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Computer-Mediated Cognitive-Communicative Intervention for Residents with Dementia in a Special Care Unit: An Exploratory Investigation

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Abstract

Residents of "lockdown" dementia units, also referred to as "Special Care Units" of skilled nursing facilities, constitute a population of rapidly escalating needs. These entail rising demands for speech-language pathology services to treat and manage symptoms of dementia. This article recounts an exploratory investigation of rehabilitation sessions with an elderly resident of a Special Care Unit, using a new computer-based program targeting cognitive-communicative capacities. Preliminary results suggest that this resident with moderate dementia achieved a higher degree of functional recovery and superior quality of life than would have been possible with more traditional therapeutic approaches alone. An iPad-based software platform was used to administer tasks to train attention, working memory, and executive functions. The resident demonstrated significant gains in task performance that were coupled with increased independence and safety, enhanced participation in non-computerized therapeutic tasks, adaptation to surroundings, and reduction of negative behaviors. The resident's improved cognitive-communicative performance was sufficient to warrant a transfer to a long-term care wing within the same facility. This proof of concept demonstration invites formulation of testable hypotheses, which should be pursued in future research on optimizing interventions for institutionalized people with dementia using leading-edge computerized therapies.

Introduction

According to the most up-to-date statistics reported by the Centers for Disease Control and Prevention (CDC), 17% of residential care communities in the United States housed special care units for residents with dementia in 2010 (Park-Lee, Sengupta, & Harris-Kojetin, 2013). For the purposes of this article, the term "Special Care Unit" (SCU) refers to locked dementia units. These are distinct enclosed portions of skilled nursing facilities specifically designated and staffed for people with advanced stages of dementia. Though some particular features of SCUs may vary between facilities, common characteristics include locked exit doors, doors with alarms requiring use of keypads or electronic keys, highly trained nursing staff, and recreational programs for dementia-related activities. Personal monitoring devices and bed/chair alarms are also frequently deployed.

The 2010 CDC report also stated that beds in dementia SCU's accounted for 13% of all residential care beds. On average, SCUs contain approximately 30 beds. Minimum on-site, staff-to-resident ratios are one registered professional nurse per 10–15 residents during waking hours, and one registered professional nurse per 15–30 residents during non-waking hours, depending upon state regulations on nurse-to-patient staffing ratios. The Alzheimer's Association national site (http://www.alz.org/) notes that, in recent years, skilled nursing facilities have experienced a

proliferation of SCUs designed to serve a surge in admissions of residents with advanced dementia. Currently, SCUs are among the most rapidly expanding components of the nursing home business, requiring specially trained clinical and rehabilitative service providers. As such, they are the subjects of a growing body of research on institutional standards of care for dementia (Cadigan, Grabowski, Givens, & Mitchell, 2012; Kok, Berg, & Scherder, 2013; Park-Lee et al., 2013).

The purpose of SCUs is to provide for the particular functional needs of residents with advanced dementia, while maximizing security for all residents facility-wide, both on and off the SCU. Residents' risks for wandering or even elopement are critical factors in determining appropriateness of admission to SCUs, as are level of dependence upon caregivers and need for multiple concurrent medical services. Special care units are designed to promote safety, with elementary floor plans including only short distances between dining and lounge areas, nursing stations, and residents' rooms. Quality of life is of equal importance as safety, and for this reason, therapeutic recreation activity programs should be offered regularly in order to maximize residents' cognitive and psychosocial well-being. These programs, preferably led by trained staff, may include gross motor exercise sessions with dancing or stretching; self-care activities, such as hair grooming or manicures; social activities such as skill games or music and singing guided by invited professional entertainers; craft projects often with holiday or seasonal themes to facilitate temporal orientation and/or reminiscing; sensory stimulation; pet therapy; and memory enhancement activities such as discussion of current events, story-telling, and paging through picture albums to promote guided autobiography or reminiscing.

Residents who require additional interventions to manage symptoms of advanced or possibly accelerating dementia may be appropriate candidates for cognitive-communicative rehabilitation led by speech-language pathologists. Courses of cognitive-communicative intervention involve individualized plans of care targeting maximal independence and safety during participation in activities of daily living on the SCUs, while minimizing risks of further decline in overall function for as long as possible. Optimal intervention techniques honor each resident's dignity and individuality by incorporating their personal preferences, using meaningful and familiar stimuli, providing senses of enjoyment and success, and capitalizing on their residual strengths and capacities.

Ideally, cognitive-communicative therapy with residents of SCUs can contribute to mitigation of the basic health care problems that are encountered with heightened prevalence in advanced dementia (Schüssler, Dassen, & Lohrmann, 2014). Major medical concerns on SCUs include falls, dehydration, malnutrition, urinary tract infections, pneumonia, pressure sores and other wounds, loss of muscle tissue (sarcopenia), chronic pain, orthostatic hypotension, blood clots, malabsorption disorders, total care dependence, agitation, depression, diabetes, renal and/or hepatic insufficiency, respiratory insufficiency, constipation or incontinence, side effects of drugs, tremors, and arthritis, among others. These clinical risk factors may lead to repeated hospitalizations that may be avoidable with quality care (Spector, Limcangco, Williams, Rhodes, & Hurd, 2013).

The pervasiveness of severe interacting medical complications characteristic of SCU residents can be used as justification to withhold speech-language pathology services. This justification may be misguided. In this article, I describe an exploratory investigation based on an innovative computerized therapy program, which resulted in significant reduction in care dependence associated with cognitive and psychosocial benefits in a person with moderate dementia living in a SCU of a large retirement community. This case report provides descriptive evidence in support of the value of speech-language therapy for the challenging and relatively understudied populations of SCUs. It involves implementation of Constant Therapy (www.constanttherapy.com), a new software application which has garnered much attention from speech-language pathologists serving clients with neurogenic cognitive-communicative disorders in outpatient and home settings (Kiran, Des Roches, Balachandran, & Ascenso, 2014).

The case is presented in detail, to illustrate the numerous and noteworthy advantages of integrating computer-mediated therapy into cognitive-communicative rehabilitation for some

residents of SCUs, along with potential drawbacks and limitations. These have been explored elsewhere, though in most previous studies participants presented with only mild or early stages of dementia and continued to live in private homes or relatively unrestricted areas of assisted living centers (Astell, 2013; Buettner, Yu, & Burgener, 2010; Cipriani, Bianchetti, & Trabucchi, 2006; Gelfand, Vick, & Lewis, 2014; Herrera, Chambon, Michel, Paban, & Alescio-Lautier, 2012; Hofmann, Hock, Kühler, & Müller-Spahn, 1996; Mahendra, Kim, Bayles, Hopper, & Azuma, 2006; Nugent, 2007; Seals, Clanton, Agarwal, Doswell, & Thomas, 2008; Zaccarelli, Cirillo, Passuti, Annicchiarico, & Barban, 2013). A notable exception is a pioneering investigation by Mate-Kole et al. (2007), in which residents of a "secured memory-impairment unit" presenting with moderate-to-severe dementia participated in computer-mediated cognitive interventions during a 6-week training program. Results indicated significant gains on measures of mental capacities coupled with caregiver reports of enhanced psychosocial functioning by the end of the program, though post-intervention probes revealed incomplete maintenance of training-related gains. The feasibility narrative presented here is intended as a foundational contribution to incentivize future research into computer-based cognitive-communicative rehabilitation programs for institutionalized residents with advanced dementia.

Case Study

This case centers upon a Caucasian, English-speaking 83-year-old female resident of a lockdown dementia unit within an expansive retirement community in the greater metropolitan area of Philadelphia. She was referred for speech-language pathology services for exacerbation of impairments to orientation, episodes of agitation, reduced participation in social group activities, and heightened risk for falls associated with reduced safety awareness and lack of insight into functional deficits. Nursing staff suspected progression of dementia, as corroborated by scores on standard cognitive assessment instruments periodically administered in skilled nursing facilities (e.g., Brief Interview for Mental Status or "BIMS"). Staff reported that the resident had exhibited a decline from minimal to maximal assistance for safety during activities of daily living (ADLs). She was ambulatory with a cane, and free of significant sensory deficits (no major loss of hearing, vision, or taste). Communication capacities were intact for accomplishment of daily verbal interactions with familiar staff and relatives, but with increasingly frequent disruptions associated with behavioral outbursts.

This resident had been admitted to the SCU from home 3 months prior to initiation of speech-language pathology intervention, with primary medical diagnoses of senile dementia, chest pain, and orthostatic hypotension. Prior medical history related to her conditions included cerebrovascular accident (CVA), myocardial infarction (MI), cardiomegaly, atherosclerosis, history of falls, syncope, hypercholesterolemia, diverticulitis, chronic ascending thoracic aneurysm without rupture, gastroesophageal reflux disease (GERD), depression, and anxiety. Surgical history included bladder surgery and appendectomy. Regarding this resident's social history, she had been widowed approximately 2 years prior to this referral for speech-language therapy services, for which she had never been referred previously. She was religious and actively prayed. She had studied French and Latin languages. Her highly involved eldest daughter, who also served as responsible party, visited her in the SCU nightly.

Broad behavioral goals for this resident's care plan were to reduce adverse behaviors such as outbursts during episodes of agitation, in order to improve compliance with nursing care, promote safety during participation in ADLs, and maximize independence during functional activities. Due to elopement risk, her discharge plan was to remain on the SCU. However, discussion between her family and case manager did address potential for transfer onto a less restricted long-term care wing of the same facility.

Initial evaluation involved testing and observation to determine dementia stage, informal introductory interview with the resident, and consultations with familiar nursing staff, her case manager, and her daughter. At this facility, residents on all nursing units were systematically

assessed for cognitive status and dementia stage. For this reason, the principal diagnostic tools were the Brief Cognitive Rating Scale (BCRS; Reisberg & Ferris, 1988) and the Functional Assessment Staging (FAST; Reisberg, 1988). Results led to determination of dementia corresponding to Stage 5 on the Global Deterioration Scale (Auer & Reisberg, 1997; Reisberg, Ferris, de Leon, & Crook, 1982). Stage 5 is considered moderate-level dementia with moderately severe cognitive decline. Testing revealed moderate-severe impairments to concentration and recent memory (BCRS Axis I and Axis II); intact past memory (BCRS Axis III); temporal disorientation but adequate orientation to self, familiar others and place (BCRS Axis IV); and moderate impairment to functioning and self-care (BCRS Axis V). To ensure her safety during daily activities, constant supervision and frequent assistance by staff or relatives were required.

Production and comprehension of speech and language were unremarkable except for occasional incidents of dysnomia during simple conversation and limited mean length of utterance estimated at an average of 6 words, ranging from 3 to 9 in informal verbal exchanges. She could follow simple directions and daily routines. She could imitate simple orofacial and limb movements and was responsive to >90% of verbal, visual, and tactile cues with adequate psychomotor speed. Pragmatic performance in simple conversation was appropriate in terms of eye contact and establishment of joint referent; nonverbal communication including head nods, facial expressions and natural gestures; use of social greetings; and prosody. Answers, acknowledgments, turn-taking and topic maintenance were intact at the level of simple conversation about immediate situations or personally relevant and meaningful topics. Endurance was estimated at a limit of approximately 12 to 15 verbal exchanges in 8 to 10 minutes, after which perseverations or polite expressions of fatigue or pain would be produced with marked frequency. However, her conversation partners assumed responsibility for initiation of verbal exchanges. This resident was pleasant and cooperative throughout the initial evaluation, as well as all subsequent therapy sessions and the discharge plan meeting. Notably, during the evaluation and initial three therapy sessions of this 6-week course of intervention, her daughter was present at bedside in order to facilitate introductions and establishment of rapport.

Long- and Short-Term Goals

As described in the previous section, the resident's level of function at the time of evaluation revealed moderate-level dementia with moderately severe cognitive decline (Stage 5), evidenced by deficits in attention, functional recall, safety awareness, and judgment. During the initial consultation, her daughter mentioned "brain-teaser" games as among her mother's favorite pastimes, such as word-search or crossword puzzles and card games. The long-term goal for this resident was to enhance cognitive-communicative performance with caregiver assistance as needed, in order to promote safe participation in ADLs, compliance with nursing care, positive and meaningful social interactions with family and peers, and enjoyment of preferred leisure activities as means of achieving optimal quality of life. This resident's rehabilitation potential was considered good because of her ability to follow 1-step directions, follow routines, and imitate. She was responsive to cueing and enjoyed strong support of family.

Also described above, a major reason for this resident's referral was her heightened fall risk. Recent research on the well-known link between cognitive impairment and falls suggests that attention and executive function are the domains that contribute most significantly to fall risk (Ambrose, Paul, & Hausdorff, 2013; Holtzer et al., 2007; Montero-Odasso, Verghese, Beauchet, & Hausdorff, 2012; Muir, Gopaul, & Montero-Odasso, 2012; Whitney, Close, Jackson, & Lord, 2012). Therefore, short-term objectives addressed attentional capacities and the executive functions that were deemed most critical for this resident's safety: mental flexibility, visuospatial processing, planning, and self-monitoring. To promote retention of information learned throughout the course of intervention, short-term objectives also addressed working memory and short-term recall of novel information.

Methods

Constant Therapy is a new mobile application for iPad or Android that provides systematic and customized therapy tools to people with impairments of cognition and language. At the facility involved in this case report, tasks were administered to the resident through the Constant Therapy software platform and conducted on a clinician-designated iPad tablet provided by the facility's Rehabilitation Department. The effectiveness of Constant Therapy for rehabilitation of language and cognition in cases of stroke and traumatic brain injury has been established (Des Roches, Balachandran, Ascenso, Tripodis, & Kiran, 2015). Success with mild early-stage dementia has been described (https://constanttherapy.com/blog/early-stage-alzheimers-patient-uses-constant-therapy-to-challenge-her-brain/). This is the first attempt to apply Constant Therapy to a case of a person with moderate dementia residing in a SCU. As the plan of care was explained to the resident and her daughter, both expressed agreement that Constant Therapy would be a worthwhile therapeutic tool to capitalize upon the resident's aforementioned enjoyment of "brain-teaser" pastimes. To target each of the objectives mentioned above, the following tasks were selected. They are listed in order of introduction throughout the 6-week course of intervention, during which the resident participated in 12 therapy sessions of 30 to 60 minutes duration. All tasks were administered at the most basic level of difficulty ("Level 1").

Sessions were conducted in the resident's room or another area of the SCU such as the dining room, with the exception of the final encounter, which occurred after her transfer to a non-secured long-term care unit within the same facility (see Table 1). Her daughter was also present at approximately half of the sessions.

Table 1. List and Characteristics of Constant Therapy Tasks Administered to the Resident (All at Level 1)

Constant Therapy Task	**Instructions for Constant Therapy Task**	**Target Cognitive Capacities**
Symbol Matching	Find all the symbols that match the one displayed.	Visual scanning Visuospatial processing
Playing Card Slapjack	Tap the screen every time you see a card that matches the first one.	Attention Visual memory
Flanker	Choose the direction the red arrow is pointing by tapping LEFT or RIGHT.	Mental flexibility Response inhibition
Picture Matching	Find the matching pictures by tapping on the squares and finding the pairs that are the same.	Visual memory Visuospatial processing
Word Matching	Find the matching words by tapping on the squares and finding the pairs that are the same.	Verbal memory Visual memory Visuospatial processing
Pattern Recreation	Watch the pattern displayed on the screen and try to recreate it.	Visual memory Visual scanning Visuospatial processing

Results

In describing the outcomes for this resident's course of cognitive-communicative intervention with Constant Therapy, both quantitative and qualitative results are presented and considered of equal importance. The quantitative results from this resident's performance on specific Constant Therapy tasks are shown in Table 2, along with degrees of cueing required from

this clinician to ensure the resident's correct following of directions and progression from trial to trial through task completion.

Table 2. Results From Constant Therapy Tasks Administered to the Resident (All at Level 1)

Tx Session #, Week #	Constant Therapy Task	Accuracy	Latency	Cue Level*
Tx 1, Wk 1	Symbol Matching	87.5	17.56	MAX
Tx 2, Wk1	Symbol Matching	90	30.51	MIN
Tx 2, Wk1	Playing Card Slapjack	76.6	26.69	MAX
Tx 3, Wk 2	Playing Card Slapjack	62.2	25.78	MIN
Tx 3, Wk 2	Flanker	83.3	10.58	MAX
Tx 4, Wk 2	Flanker	100	10.46	MOD
Tx 5, Wk 3	Flanker	80	8.7	MIN
Tx 5, Wk 3	Picture Matching	91.1	33.32	MOD
Tx 6, Wk 4	Picture Matching	97.2	19.11	MIN
Tx 5, Wk 3	Word Matching	95.5	23.51	MOD
Tx 6, Wk 4	Word Matching	94.4	14.29	MIN
Tx 7, Wk 4	Pattern Recreation	88.1	18.96	MOD
Tx 8, Wk 5	Pattern Recreation	73.3	25.78	MOD

**MIN= Minimum cueing of one type (visual) required on <25% of occasions. MOD= Moderate cueing of one or two types (visual and verbal) required on 26-50% of occasions. MAX= Maximum cueing of two or three types (visual, verbal and tactile) required on 51-75% of occasions. Total assistance, that is, multi-modal cues on >75% of occasions, was never required for this resident.*

For the introductory session, the resident's daughter was present at bedside as a passive participant to witness her mother's enthusiastic engagement in the Symbol Matching task while she lay in bed. The resident required maximal cues to follow directions on each trial, tap "Check Answers" and then tap "Next" to progress to the next trial. At task completion, the resident expressed pride in having achieved 87% accuracy, described the session as "Very good!" while smiling at this clinician, and expressed interest in continuing with Constant Therapy during subsequent sessions.

At the next session, the resident's accuracy on the Symbol Matching task increased slightly, and response time nearly doubled. Although this result could be interpreted as performance deterioration, it was considered improvement in light of her significantly increased independence in performing the task. At this second exposure, she required only minimal (visual) cues. Her daughter, again seated at bedside, and this clinician verbally reinforced the resident's rapid learning of the task routine. Moreover, the resident's enjoyment of the rhythmic pace of completing each trial then progressing to the next trial was assessed by both this clinician and her daughter as a highly advantageous feature of Constant Therapy. As noted in the initial evaluation, this resident had exhibited a new onset of agitated behavioral outbursts. Engagement in this and five other Constant Therapy tasks had a perceptible calming, almost meditative effect on this resident, as she concentrated on each task without any interruptions, distractions or complaints.

Also at this second session, the resident was again lying in bed, but she demonstrated sufficient engagement and endurance to attempt a new task, Playing Card Slapjack. A formerly

avid card player, she expressed enjoyment in returning to this pastime via the iPad interface. Its original form with real cards laid out on a flat surface requiring sorting and dealing seemed overly cumbersome and complicated in her current state on the SCU. Between the second and third sessions, the accuracy of her Playing Card Slapjack performance declined though latency improved slightly. Here again, the resident's significantly increased independence from this clinician's cues constituted evidence of learning that was pivotal in reinforcing her participation in this novel therapy.

Analysis of functional outcomes from the third session established that this resident could actively engage in previously conducted and unfamiliar cognitive rehabilitation exercises presented in Constant Therapy, for up to 30 minutes. Moreover, she demonstrated partial recall of this clinician's identity, including name and association with Constant Therapy exercises, though she did not yet recall this clinician's role of "speech-language pathologist." At this session, the Flanker task was introduced. This was the first Constant Therapy task on which she demonstrated gains across sessions. Again, this clinician's cues were faded from maximal to moderate then minimal levels. The resident's accuracy increased at the fourth session before declining to slightly below baseline at the fifth session, yet her response time improved to nearly 2 seconds faster.

Crucially, the resident responded positively to this clinician's counseling and education on how the cognitive capacities trained by the Flanker task, namely mental flexibility and response inhibition, could be applied to her ADLs on the SCU. To illustrate, at the fourth session, the resident was encountered during dinner in the dining room. Her daughter was not present. There, she demonstrated distraction while complaining of frustration due to the presence of a neighboring peer with palilalia, who repeatedly and loudly called out the same phrases in her native Polish language. This clinician counseled the resident to apply the lessons learned from the Flanker task, specifically, to ignore irrelevant signals from the environment in order to focus on the immediate task. In this setting, the irrelevant signal was the palilalic speech of her peer, and the immediate task was feeding. The resident reported great satisfaction with the analogy of dining in a noisy environment to focusing on the direction of a red arrow amidst a series of black arrows. She smiled while exclaiming, "Okay, I like that!" before finishing her dinner and ambulating towards her room using her walker, accompanied by this clinician. This carryover of strategies learned in Constant Therapy to real-life situations was central to caregiver training in consultations with the resident's daughter and the interdisciplinary team.

By the fifth session, the resident demonstrated sufficient attentional capacities to complete the familiar Flanker task and be introduced to two unfamiliar tasks, Picture and Word Matching. The resident participated in Constant Therapy tasks for greater than 45 minutes amidst the noisy environment of the common lounge area on the SCU, where she was surrounded by her peers, wheelchair alarms sounded intermittently, and a movie played on the lounge television. Notably, throughout the entire course of intervention, the resident never refused participation in Constant Therapy activities, regardless of her situation. She willingly completed the iPad-based exercises during daytime hours when her daughter was not present or evening hours when her daughter was visiting, in the common lounge area where she was seated upright and surrounded by peers or in her room where she was alone and supine in bed. Thus Constant Therapy proved to be a versatile and appealing therapeutic tool by virtue of its successful implementation across settings. Perhaps a principal reason for its appeal was the resident's appreciation for Constant Therapy's self-oriented, customized, and challenging activities that restored her dignity as a unique and sentient human being. She relished the prestige associated with the elegant high-tech tablet, which was distinct from the more low-tech rudimentary materials available on the SCU.

The resident required only moderate cueing upon her introductions to the Picture and Word Matching tasks. At her sixth session with Constant Therapy, she achieved performance gains on both tasks, as evidenced by increased accuracy on the Picture Matching task and markedly faster response times on both tasks, with only minimal cueing. These performance

gains on tasks targeting visual memory and visuospatial processing were translated into enhanced safety on the SCU, by creating analogies between the matching tasks and situations during which the resident was most vulnerable to falls. This clinician counseled the resident to apply the same vigilance trained in the Constant Therapy matching tasks to occasions of rising from seated position in order to ambulate throughout the SCU. Specifically, the resident was trained to attend to the spatial layout of familiar areas on the SCU, such as the space between her bed and the front door of her room or the trail between her seat in the dining room to the nursing station. As before with the Flanker task, the analogy between activities in Constant Therapy and real-life situations was well received by the resident and conveyed to the family and interdisciplinary team by this clinician.

The Pattern Recreation task was chosen as the final activity in Constant Therapy, because of its emphasis on a variety of visual capacities considered essential for fall prevention. On the seventh session, this clinician encountered this resident alone in her room. Only moderate cueing was required for her to achieve a high degree of accuracy (>88%). Notably, this was also the last session at which the resident was encountered on the SCU. She had demonstrated sufficient gains in attention, safety, judgement, and functional recall to be considered safe and appropriate for transfer onto another wing in the same facility. She was consistently participating appropriately in therapeutic and functional daily activities, requiring only minimal redirection from staff. The long-term care unit to which the resident was transferred during her fifth week of this course of intervention was non-secured and allowed for considerably greater freedom. She could be regularly transported to the facility gift shop and outdoor patio, or to a large conference room off the unit for group activities led by the recreation department.

Not until four sessions after the resident was transferred from the SCU to the non-secured long-term care unit was Constant Therapy incorporated into a therapy session again. In her new setting, the resident shared a room with a more elderly and medically fragile peer (who passed soon after this course of intervention was completed). The resident exhibited a new onset of anxiety that seemed to be expressed through excessive concern regarding her roommate, as evidenced by attempts at assisting her roommate with ambulation and toileting, among other ADLs. Her new nursing staff and her daughter trained the resident to utilize the call-bell instead of attempting to assist her roommate independently.

The resident's initially adverse adjustment reaction to her transfer was considered sufficient cause to withhold Constant Therapy activities until she had accommodated to her new setting. The treatment approach was updated to include a temporary focus on safety and socialization in the unfamiliar long-term care unit, with intent to return to therapeutic tasks within Constant Therapy after she had demonstrated adequate and safe adaptation to her new environment. By the end of her first week on the non-secured long-term care unit, this clinician encountered the patient in bed in her new room for the eighth session with Constant Therapy. Her daughter, seated at bedside, and her assigned nursing assistant both reported gradual adjustment to the new setting, as evidenced by enhanced recall of new staff and events from previous dates since transfer. The resident verbalized anxiety but also gratitude towards this clinician for counseling and education provided on the positive consequences of her transfer, such as greater independence, a more attractive and spacious unit, and a friendly roommate.

The resident was then invited to "play another computer game". She engaged in a repeat trial of the Pattern Recreation task in Constant Therapy, with moderate visual and verbal cues from this clinician. Comparison of her initial performance on this task a week earlier revealed that her accuracy had decreased and her response time was longer. This clinician reassured the resident and her daughter that the apparent drop in performance was expected due to her understandable adjustment reaction. The resident expressed great satisfaction with this evidence and acknowledgement of the legitimacy of her reaction to the transfer, once again smiling while uttering her now-familiar phrase of approval, "Okay, I like that!"

Due to circumstances unrelated to the details of this case report, this course of intervention was terminated soon afterwards. A new therapy company announced assumption of responsibility for all rehabilitation services beginning the following month, entailing discharge planning and termination of all open cases. Nevertheless, informal follow-up confirmed the resident's successful and safe adaptation to life on a non-secured long-term care unit, on which she continues to reside at the time of manuscript submission.

Conclusion

The results captured throughout the course of intervention—specifically accuracy, response latency, and degree of independence performing the therapeutic tasks— related well to the psychosocial and safety factors observed in this SCU resident by the interdisciplinary team. A comparison of baseline and final scores revealed increased accuracy and/or speed concurrent with enhanced independence for completing the iPad-based tasks. These task-based gains were coupled with augmented attentional capacities such as longer cognitive endurance, reduced susceptibility to external distractions, and greater mental flexibility as evidenced by consistently positive and timely responses to redirection and multi-sensory cues for task-switching. Perhaps most striking was the release of this resident from a SCU onto a non-secure long-term care wing in the same nursing facility. Moreover, she experienced this transition with moderate but manageable signs, symptoms, and self-reports of anxiety. The nursing staff on her new long-term care wing did not report any major incidents such as behavioral outbursts or falls, both of which had been documented in her chart prior to this course of intervention.

Implications

The working hypothesis proposed here is that computerized cognitive-communicative interventions such as Constant Therapy are not only appropriate for some residents of SCUs, but that their use may result in superior levels of cognitive-communicative performance, quality of life, and safety than would be achievable with the current standard of care on SCUs. Thus tablet-based software platforms may be successfully integrated into cognitive training or enrichment programs for some institutionalized residents with advanced dementia, though others may prefer more traditional therapeutic tasks (e.g., another resident from the same unit as the case described here enjoyed leafing through periodicals that she had habitually read prior to her admission to this facility). The wealth of data supplied by applications such as Constant Therapy affords clinical researchers the means with which to track subtle signs of residents' responses to therapy as well as to environmental, situational, and even biological changes (Kiran, 2014). Such signs may remain undetected with less fine-grained measures of assessment informed by clinical observations or standardized health care questionnaires (Chodosh et al., 2008; Hawes et al., 1995; Morris et al., 1994; Morris, Fries, & Morris, 1999; Morris et al., 1990).

Furthermore, test reports from therapy software applications could be statistically correlated with standard measures applied in nursing homes for assessing SCU residents' safety and well-being. Significant positive correlations would indicate that these applications could potentially serve as preventive tools to minimize risks of further decline in mental or overall function, increased dependence upon nursing care, prescription of additional pharmacological interventions, and repeated hospitalizations.

For these reasons, computerized cognitive-communicative interventions such as Constant Therapy merit investment in large-scale efficacy and effectiveness trials for residents with dementia living in SCUs. Nationally and globally, skilled nursing facilities are allocating greater extents of space and resources to accommodate the surge in mid to late-stage dementia population. Computerized treatments such as Constant Therapy may prove to be worthwhile, cost-effective, and possibly even cost-containing components of comprehensive dementia care.

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