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The LeadingAge Center for Aging Services Technologies (CAST) is focused on accelerating the development, evaluation and adoption of emerging technologies that will transform the aging experience. As an international coalition of more than 400 technology companies, aging-services organizations, businesses, research universities and government representatives, CAST works under the auspices of LeadingAge, an association of 6,000 not-for-profit organizations dedicated to expanding the world of possibilities for aging.

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Transforming Dementia Care Through Cutting-Edge Technology: The Birdsong Initiative Research Study

Categories

- Quality of Life/Satisfaction with Care
- Reduction in Antipsychotic Medication Use
- Functional/Behaviors/Health Outcomes
- Partnerships with universities and vendors
- Innovation in care of those with Dementia

Organization Name

Westminster-Canterbury on Chesapeake Bay

Organization Types

Life Plan Community (formerly known as Continuing Care Community (CCRC))

Other Partners

- It's Never Too Late (iN2L)
- Eastern Virginia Medical School (EVMS)
- Virginia Wesleyan College (VWC)

Organization Description

Westminster-Canterbury on Chesapeake Bay was founded in 1982. Located right on the Chesapeake Bay in Virginia Beach, Virginia, we are a non-profit Life Care community sponsored by the Episcopal Diocese of Southern Virginia and The Presbytery of Eastern Virginia of the Presbyterian Church. We provide a vibrant lifestyle for seniors 62 years of age and older who worked hard their entire lives and deserve not just beautiful homes, but peaceful, lively and pleasant experiences. We also view our purpose to be of service to the families of our residents, as well as the broader community. Our Mission is *"Creating community to foster joy and well-being"* and our values are *Respect, Passion and Professionalism*.

As a Life plan community, Westminster-Canterbury touches over 3,000 people annually and we are constantly expanding our outreach. With approximately 682 residents residing on our campus, we offer all levels of care that include independent living, assisted living, long-term care, skilled nursing care, home health and hospice care. Our home health

and hospice services expand beyond our walls into our community of Virginia Beach. On our campus, we provide transportation services, a retail pharmacy within our country store, multiple dining venues, a full service bank, an urgent care clinic as well as emergency on-call nursing services.

The Challenge

Dementia is a growing cause for concern for the American public with staggering statistics of those who will be and are affected by one kind or another. With the rise in Dementia, the challenge appears in long-term care and with caregivers everywhere the increase of negative behavioral episodes, anxiety and agitation that can be harmful to the person and/or others.

Historically, antipsychotic medications have been used to manage these negative behavioral episodes, anxiety and at times, unfortunately, staff convenience. The Centers for Medicare and Medicaid Services, better known as CMS, a large funding source for health care providers, has recently embarked on a partnership with national and state agencies to reduce antipsychotic medication use in nursing home residents with Dementia. They have instituted consequences of rating reductions, citations and even fines for continuing use of these medications when not indicated clinically nor managed appropriately.

As we try different non-pharmacological interventions, it is important to find ways to address these root-causes to assist caregivers with the challenge, without creating an added financial or time burden. As early research indicated, engagement with others can lead to reducing the triggers for behavioral episodes or anxiety, ultimately reducing the need for antipsychotic medication use. Engagement can also reduce the symptoms of depression and increase satisfaction with life. However, personal one-on-one engagement can be time consuming for busy caregivers and can lead to added financial burdens for long-term care providers. Technology can assist in filling this gap and providing engagement to reap the aforementioned benefits efficiently and cost-effectively.

Project Description

The Birdsong Initiative is an active partnership with multiple entities to provide a 24-week research study on the effects of computer technology use on increasing socialization and improving mental health in nursing home and memory support patients.

The initiative was made possible by a generous donation from WC Foundation Board Member, Sue Birdsong, and her husband George. Their gift of \$228,000 funds the entire project for multiple years. The continued success beyond the project will be supported by a partnership with the Therapeutic Recreation Department at Virginia Wesleyan College. Therapeutic Recreation students will intern at our community and work with these innovative technology tools to prepare them for their future roles in nursing homes and assisted-living communities.

The partnership with iN2L was formed by discussions around increasing quality of life for our residents, while utilizing touch screen computer technology and engaging the residents in computer activities they could learn to initiate themselves and routinely utilize at their leisure.

Eastern Virginia Medical School's (EVMS) partnership grew out of the shared commitment to improving quality of life for those with Dementia. The Principal Investigator, Community Faculty in Psychiatry, Family Medicine and Division of Geriatrics at EVMS, Dr. Scott Sautter, Neuropsychologist with Hampton Roads Neuropsychology, Inc., leads the study along with Co-Principal Investigator, Dr. Paul Aravich. Dr. Aravich is a professor in the Departments of Pathology & Anatomy, Internal Medicine, Division of Geriatrics and Physical Medicine and Rehabilitation at EVMS.

Research Study Design

62 residents of Westminster-Canterbury were selected for the study due to their diagnosis of Dementia or Dementia related disorders along with the fact that they resided in our long-term care or secured memory support community. The 62 participants were divided into 2 groups (high- and low-cognition) using the MoCA (Montreal Cognitive Assessment) scores and then randomized into either the test or control group.

The research study ran for a total of 24-weeks, with two 12-week sessions. Each 12-week session had a control group and a test group. Each participant in the test group received one of 31 touch-screen computers placed in their room and it was available to be used 24/7. The content was standardized with 10 core applications as well as additional content customized based on participant's individual interests, such as sports, videos, music or brain games to name just a few. Each participant in the test group was also paired with a Therapeutic Recreation Intern from Virginia Wesleyan College that introduced and engaged the resident in use of the 10

core applications for 5 hours per week for the duration of the “intervention”. The control group participants also received individualized therapeutic recreation in a group setting, but do not have touch-screen computers system available in their rooms nor utilized the computer for one on one activity.

At the beginning, middle and end of the study, all participants (control group and test group) were assessed using specific research instruments that were used to evaluate and analyze the effects of the computer use statistically.

Assessments included:

- Blood Pressure readings from medical records.
- Saliva tests to determine levels of stress hormone present.
- Frequency and dosage of anti-psychotic medication use.
- Frequency and Intensity of behavioral episodes as observed and documented by staff.
- Cognitive function as determined by scoring on the Montreal Cognitive Assessment (MoCA).
- Mood indicators as determined by the Affect Balance Scale.
- Depression indicators as determined by the Geriatric Depression Scale.
- Demographics to include diagnosis, origin, age, highest level of education and previous occupations.
- Staff caregivers' stress as determined by the Perceived Stress Scale.

All of the assessments (except the Perceived Stress Scales for caregivers and the behaviors) were provided before and after each 12 week session to total 4 time periods for each assessment.

In addition to the participant assessments, caregivers (Certified Nursing Assistants (CNAs)) who work directly with the participants were asked to complete a Perceived Stress Scale before, at the beginning and at the end of each study timeframe to total three assessments. This assisted us in analyzing the alleviation of stress with this type of intervention for those with Dementia or Dementia related disorders.

The study began on June 30, 2015 and completed on December 18, 2015. We ended the study with a total of 51 participants due to attrition by multiple deaths and discontinuations.

System Type and Description

The touch-screen computer provided by It's Never 2 Late (iN2L), a company based in Colorado, was a 23 inch Dell all in-one computer system with speakers. The custom cart was designed through partnership with Westminster-Canterbury and iN2L to provide maximum utilization within the participants' rooms. The cart is on wheels, with an adjustable height tray top to replace the over the bed table. The computer swings away easily for maximized use of the table surface for eating or other use.

Due to regulations that require weekly generator tests, each cart is equipped with a battery backup power strip, which allows for a smooth transition of electricity that will not cause any malfunction to the computer's operating system or interrupt utilization. An aquarium screensaver application automatically launches after 20 minutes of idle time to attract the resident's attention and re-engage the resident if and when they stop using the computer.

iN2L and Westminster-Canterbury also collaborated to customize a home screen for residents that allows them to easily manipulate the activity content with fewer clicks. Inside the customized home screen, iN2L created a custom button so that has the community's audio files of the Chaplain sermons, town hall meeting videos, weekly menus, activity calendars and campus news to keep the participants engaged in the local happenings around the community.

Implementation Approach

BlueOrange began the penetration testing process by gathering information about the environment, identifying IP ranges, determining the best social penetration testing model and identifying a finite set of email addresses for a phishing campaign. BlueOrange performed an external vulnerability scan remotely, and then came on-site to perform an internal vulnerability scan. Armed with the latest penetration testing tools and techniques, BlueOrange initiated a phishing expedition to attempt to solicit information, and also probed various devices for vulnerabilities and exploitation potential. During the penetration tests, also known as “ethical hacking”, BlueOrange simulated the practices and methods of external or internal agents attempting unauthorized data access. Finally, BlueOrange gathered the results and provided RiverSpring Health with a prioritized, detailed and actionable remediation plan.

Business Model

The initiative is funded by a private donor.

Advantages to the Approach

Westminster-Canterbury took an interdepartmental, inter-professional approach along with strategic partnerships with Eastern Virginia Medical School who are known for their research along with Virginia Wesleyan, known for their therapeutic recreation programming.

This approach was advantageous in that it provided us with resources to implement the study appropriately and with sound methods with experienced research professionals.

Interdepartmentally, the project brought teams together to ensure success of our intervention and to provide support when needed to troubleshoot. Inter-professionally, the medical students, therapeutic recreational staff along with our Certified Nursing Assistants were able to support each other and learn about each other's profession.

It became a fun way for each of these professions to work together and provide care during difficult situations. Caring for those with Dementia presents unique challenges to every aspect of care. When the different disciplines learned a way of handling something negative with the iN2L, they would share it to help out others.

Outcomes

In conclusion of The Birdsong Initiative, we found that four of 10 participants, 40%, when engaged with the computer had a clinically significant reduction of total doses of anti-psychotic medications then when they did not have the computer. Of those 4 whose doses reduced, did so by an average of 26 doses.

This clinically significant finding is not only a game-changer for the industry searching for non-pharmacological interventions that are proven to work, but there were other positive findings in trending our data as well. While participants were engaged with the computer:

Behavioral episodes became less frequent for 54% of participants, ceasing entirely for 30% of those. They became less intense for 75% of participants.

Behavioral episodes can be defined by any of the following: kicking, spitting, yelling, throwing objects,

cursing, crying or refusing care. The frequency of these episodes when reviewed was reviewed as daily, weekly, monthly or occasional. Daily frequency was considered the worst frequency and occasional being the least.

Intensity was reviewed in three categories: high, medium, and low. High intensity episodes involved contact with another person or object. Medium was refusing care, attempted contact with another person or object. Low intensity involved yelling, crying and cursing. The goal as you can see is the lower frequency or elimination of episodes and lower intensity.

When evaluating the data trends for behavioral episodes, we utilized the documented episodes within each participant's medical record. The first collection of data was for 3 months prior to the first 12 week session, the second collection was of the 3 months during the first 12 week session and the third collection involved the last 12 week session. We compared the groups episodes pre and post study data to determine the decrease in the above data.

Depression decreased 41%.

Depression was evaluated by the completion of the Geriatric Depression Scale short form. Interns and medical students were trained in administering these tools. The assessment was completed prior to the start of the study, at the end of the first 12 weeks, at the beginning of the second 12 weeks and at the end of the second 12 weeks. Their answers were scored by two of the researchers for accuracy. Of the 51 total participants that completed the GDS, 21 indicated less signs and symptoms of Depression.

Cognitive / brain power scores rose for nearly 23.5%, with an average increase of 4.86 points on a 30-point scale.

Cognition was assessed by the MoCA (Montreal Cognitive Assessment). Once the study was complete, we found that out of 51 participants, 12 had an increase in MoCA scores while engaged with the computers during their test session over the 24 weeks. 2 of them stayed the same with no reduction over the 24 weeks. Out of the 12 who saw an increase, they increased by an average of 4.86 points on a 30-point scale. We did account for visual impairment as the validated MoCA tool, provides a visual impaired version for data collection.

Stress indicators for staff caregivers dropped by 47%.

During the 24 week study, there was staff on all shifts, randomly assigned to residents within the control and test groups. Those that had a participant of the study as part of their assignment were considered staff participants within the study. These staff members signed consents for participation in research and completed three total assessments. The first survey was completed prior to the study, the second in the middle of the two 12 week sessions and a last one at the end of the study. Out of those 32 staff caregivers that completed all three of the surveys, 15 of those surveys indicated lower stress.

Our study had two statistically significant findings:

1. The Affect Balance Scale, which indicates mood, increased significantly for all study participants (test and group) over the entire 24 weeks.
2. The intensity of behaviors decreased for participants over the entire 24 weeks.

Our conclusion to the study is that we need to continue to provide ongoing research in engagement with the computers in additional settings to continue to gather more evidence of the positive effects of engagement with technology. We had clinically and statistically significant findings that showed an improvement in the quality of life of our participants. We hope that with this knowledge that it continues to spread and that this intervention can help give hope to those suffering from Dementia and to their caregivers.

Challenges and Pitfalls to Avoid

Staff compliance with new more stringent policies takes time. Make sure to provide staff with education, and engage them in the development of internal policies, testing, refinement, and ongoing training to garner their buy-in. This requires understanding and support from the top level executives as well.

Lessons Learned

- **IT component**– We found that it was helpful to add our IT team into the discussions of project planning from the beginning stages. Wi-Fi Internet connectivity was required in the nursing home area of the community and it needed to be reliable. The residents with cognitive impairment were not going to be able to troubleshoot Internet connection issues, so we had to be diligent in setting up the connection and testing it prior to deploying all the new computers. Updates to the system are required

routinely; to prevent pop ups that might confuse our residents, updates had to be managed proactively by staff. We also had to test the usage reports on each computer to make sure that the reporting software was accurate. There was a lag time for the machines to “communicate” electronically. In addition to the IT functions, we found that in the nursing home, the regulated generator weekly checks would interrupt the power to the computers, so we had to invest in power strips with battery backups that could handle the electrical load of the computer without harming any of the hardware or software and keep it on uninterrupted during the generator checks. Finally, we discovered that computers needed to be restarted from time to time to ensure smooth operation and prevent hang-ups, so we had to incorporate this into the staff-managed process when the residents were neither in their rooms nor engaging with the computers.

- **Communication/Consent Forms**– Due to the fact that the research study was approved and overseen by the Institutional Review Board of research at Eastern Virginia Medical School, and involved participants who were considered “vulnerable” due to their inability to make decisions without a power of attorney, it required a lengthy surrogate consent form. The form was so long that it was a challenge although minimal risk was involved with participating in the study. Hence, it took longer time than expected to present the information and explain the study to all 62 participants and their families.
- **Institutional Review Board application process**– In partnering with an academic research institution, such as Eastern Virginia Medical School, before formal research can begin, the principal investigator must apply to the IRB (Institutional Review Board) board a proposal explaining the study, the methodology and data collection tools in detail. We found that the process was very slow and tedious, requiring lots of follow up and attention. The entire process took approximately 3 months for approval to begin and continues to be ongoing with updates and reports to the IRB. Each addendum also took several weeks for approval, so take the time to ensure that the proposal is accurate and complete.
- **Movement of units (initial deployment and storage)**– Any time the computers were moved into each room, changed after 12 weeks and after the study, it takes organizational planning for who’s

computer you are moving, when, and how. It takes time to physically move them all one at a time. We found that we allowed approximately 2 hours for 31 computers to carefully move them around without damage.

- **Intern and med student scheduling/management**– Having the assistance of the interns/students from both Virginia Wesleyan College and Eastern Virginia Medical School were invaluable, however, they all come and go at different times. It was quite a responsibility to manage their schedules to make sure that we did not miss any of the interventions with the residents due to disorganization. We had to track which residents and how long that they had the intervention each day and documented so that interns/students did not replicate interventions.
- **Trainings**– Prior to and during the study we incorporated many training sessions for the students on the assessment tools, such as how to perform them and what was the process to complete an assessment on time. We also learned we had to incorporate continuous training for new students as some initial students turned over and ones joined later in the study. The trainings had to be completed consistently to all trainees, so it was important to ensure that the leader remained the same and was consistently providing the same trainings.
- **Results with participants and families**– Once the study had come to a conclusion, we learned that family members were interested in knowing how their loved one did in the study and the relevant assessments. In the health care field, it is common to always want to be transparent and as quick as possible in sharing information. In research, it is important that the information you give out about participants is presented in a manner in which the recipient understands the data to prevent negative emotional responses as the information may not always be positive. While our study was not high risk, a family member of the participant could get emotional for a decline detected from the data and reported, without understanding exactly how the data was gathered and how it related to the overall condition of their loved one or the care they received in the nursing home. Our principal investigator handled all discussions with families about their loved ones participation and scores in order to appropriately address any questions they may have and to make sure that they understand the information being presented.

- **Keyboards**– It was important to use large print keyboards for the computer. Although the keyboard is not used often, but a standard keyboard was difficult for seniors to read when used. Consequently, we ordered the ones with large print for all computers.
- **How to handle when someone did not want the computer**– There were very few people that didn't like the computers. As a team, we discussed before the study that anytime we introduce the intervention and it made the resident upset in any way, we quietly removed it immediately to not cause any distress. If the resident asked for it to be removed we did not encourage it staying and removed it immediately. We found that a few individuals did not like the power light at night, therefore they requested us to turn off the computer so that the power light did not reflect in the room during their bed-time. When the computers were not in the residents room or being used, secure storage was an important challenge as well as taking note of when it was not in the room, so that we knew what computer each person had and for what days and times for our usage data collection.

Advice to Share with Others

After our study was complete, we re-deployed the computers back into our nursing home in order to keep them in use, while we awaited approval for the 2nd study in our series of 3. We found that the staff absorbed the computers back into use without asking for additional staffing. This was the ultimate test. When introducing new interventions, additional staff time and how the intervention would other duties of staff always seems to be a concern. We turned this intervention into a way of providing care at Westminster-Canterbury in a way that was not perceived as “extra work”, but a way of life. Our therapeutic recreation team utilizes it to provide one-on-one activities with some individuals who require consistent engagement. Our nursing care staff has learned to utilize it to manage behaviors that may arise during care times by playing familiar music of preference for the resident or a soothing fireplace scene crackling in the background. Our families even use it to reconnect with their loved ones. We have not found a reason yet not to put this technology to use throughout our care settings.

A news release and video of the study can be found at www.wcbay.com/birdsong and for all other inquiries please contact us at birdsong@wcbay.com.