American Journal of Alzheimer's Disease & Other Dementias®
Volume 24 Number 6
December 2009 450-455

10.1177/1533317509350153
http://ajadd.sagepub.com

The Effect of Multisensory Stimulation on Persons Residing in an Extended Care Facility

Peggy Ward-Smith, RN, PhD, Sarah M. Llanque, RN, MSN, MEd, and Denise Curran, RN, BSN

Background: Non-pharmacological interventions, such as multisensory stimulation environments (MSSE), have demonstrated the ability to reduce inappropriate behavior among individuals with Alzheimer's disease. *Methods:* In this study, we compared the incidences of problematic behavior among individuals with Alzheimer's disease residing in a long-term care facility who were and were not exposed to an MSSE. Retrospective data were obtained using the Psychotic Behavior Assessment Record (PBAR), mandated by Medicare to be used when antipsychotic medications are administered. Psychotic Behavior Assessment Record data were collected using the first and sixth month of admission for residents after appropriate consent was secured. *Results:* Documented disruptive behavior included pacing, exit-seeking activities, hitting, yelling, and aggressive talking. The use of the MSSE resulted in a decrease in the number of incidences of disruptive behavior, but not the behaviors present. *Conclusion:* The use of MSSE, as a non-pharmacological intervention, demonstrates the ability to decrease the number of incidences of disruptive or problematic behavior. The use of these interventions, where feasible, should be considered prior to the use of pharmacological methods.

Keywords: Alzheimer's disease; dementia; multisensory stimulation; disruptive behavior

Introduction

Statistics indicate that someone is diagnosed with Alzheimer's disease (AD) every 70 seconds.[1] Currently, there are 5.3 million people living with AD in the United States. The prevalence of AD is expected to reach 16 million people as the baby boomer cohort enters into older adulthood. This chronic progressive disease includes a decline in memory and cognitive abilities.[1] These changes frequently require assistance with activities of daily living (ADLs), resulting in the need to reside in an extended care facility (ECF). Some ECFs have developed residential areas capable of providing the physio-psycho-social needs for the person with AD. At this study site, the special care unit (SCU) has a dedicated room capable of providing multisensory stimulation.

The cognitive decline that occurs in the latter stages of AD has been associated with disorientation, restlessness, confusion, behavior changes, difficulty speaking, and agitation.[1] According to Cohen-Mansfield,[2] health care providers have identified confusion and agitated behaviors as the most difficult to manage. Up to 97% of persons residing in an ECF who have AD experience behavioral problems and a reduced quality of life.[3] Federal mandates limit the use of chemical and physical restraints, and the nursing shortage,[4] coupled with reimbursement limits, have restricted the resources needed to provide the high staff/client ratio necessary to safely manage problematic behavior. Although medications are available to treat the aggression and agitation associated with AD, research has determined that these medications are associated with serious adverse events and side effects.[5]

Residents in ECFs may experience alterations, either too much or too little exposure to sensory stimulation. Residents with AD are thought to have a decreased sensory threshold, making them easily

From the School of Nursing, University of Missouri, Kansas City, Missouri (PW-S, SML); and LaVerna Village and Apartments, Savannah, Missouri (DC).

The authors have reported no conflicts of interest.

Address correspondence to: Peggy Ward-Smith, 2464 Charlotte Street, Kansas City, MO 64108; e-mail: wardsmithp@umkc.edu.

overstimulated.[6] Since both overstimulation and sensory deprivation have been associated with unhappiness, agitation, and depression,[6] providing a therapeutic environment is challenging. The cognitive impairment associated with AD has been identified by Beck and associates as an antecedent to agitation.[7] Agitation, for the resident with AD, has been defined by Cohen-Mansfield as "inappropriate verbal, vocal, or motor activity that is not explained by needs or confusion of the individual per se."[8] Agitation has been attributed to the decreased ability to receive and process sensory stimuli, ultimately decreasing one's stress threshold.[9] These authors posit that stress is lowest in the morning, and, without intervention, will peak in the early afternoon. Some residents (approximately 45%) with AD experience sundowning, a state of confusion in people with AD that occurs at the end of the day and into the night.[10] Ballard and associates suggest that "alternative therapies should be considered before pharmacological therapies are prescribed."[5]

Alternative or complementary health care interventions, such as music therapy, have demonstrated the ability to reduce agitation.[11] Other nonpharmacological interventions, such as Validation Therapy, reality orientation, reminiscence therapy, and diversional therapy, have demonstrated a positive influence on quality of life and a decrease in undesirable behaviors among people with dementia.[12]

A systemic review of research-based approaches toward managing the psychiatric-associated systems of dementia was performed by Livingston and colleagues.[13] Reviewing 162 studies that focused on examining effects of psychologically based therapy to treat the neuropsychiatric symptoms of dementia, these authors determined that behavioral management, focused staff and/or family education, and cognitive stimulation demonstrated lasting effects. Results identified by these authors from the 15 studies that specifically explored the use of sensory stimulation achieved a grade recommendation of B. This recommendation, from these authors, is based on repetitive findings for primarily small, randomized studies, which found a short-term positive effect from sensory stimulation. These authors caution readers from assuming that these results reflect a lack of efficacy for psychological intervention because of the lack of evidence. The paucity of research and the inability to develop high-quality randomization research with sufficient participants inhibits the ability to perform the research necessary.

Multisensory Stimulation Environments

Multisensory stimulation environments (MSSE), or Snoezelen, are controlled multisensory environments developed by Hulsegge and Verheul in the 1970s.[14] Originally utilized among severely disabled persons, these environments have demonstrated a reduction in problematic behavior.[15] Ball and Haight state that an MSSE provide social interaction, recreation, and leisure activities.[16] Multisensory stimulation environments may be provided using a filtered light source, mirror ball, fiber optic curtain, bubble column, mirrors, fiber optic spray, aroma diffuser, miscellaneous tactile objects, antigravity rocking chair, and music. These authors posit that ECF health care providers who implement MSSE-based interventions will positively affect quality of life (QoL) for both the resident with dementia and the ECF staff.

Results of a qualitative study by Riley-Doucet determined that an MSSE intervention was effective when provided to people with AD residing in a home setting.[17] Semistructured interview data were obtained from 10 dyads; family members and individuals with dementia. Satisfaction with the MSSE was described by the family members. The individual with dementia appeared more relaxed, more responsive to the environment and other family members, and displayed a positive change in demeanor and was less restless.

Milev and associates randomly assigned long-term care residents with dementia to a control group, which received no intervention, or 1 of 2 intervention groups, which received 1 or 3 multisensory interventions per week.[18] Data were collected over a 24-week period. These results indicate that improvement, determined by scores on the daily observation scale (DOS), and clinical global impression-improvement (CGI-I) were statistically significantly improved at weeks 8 (DOS) and 12 (CGI-I) for residents receiving each of the interventions.

In a review article, Lancioni and associates[19] analyzed the results of 7 studies where Snoezelen was used among people with dementia. Despite the methodological issues within each of these studies (weak control situations, small sample sizes, qualitative, and/or descriptive data), within-session positive effects appear to prevail. Further research is suggested. The Cochrane library evaluated published research on the efficacy of Snoezelen or multisensory stimulation programs.[20] Noting that originally short-term benefits were realized which promoted adaptive behaviors among people with dementia, these results

did not remain once rigorous review methodologies were used to analyze these results. These authors also conclude that reliable, randomized trials be developed. According to the American Association of Multi Sensory Environments (AAMSE),[21] randomized clinical trials may not be ethically appropriate, yet establishing practice guidelines and identifying common characteristics between studies will make the results generalizable and comparable. The purpose of this retrospective study was to determine whether the sporadic use of multisensory stimulation affected behavior among individuals with AD, residing in a locked special care unit, located within an ECF.

The multisensory simulation room (MSSR) at the study site provides multiple methods of stimulation. Since it does not provide trademark-regulated Snoezelen, this intervention will be considered multisensory environment (MSE)-based therapy, to avoid any confusion with the use of a trademarked product, as suggested by Hutchison.[22] The MSSR is a small area, located off the main activity center within the locked Alzheimer's Special Care Unit (ASCU). This room has a solid door that provides privacy and the ability to eliminate distractions from activities occurring within the area. When not in use, the MSSR is kept locked. Within this room, there are methods to provide MSE-based therapy. These interventions include music, light, touch, message, and aromatherapies. There is a small bench to recline on, and the lighting may be dimmed. Presently, use of the simulation room is sporadic, and residents are offered the use of the room based on the clinical judgment of the activity director. Data for this study were obtained by reviewing the Psychotic Behavior Assessment Record (PBAR), a Medicare/Medicaid documentation requirement when antipsychotic medications are administered.

Setting and Participants

Participants in this study were residents of the special care unit (SCU), a locked 20-bed unit specifically designed to meet the physical and psychological needs of the individual diagnosed with AD or other forms of dementia. The MSSE provides MSE-based therapy, using the Snoezelen philosophy. The aims of MSE-based therapy are to provide relaxation and enhance alertness using various therapeutic objects such as an interactive bubble column, a light wheel, vibrating pillows, fiber optic lights, aromatherapy, DVDs, comfortable seating, and wind chimes.[21] The treatment plan is tailored to each resident and used intermittently. Each treatment is provided over a 15- to 20-minute period and coordinated by the activity director.

Residents of the SCU, at minimum, must be able to transfer with the assistance of one individual, propel themselves if a wheelchair is used, be able to perform ADLs with the maximum assistance of 1 individual, behave appropriately (not disruptive), and be able to participate in group and individual activities. Individuals requiring more supervision or assistance beyond this scope are not appropriate for the SCU. Thus, residents within the SCU fit the Alzheimer's Association for Stage 5 and 6 of this disease process.[23] The study site is a licensed provider for all skilled, rehabilitation, palliative, Parkinson's, and dementia care. It is noteworthy that the majority of individuals who reside in this SCU have family members who visit on a routine, almost daily, basis.

Methods

After obtaining Institutional Review Board (IRB) approval, permission to review the medical record was obtained from the appropriate legal representative or the individual identified as the durable power of attorney (DPOA) for the resident. The purpose and goal of the study was explained by the facility representative prior to receiving permission. This approach allowed the researchers to have access to the medical records, complying with current Health Insurance Portability and Accountability Act (HIPAA) recommendations.

Data were obtained by a retrospective medical review through a chart audit. Although study participation was solicited for all residents, data were collected only on those residents who were receiving routine antipsychotic medications. This allowed data to consist of PBAR documentation, required with the administration of antipsychotic medications. Psychotic Behavior Assessment Record data documents the presence and frequency of aggressive behavior daily. This documentation provides quantitative data, reflective of the resident, avoiding the Hawthorne effect often associated with such research.

Prior to the medical record audit, the administrator at the study site noted whether the resident was using the MSSR. This information provided a mechanism to develop two separate study groups; residents who used the MSSR became the intervention group, with the other residents formulating a

control group. Data collected included demographic information, which was used only to describe the study population and compare study groups. Other information included admitting diagnoses, mobility status, orientation, medications, ability to participate in activities and preferred activities, psychotic behaviors, and number of incidences per day, as documented within the PBAR. The time of day and type of MSE-based intervention were noted for the intervention group. Descriptive statistics were used to describe each study population, compare means, and identify differences.

Results

Permission was obtained from 15 DPOAs. One resident was excluded from the study because the present medication regime did not include antipsychotic medication. Thus, a total of 14 medical records were reviewed. This provided 7 participants in each study group. Collectively, these residents were primarily female (n = 12; 86%), Caucasian (n = 14; 100%), and widowed (n = 13; 93%), with level of education between 8 and 16 years (mean = 11.3; SD 2.0). Occupations varied from housewife to farming and truck driver. The only college-educated person was a nurse.

Collectively, the ages of these residents ranged from 67 to 92 years (mean = 81.3; SD 7.8). Within the control group, the ages ranged from 67 to 92 (mean = 79.1; SD 8.7), with ages in the intervention group ranging from 67 to 89 (mean = 82.7; SD 7.3). Thus, there were no appreciable differences between these groups based on gender, ethnicity, marital status, or age. The educational level of the residents in the intervention group was slightly less (mean = 11.1) then the residents of the control group (mean = 11.4), which reflects the presence of the college-educated resident in the control group. There was 1 male participant in each study group.

The length of time within the special care unit varied slightly for each study group, but failed to achieve statistical significance as determined by paired sample *t*-test ($P = .005$). Those in the control group, who did not use the simulation room, were residents of the SCU an average of 18.3 months (range 5-30; SD 10.1) while those in the intervention group, who used the MSSR, were residents of the SCU an average of 23.3 months (range 5-48; SD 14.2).

Each MSE-based intervention was provided in the early afternoon hours, between 1300 and 1600. There were a total of 84 MSE-based interventions provided during the study collection period. Each of the residents received a variety of MSE-based intervention. The most preferred type of MSE-based intervention was DVD music therapy (N = 38); the fiber optic light string (N = 18) and the light wheel were equally as popular (N = 18). Watching the interactive bubble column while seating was moderately used (N = 8), while the vibrating pillow was rarely requested (N = 3). Administration of the antipsychotic medication for all of the residents receiving an MSE-based intervention was 3 times per day (TID) on a 0900, 1300, and 1700 schedule. Thus, this medication was routinely administered prior to providing any MSE-based intervention. No additional, or PRN doses of antipsychotic medications were administered to any resident during the data collection intervals.

Data obtained from the PBAR included the type of behavior demonstrated and recorded the number of times each behavior occurred during the morning, afternoon, and evening for each study participant. PBAR records were evaluated for each study participant during their first month in the SCU and 3 months later. Behavior monitored within the PBARs of all study participants included pacing or exit-seeking behavior, which was documented in 13 (93%) of these medical records at each study data collection interval. Other behaviors included hitting, scratching, or kicking, which were grouped using the variable of aggressive behavior and documented in 7 (50%) of the medical records. The behavior of aggressive talking or yelling was reported in 4 (29%) medical records; crying or refusing food or medication were each reported twice (14%). Toileting in inappropriate places, confusion, and slamming doors were each reported in 1 medical record (7%).

Data from the initial PBARs, obtained during the first month of residency in the SCU, reported the number of incidences of each type of psychotic behavior ranged from 1 to 70 per 8-hour period. At this time, there were no differences, nor any predictable pattern to identify the resident who would subsequently use the MSSR. Comparing the number of incidences of recorded PBAR behavior detected a decrease in the number of incidences or psychotic behavior, but not the number of behaviors present. Individual recorded mean PBAR behavior incidences are shown in Table 1.

Incidences of psychotic behavior among the residents who did not use the MSSR are shown in Table 2.

Table 1. Individual Recorded Mean PBAR Behavior Incidences Among Residents Who Used the MSSR

Behavior	Initial Month in the SCU—Mean Score	Three Months Later and Using the MSSR—Mean Score
Pacing/exit seeking	32	17
Aggressive behavior	30	13
Aggressive talking/yelling	14	6
Crying	4	2
Refusing food/medication	6	3
Slamming doors	8	3

Abbreviations: PBAR, Psychotic Behavior Assessment Record; SCU, special care unit; MSSR, multisensory simulation room.

Table 2. Incidences of Psychotic Behavior Among the Residents Who Did Not Use the MSSR

Behavior	Initial Month in the SCU—Mean Score	Three Months Later and Not Using the MSSR—Mean Score
Pacing/exit seeking	31	40
Aggressive behavior	27	36
Aggressive talking/yelling	16	16
Refusing food/medication	7	10
Toileting inappropriately	4	10

Abbreviations: MSSR, multisensory simulation room; SCU, special care unit.

Conclusion

The results of the study demonstrate that the MSSR and MSE-based interventions have the potential to decrease problem behaviors among ECF residents with AD who experience agitation. Residents receiving an MSE-based intervention demonstrated a decrease in psychotic behaviors when compared with residents who did not receive an MSE-based intervention. Due to the small sample size and lack of randomization in study groups, a causal effect in the use of the MSSR cannot be concluded. However, the overall improvement in psychotic behaviors for those who used the MSSR demonstrates a decrease in mean PBAR-documented behaviors. Those who did not receive an MSE-based intervention experienced an increase in PBAR-documented behaviors, with the exception of aggressive talking/yelling behavior, which remained the same. Since no supplementary or "as needed" (PRN) antipsychotic medication was administered to any study participant during the data collection intervals, it may be assumed that these behavioral changes are not the consequence of additional medication. Thus, an MSE-based intervention appears to affect psychotic behavior among residents with AD residing in an SCU receiving antipsychotic medication.

Limitations

Including the administration of antipsychotic medications as a requirement for study inclusion limits the generalizability of these results only to ECF residents with AD who are receiving similar medications. Removing a resident from the general SCU environment and providing one-on-one care may also achieve outcomes similar to those obtained with an MSE-based intervention. The lack of specific criteria for determining which resident would benefit from an MSE-based intervention prohibits replications of these results. Study data were collected from one study site, a health care facility located in rural Missouri, a close-knit area which is not culturally or ethnically diverse.

Replication of this study with residents at different stages of AD, not receiving antipsychotic medication, and from different ethnic backgrounds is strongly recommended. A larger sample size and the use of specific medical and/or clinical criteria to assure homogeneity among residents who use the MSSR would provide validity to future results. Providing an MSE-based intervention on a routine basis would allow future study results to determine the frequency and time of day required to optimize the behavioral effects of the MSSR. Exploring staff and family member perception of MSE-based interventions could provide additional insight into the perceived benefits of this intervention.

References

1. Alzheimer's Association. *Alzheimer's Disease Facts and Figures*; 2009. http://www.alz.org/national/documents/reportalzfactsfigures2009.pdf. Accessed March 29, 2009.
2. Cohen-Mansfield J. Agitated behaviors in the elderly. II. Preliminary results in the cognitively deteriorated. *J Am Geriatr Soc*. 1986;34(10):722-727.
3. van Weert JC, van Dulmen AM, Spreeuwenberg PM, Ribbe MW, Bensing JM. Behavioral mood effects of Snoezelen integrated into 24-hour dementia care. *J Am Geriatr Soc*. 2005;53(1):24-33.
4. Phillips CD, Spry KM, Sloane PD, Hawes C. Use of physical restraints and psychotropic medications in Alzheimer

special care units in nursing homes. *Am J Public Health*. 2000;90(1):92-96.
5. Ballard CG, Gauthier S, Cumming JL, et al. Management of agitation and aggression associated with Alzheimer disease. *Nat Rev Neurol*. 2009;5(5):245-255.
6. Kovach CR. Sensoristasis and imbalance in persons with dementia. *J Nurs Scholarsh*. 2000;32(4):379-384.
7. Beck C, Frank L, Chumbler NR, et al. Correlates of disruptive behavior in severely cognitively-impaired nursing home residents. *Gerontologist*. 1998;38(2): 189-198.
8. Cohen-Mansfield J. Agitated behavior and cognitive functioning in nursing home resident. *Clinical Gerontologist*. 1988;7(3):11-22.
9. Hall GR, Buckwalter KC. Progressively lowered stress threshold: a conceptual model for care of adults with Alzheimer's disease. *Arch Psychiatr Nurs*. 1987; 1(6):399-406.
10. Scarmeas N, Brandt J, Blacker D, et al. Disruptive behavior as a predictor in Alzheimer disease. *Arch Neurol*. 2007;64(12):1755-1761.
11. Gerdner LA. Effects of individualized versus classis "relaxation" music on the frequency of agitation in elderly persons with Alzheimer's disease and related disorders. *Int Psychogeriatr*. 2000;12(1):49-65.
12. Burns I, Cox H, Plant H. Leisure or therapeutics? Snoezelen and the care of older persons with dementia. *Int J Nurs Pract*. 2000;6(3):118-126.
13. Livingston G, Johnston K, Katona C, Paton J, Lyketsos CG. and the Old Age Task Force of the World Federation of Biological Psychiatry. Systematic review of psychological approaches to the management of neuropsychiatric symptoms of dementia. *Am J Psychiatry*. 2005;162(11):1996-2021.
14. Cavet J. Multisensory environments. Snoezelen—your questions answered. *Commun Living*. 1994;7(3):26.
15. Hogg J, Cavet J, Lambe L, Smeddle M. The use of 'Snoezelen' as multisensory stimulation with people with intellectual disabilities: a review of the research. *Res Dev Disabil*. 2001;22(5):353-372.
16. Ball J, Haight BK. Creating a multisensory environment for dementia: the goals of a Snoezelen room. *J Gerontol Nurs*. 2005;31(10):4-10.
17. Riley-Doucet CK. Use of multisensory environment in the home for people with dementia. *J Gerontol Nurs*. 2009;35(5):42-52.
18. Milev RV, Kellar T, McLean M, et al. Multisensory stimulation for elderly with dementia: a 24-week single-blind randomized controlled pilot study. *Am J Alzheimers Dis Other Demen*. 2008;23(4):372-376.
19. Lancioni GE, Cuvo AJ, O'Reilly MF. Snoezelen: an overview of research with people with developmental disabilities and dementia. *Disabil Res*. 2002;24(4):175-184.
20. Chung JJCC, Lai CCKY. Snoezelen for dementia. *Cochrane Database Syst Rev*. 2002;(4):CD003152.
21. American Association of Multi Sensory Environments. *Position paper*; 2009. http://www.aamse.us/research.php. Accessed July 7, 2009.
22. Hutchison R. *Sensory Environments*. Chesterfield: Whittington Hall Hospital; 1994.
23. Reisberg B. Diagnostic criteria in dementia: a comparison of current criteria, research challenges, and implications for DSM-V. *J Geriatr Psychiatry Neurol*. 2006; 19(3):137-146.