participate. A recent Minimum Data Set report (CMS, 2011) revealed that more than 77% of residents did not participate in group activities offered by NHs. Almost 60% of their residents spent most of time alone watching TV when they were not receiving treatments or ADL care (CMS, 2011).

Individualized activities require substantial involvement of nursing staff, and with a nationwide shortage and high turnover of nursing staff in long-term care settings, it is unrealistic to expect nursing staff to be available for individualized activities (DHHS, 2002). Computer technologies, however, have the potential to make hundreds of activities accessible in an easy, convenient format, adaptable to residents' abilities, and without requiring a lot of staff time (Winter, Newell, & Arnott, 1985; McConatha, et al., 1995; Tak, et al., 2005; Tak & Beck, 2010). Further, computer activities can be therapeutic because of unique features like visual and auditory stimulation, interactivity, value-free feedback, and multiple repetitions on demand (Winter, Newell, & Arnott, 1985; McConatha, et al., 1995; Wilson, 2000; Cho, et al., 2002; Antonietti, A., & Mellone, 2003; Tak, et al, 2005; Mahendra, 2011).

Previous studies indicate that computer activities provide enjoyment and cognitive stimulation for NH residents (Weisman, 1985; Purnell & Sullivan-Schroyer, 1997; Alm, & O'Mara, 2001; Gunther, et al., 2002; Namazi & McClintic, 2003; Tak, & Beck, 2005). Further, despite the stereotypical view of older adults as resistant to new technologies, NH residents have shown high levels of acceptance and openness to computer activities. Purnell and Sullivan-Schroyer (1997) reported an increased sense of productivity and accomplishment in NH residents when they learned how to use computers to create their own letters, greeting cards, and posters. According to a study of Alm and O'Mara (2001), creating a scrapbook on the computer ameliorated distress among persons with dementia. In a survey with nursing home administrators of Alzheimer's Care Units (ACU), nearly 88% said they were interested in making computer activities available for residents (Tak, Beck, & McMahon, 2007).

The literature also suggests that computer activities have the potential not only to make unoccupied time more meaningful and enjoyable, but also to improve specific cognitive performance including psychomotor abilities, reaction time, hand-eye coordination, information-processing skills, and creativity (Rabbitt, Banerji, & Szymanski, 1989; Bliss, et al., 1991; Yuji, 1996; Namazi & McClintic, 2003; York, 2003). However, little is known about the feasibility of providing computer activities for NH residents with dementia.

Therefore, this study provided a 12-week computer activity program (CAP) for NH residents with dementia and examined their reactions to the CAP (time spent in activities, preferred activity, level of engagement, verbal and non-verbal reactions, types of assistance needed, and barriers to engagement in activity).

METHODS

Design

The study used a descriptive design with observational data of CAP sessions.

Participants

A convenient sample of 14 participants was recruited from three nursing homes in a Southern state. The mean number of beds in the nursing homes was 79, typical of nursing homes throughout the country. Inclusion criteria were (a) age 65 years or older; (b) diagnosis of dementia in the medical record; (c) Mini-Mental State Examination (MMSE) (Folstein, Folstein, & McHugh, 1975) score of 4–27; (d) no change in psychoactive medications within the past 30 days; and (f) at least 2 weeks' residency in the nursing home. Elders with MMSE scores < 10 were considered to have severe dementia while those with an MMSE score between 11–20 had moderate dementia and those with scores between 21–27, mild dementia (Petersen, et al., 1999; Kim & Caine, 2002; Kavirajan & Olazaran, 2005). Participants completed a brief assessment for physical disability including vision, hand-and-finger function (HFF), and hearing. For the vision check, participants were asked to read an 18-point letter on a computer screen, and the result was recorded as "yes" or "no". A subscale on physical function of the Arthritis Impact Measurement Scales (AIMS) was used to measure HFF (Meenan et al., 1982; Meenan, 1990). Possible scores range from 0–30; a score of less than 5 was considered severely impaired, a score between 5–15 fair to good, and a score above 15, excellent. Hearing ability was assessed using the highest level of volume from a computer speaker, and the result was recorded as "yes" or "no." The university institutional review board approved the study protocol. Written consent was obtained from each participant's responsible party and assent was obtained from the participant.

Intervention

The CAP was offered to study participants for 12 weeks (5 days a week for up to 30 minutes per day). A personal computer was set up in a quiet private room in each nursing home. Prior to CAP, each participant attended two 30-minute individual orientation sessions which included getting familiar with the activity menu screen and adaptive accessories (e.g., trackball, touch screen, headphone), and trying out a computer activity or game. The pace and content of orientation were adapted to the individual's level of cognition, vision, hand-and-finger function, and hearing. Adaptive accessories were available to facilitate the use of the computer during the orientation sessions and throughout CAP. At each CAP session, a research assistant (RA) turned on the computer, set up equipment such as the printer, and was available for technical assistance.

The activity content of CAP included sets of slide shows with music, and games. The slide shows consisted of a series of nature scenes (e.g., mountains, lakes, flowers) accompanied by calm and familiar musical pieces. Visual scenes designed to elicit positive emotion were selected from a pool of more than 3000 photos from the National Geographic Photo Gallery software (2003). The slide shows used songs from two music CDs (Reminiscing Moments and Quiet Moments from Music and Motion, Inc, 2003) that others had found effective for persons with AD. A computer technician created the slide shows using the Microsoft® Power Point program. Free or commercially available computer games included solitaire, tidy-up, balloon kaboom, blocks, jacks, pinball, and sticks that were considered appropriate for elders with dementia (Tak et al., 2005).

Each participant selected computer activities on a thumbnail-style activity menu on the computer screen that showed the names of the activities along with large visual icons. The research assistant helped participants choose one or more activities that interested them and then was available for technical support such as opening a new computer game. If participants appeared disengaged from an activity, the research assistant made attempts to re-engage them up to three times. If they still did not wish to continue, the research assistant stopped the activity session and recorded the amount of time spent in each activity. As a token of appreciation, participants received $40 for their participation upon completion of the study.

Data collection/measures

A monitoring log was used to record observational data on each CAG session. A research assistant observed the sessions and recorded: (a) total time spent in a session (minutes and seconds), (b) names of all the activities participants engaged in and time spent in each activity, (c) level of engagement in each activity, (d) assistance participants needed, (e) participants' verbal and nonverbal reactions, and (f) barriers to engagement in activities. Face validity of the items was evaluated by a panel of seven researchers and health professionals in gerontology. The RA measured time on activity using a stopwatch. If after three attempts to engage a participant, the person still did not show interest in an activity and did not wish to engage in another activity during a session, the RA stopped timing and recorded the time spent in the session. Level of engagement in an activity was measured on a scale of 0–3 developed by Kovach and Magliocco (1998) (0 = dozing; 1 = null – physically inactive, eyes open, but not focused and no purposeful activity; 2 = passive – paying attention to the activity; 3 = physically or verbally engaging in the activity). Interrater reliabilities of the scale have been reported in studies of other activity interventions for persons with dementia (Kolanowski, Litaker, & Buettner, 2005; Kolanowski, et al., 2010). Prior to data collection, research assistants had 2 weeks of training on collecting observational data using monitoring logs. Inter-rater reliability of .95 was obtained.

Content analysis was used to identify participants' verbal and non-verbal reactions, technical assistance needed, and barriers to engagement in computer activity. Information was sorted into categories and compared among participants. As commonalities became apparent, subcategories, patterns, and themes were produced and refined by grouping and collapsing

them. All data were repeatedly reviewed; any discrepancies in coding were discussed until there was agreement. QRS NUD*IST, a computer program for analysis of qualitative data, was used to organize the qualitative data.

RESULTS

Sixteen residents provided consents and 14 completed the 12-week CAP; one participant moved to a different nursing home in the middle of the program, and another was withdrawn from the study because she was not interested in computer activities. Thus, observational data were collected on 462 CAG sessions of 14 participants.

Participants included eight women and six men with a mean age of 81.0 years (S.D. 11.0, range of 61–102 years) and a mean education level of 12th grade (S.D. 3.2, range of 6–16 years). Nine participants were African American and five were Caucasian. The mean MMSE score of participants was 14.9 (S.D. 5.5, range of 6–25). Four had severe dementia while the others ranged from mild to moderate dementia. All except one were able to read an 18-font letter on the computer screen. The mean score for hand and finger function was 10.2, indicating moderate disability. All participants were able to hear sounds at the highest volume of the computer speaker.

On average, participants had 33 sessions (S.D. 10.5, range of 22–59) and spent 941.7 minutes (S.D. 361.6, range of 510–1365) in the program over 12 weeks. They attended approximately 3 sessions per week, and each session lasted a mean of 27.6 (S.D. 3.6) minutes. The intensity of participation (Kovach & Magliocco, 1998) was high during the sessions (mean score of 2.1 out of 3.0). Slide shows with music were the most preferred activity. On average, participants spent about 16 minutes each session watching slides along with music. Participants also enjoyed playing simple games such as tidy-up or balloon kaboom. Table 1 presents their preferred computer activities, time spent, number of sessions, and engagement scores during the 12-week CAP.

During CAP sessions, the participants frequently expressed pleasure and enjoyment verbally and non-verbally. They smiled, laughed, and talked about the pictures in the slideshows and the games they played. With excitement, they clapped hands, bobbed heads with the beat, and sang along with the music. Negative responses were rare but were exhibited when they were anxious about learning game rules and using the mouse or were not happy with their performance. Sometimes, they wanted to engage in conversation with a research assistant rather than focus on the activities. Table 2 summarizes participants' verbal and nonverbal responses to CAP sessions.

None of the participants had any previous experience with a computer, and they needed technical assistance during the CAP sessions. They needed the greatest assistance in launching an activity program and switching to a new activity, placing and clicking a mouse, and getting directions on how to play a game. Surprisingly, although no formal computer skill training was provided, they showed a dramatic improvement in the use of the mouse and trackball. All participants except two improved their computer skills and were able by

the end of the intervention to point a computer mouse/trackball to a target item on the screen, click, and engage in interactive computer activities.

Both personal and environmental factors affected engagement in activity. Personal factors included physical disability, cognitive status, pain/ fatigue/ depressive mood, emotional status, physiological needs, social needs, and unanticipated incidents. Environmental factors included room issues, schedule issues, interruptions, computer problems, and unanticipated incidents. Barriers that kept participants from engaging in a CAP are summarized in Table 3.

DISCUSSION

The findings of this study indicate that NH residents with dementia can engage in and enjoy computer activities. Our participants exhibited positive verbal and non-verbal responses along with a high level of openness and acceptance of the computer activities. The majority enjoyed CAP sessions, made good progress in using an interactive device such as the mouse, and became more independent, with less need for technical assistance.

The computer activity most preferred was watching slideshows while listening to music. Picture scenes provided cognitive stimulation with vibrant colors and various objects. Participants verbalized the names of colors and objects and appreciated the beauty of nature, landscapes, and animal pictures. Music was effective in cheering them up or calming their mood. They liked to listen to their favorite singer or music. Participants also enjoyed playing simple games that required only a one-step task such as picking up an object on the floor in a Tidy-up game. Several participants with mild or moderate dementia preferred cognitively challenging activities such as solitaire or creating a greeting card. In general, they expressed pleasure and a sense of accomplishment and often asked to play their favorite games again during CAP sessions. When participants did not want to continue in the activities, they either exhibited distracted behaviors (e.g., looking around the room) or asked to stop the sessions.

Almost all the participants needed assistance in opening and closing programs because this required them to understand the window concepts of the computer and the management of multiple programs. Once a program was open for them, they could focus on the program and worked well. Removing the keyboard kept them from being cognitively overwhelmed. Because of their dementia, they often forgot what the activity was about, so explanations and assistance were necessary for them to continue the activities. A good strategy to help them engage in activities was to begin a computer activity session with an easy, slow-paced activity (e.g., slideshows with music) and then try out simple games with a one-step task. Multi-task games with some working memory requirement (e.g., solitaire) were appropriate for participants with mild or moderate dementia, while slide shows with music were preferred by persons with severe dementia. Less supervision and assistance was needed if a participant had a high cognitive ability, was good at using a mouse or trackball, and had a high interest in computer activities.

The majority of participants became skillful in using interactive devices, a mouse or trackball, by the end of the intervention. However, when the size of an object was too small,

it was difficult for them to point and double-click it. Then, they became anxious and sometimes lost interest in continuing with the activities. Other factors such as vision, pain, fatigue, depressive mood, or unanticipated incidents affected participants' engagement in activity. Tailoring activities is clearly essential to meet the differing needs of individuals. When activities are tailored to individual needs and abilities, more NH residents are likely to participate in activities.

Engaging in meaningful activities is crucial for NH residents to improve quality of life. While our sample was small, the findings suggest that computer activities may meet needs for enjoyment and stimulation in elders who have limited activity opportunities and are under-stimulated. Person-centred care for persons with dementia supports the importance of tailoring computer activities in order to meet the needs of individuals. Strategies for tailoring process need to be developed in order to increase participation and satisfaction in activities. Further research is warranted to examine the effects of computer activities on cognition, affect, and staff time.

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Table 1

Preferred computer activities: time spent, number of sessions, and engagement score during the 12-week CAP (N of participant = 14, N of observations = 462)

Name of activity	Total minutes spent (minutes)	Total number of sessions†	Mean minutes spent per session (minutes)	Mean score of engagement*
Slideshow with music	4144	258	16.1	2.1
Tidy-up	2654	155	17.1	2.3
Balloon kaboom	2582	113	22.8	2.3
Solitaire	1194	58	20.6	2.7
Blocks	997	72	13.8	2.4
Music only	473	38	12.4	2.8
Slideshow only	415	31	13.4	2.8
Bingo	373	21	17.8	2.8
Pinball	114	12	9.5	2.7

* Note: Engagement scores may range from 0 (dozing) to 3 (actively engaged).

† A activities selected less than 10 sessions in total for 12 weeks were not included.

Table 2

Participants' verbal and non-verbal responses

Responses	Positive	Negative
Verbal	Recognize/name objects and colors Read words or count Ask for instructions/guidance Mumble game strategies while playing games Verbalize comprehension, pleasure, sense of accomplishment, or desire to replay Hum/laugh Sing along lyrics Appreciate the beauty of natures, landscapes, or animals in pictures	Repeat questions anxiously about game rules or use of mouse Express dissatisfaction with a low score/performance in a game Talk about other things during activity session Request to leave or stop an activity
Non-verbal	Smile, clap hands, shake fist, tap fingers, throw hands in air hands, tap feet, nod/bob head with beat, sway/rock, dance Pull chair closer, lean forward, look at screen, focus on activity, look for more information on screen Point/trace/click on screen with mouse/trackball, play a game with fast hand/eye coordination	Look around room, hold head down, do not look at screen, do not pay attention to computer Appear sleepy/ yawn/ go to sleep Look at hands, wiggle foot, fidget hands/feet Frown, sigh, grunt, appear anxious

Table 3

Barriers to engagement in computer activities

Personal factors	Environmental factors
Physical disability: vision, mobility, hand/finger function Cognitive status: disorientated, confused, distracted Pain/ Fatigue/ Depressive mood: lethargic, tired, not feeling well, quieter than usual, distant, withdrawn, sad mood Emotional status: frustrated, upset, agitated Physiological needs: hungry, thirsty, sleepy/nap, short of breath, incontinent of feces or urine Social needs: talkative, desire for attention/social interaction Unanticipated incidents: hospitalization	Room issues: room temperature, noise(e.g., Intercom), room change, plumbing problem Schedule issues: medication/primary care time, lunch time, participation in nursing home's activities, doctor's appointment, family visit, State office audit visit, holidays Interruptions: nursing home staff/people popping in/out Computer problems: frozen screen, defects in software/hardware, broken computer, power outage Unanticipated incidents: weather (e.g., roads closed due to snowy day)