Using Technology to Increase Meaningful Engagement in a Memory Care Unit

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ABSTRACT
Dementia is affecting an increasing number of people due to the global aging of the population. People with dementia living in memory care units (MCUs) often lack access to meaningful activities and social interactions. Information and communication technologies (ICT) have a tremendous potential to increase activity opportunities for people in MCUs. In two longitudinal studies, I used observations, interviews, and repeated quantitative measures to evaluate the use of a commercially available multi-functional technology system with people with dementia, staff, and family members. Next steps include data analysis and generating recommendations for system designers.

Categories and Subject Descriptors
J.3. Life and Medical Sciences (Health)

General Terms
Human Factors

Keywords
dementia; accessibility; multimedia; ICT

1. INTRODUCTION
14.7% of Americans over the age of 70 were affected by dementia in 2010 [1]. As the older adult population grows, the number of individuals with dementia will increase proportionally. Cost of health and long-term care for people with dementia is estimated to rise from $200 billion spent in 2012 to $1.1 trillion spent in 2050 [2]. A significant cost of care with people with dementia are housing costs, as 30-40% of people with dementia live in nursing or assisted living facilities and memory care units, compared to only 2% of older adults without dementia [2]. With dementia care already prohibitively expensive and a shortage of paid staff, recreational and leisurely activities may be overlooked.

1.1 The Importance of Activities for People with Dementia
Structured activities are extremely important for people with dementia. Unlike pharmacological treatments (which certainly have benefits), activity interventions may address loneliness, sensory deprivation, and boredom, which are often at the root of problematic behaviors [3]. People with dementia experience benefits such as greater well being during activities [4], reduced agitation [5], and delayed progression of cognitive impairments [6]. Despite the benefits, people living in MCUs may not have opportunities for sustained social interactions and stimulating activities [7]. There is a clear unmet need for stimulating activities that don’t place an additional burdens on staff, the MCU or the healthcare system.

2. Related Work
2.1 ICT and Dementia
ICT has the potential to support cost-effective activities in a way that reduces staff burden. Marshall described nine uses of technology for people with dementia, including compensation, stimulation and relaxation [8]. Topo added communication to this list [9].

Many projects explored ICT interventions for people with dementia for single purposes, such as communication [10] and musical stimulation [11].

2.2 Multifunctional Technology Systems
Single-purpose ICT interventions may be problematic for several reasons, including cost, setup time, technical expertise, and learning time. Additionally, space may be quite limited in MCUs. Multi-functional systems can alleviate some of these issues. I conducted a systematic literature review of multi-functional technology tools designed for or used with people with dementia on five databases including Compendex and Inspec. I found 14 systems which met the criteria of containing at least one application in at least two areas: cognitive, psychosocial, sensory, and movement (these categories are from [12]). The retrieved related work was limited in that systems were often designed and used only with people with mild dementia, were not commercially available or accessible to the general population, and were quite limited in terms of the number and range of applications supported. Later I describe the technology system that I used for my study, which addresses each of these issues.

3. Research Questions
My research questions are the following:

1. How is a multi-functional interactive technology system designed to facilitate engagement in activities in people with dementia perceived by staff, residents, and family members?

2. How does the system facilitate and support interactions between people with dementia, a researcher, family members, and staff?

3. What recommendations for designers of a system to improve access and support of activities for people with
dementia can be generated from data gathered throughout the evaluations?

4. Methods
My project is composed of three parts: 1) an evaluation of a commercially available multi-functional technology system in a memory care unit, 2) an evaluation of the system in a memory care group, and 3) the creation of recommendations for designers of technology for this population.

4.1 Technology System Used for this Study
The technology system that was evaluated is depicted in Figure 1. The version I used for this study has a prototype version of an interface designed for people with dementia. The system is intended to provide opportunities for social involvement (e.g. video calling, email-access, and Facebook), recreation (e.g. games, puzzles, exercise videos, movies, and music) and cognitive training (e.g. memory games). Applications are organized into categories as shown in Figure 2. It is also possible to create custom grouping of applications and place them under icons for a specific resident or staff member. The unit can be wheeled from room to room and has a webcam, microphone, and speakers. It also comes with a video camera, bike pedal, joystick, and headset. The touch-screen monitor can be plugged into an external monitor. The height can be adjusted to be used by people seated or standing.

4.2 Evaluation in a MCU
Residents of a local MCU were enrolled for six months with a family member whenever possible. Five residents, four family members, and seven staff were enrolled in the study. I conducted weekly sessions with the residents, taking handwritten notes, and administered standardized instruments on measures such as quality of life and resource utilization at three time-points. I interviewed staff monthly and family members at three time points.

4.3 Evaluation in a Memory Care Group
Residents of the facility in which the MCU from the previous study was located were enrolled for three months in this second study. The memory care group is a service provided by the facility for people showing signs of memory impairment but deemed able to engage in stimulating group activities. Three residents and two staff members were involved in this study. I observed the use of the system twice a week for two hours and took notes, including rating factors such as whether residents interacted with staff, each other and the system. I also interviewed staff monthly, and interviewed and administered standardized instruments to residents at baseline and exit.

4.4 Recommendations
I will generate recommendations for designers of activity systems for people with dementia using a secondary analysis of the data from parts one and two and validate them with a panel of experts, including experts from HCI and gerontology.

5. Current Status and Next Steps
Based on preliminary analysis, findings include that staff and family members found benefit in using the system such as providing residents with something to do, giving residents a sense of accomplishment, and enabling conversations about new topics. Different applications were found appropriate for group use versus individual use, and individual use was seen as more beneficial but also less likely to occur due to time and staff shortages. People with dementia were able to use and benefit from the system with the assistance of a member of the research team or staff, but not independently.

Next steps include a systematic analysis of the data through open coding and the generation of recommendations.

6. Expected Contributions
This work has several areas of potential contribution towards the fields of HCI and CSCW, including understanding and exploring:

- The impact of the introduction and utilization of technology on relationships between people with dementia, staff, family members, and researchers.
- How organizational factors, such as different group sharing a system and the system being located in a communal space, impact the use of the system.
- How the system impacts staff workflow and roles in the care of people with dementia.

7. ACKNOWLEDGEMENTS
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8. References


