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Development and Evaluation of a Sleep Education Program for Older Adults with Dementia Living in Adult Family Homes

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Abstract

Objectives—To investigate the feasibility of implementing a Sleep Education Program (SEP) for improving sleep in adult family home (AFH) residents with dementia, and the relative efficacy of SEP compared to usual care control in a pilot randomized controlled trial.

Participants—Thirty-seven AFH staff-caregivers and 47 residents with co-morbid dementia and sleep disturbances.

Intervention—SEP consisted of four training sessions with staff-caregivers to develop and implement individualized resident behavioral sleep plans.

Measurements—Treatment fidelity to the SEP was assessed following the NIH Behavior Change Consortium model utilizing trainer observations and staff-caregiver reports. Resident sleep was assessed by wrist actigraphy at baseline, 1-month **post-treatment**, and 6-month follow-up. Caregiver reports of resident daytime sleepiness, depression, and disruptive behaviors were also collected.

Results—Each key area of treatment fidelity (SEP delivery, receipt, enactment) was identified, measured, and yielded significant outcomes. Staff-caregivers learned how to identify sleep scheduling, daily activity, and environmental factors that could contribute to nocturnal disturbances, and developed and implemented strategies for modifying these factors. SEP decreased the frequency and disturbance level of target resident nocturnal behaviors, and improved actigraphically-measured sleep percent and total sleep time over the 6-month follow-up period compared to the control condition.

Conclusion—Results suggest behavioral interventions to improve sleep are feasible to implement in adult family homes, and merit further investigation as a promising intervention for use with AFH residents with dementia.

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INTRODUCTION

The rapidly growing population of older adults in the United States is stimulating discussion regarding residential care options for seniors who can no longer live independently in their own homes. By the year 2031, when most baby-boomers will have reached age 65 or beyond, the number of seniors in this country is expected to double compared to the year 2000.¹ The National Clearinghouse for Long-Term Care estimates that approximately 70% of U.S. older adults will need residential care at some time in their lives.² For many, more economical and less restrictive alternatives to traditional skilled nursing homes will be both appropriate and preferred.

One such alternative is community residential homes, which go by a variety of names including board-and-care homes, adult family homes, group homes, adult foster care, and small-scale living. These homes are considerably smaller than skilled nursing and assisted living facilities, typically caring for fewer than 20 individuals, and offering person-centered care in a comfortable, homelike environment. They provide room and board, 24-hour supervision, and in some cases, specialized care for persons with mental health issues, cognitive impairment, or developmental disabilities. These more intimate and affordable home settings are growing in popularity worldwide, particularly for the care of older adults with dementia.^{3,4}

Despite their popularity, these homes pose systemic challenges for the development and implementation of standardized approaches to care. Many are family-owned and operated, with caregivers co-residing in the home. Licensure requirements vary widely from state to state and homes differ in their size, physical layout, staffing ratios, cultural/linguistic backgrounds, administrative structures, and shift scheduling practices. Reimbursement comes from a variety of sources including private pay, long-term care insurance, and Medicaid, leading to disparities in what services can be provided. There are often no on-site professional medical or nursing staff. Due to the heterogeneity in what constitutes a community residential home, current data on resident, staffing, and facility characteristics are not readily available.⁵ Almost nothing is known about how best to provide evidence-based staff training that meets the needs of this diverse and complex health care environment, or how to evaluate the impact of training on resident outcomes.

In Washington State, adult family homes (AFHs) provide room, board, and personal care to 2-6 adults not related to the owner or operator. A high proportion of AFH residents are cognitively impaired and have higher rates of behavioral problems than residents in larger board and care or assisted living facilities.⁶⁻⁸ Sleep-wake disturbances are common⁹ and a leading cause for transfer into skilled nursing care. Training staff to better manage sleep-wake disturbances in AFHs could help residents remain in a less restrictive environment for a longer time, and enhance resident quality of life. However, it is unknown whether treatments to improve sleep that have shown promise with cognitively impaired individuals in independent living or nursing homes would be feasible or efficacious in AFH settings.

The goals of the current study were two-fold. First, we sought to examine the feasibility of implementing a 4-session Sleep Education Program (SEP) for improving sleep and reducing nocturnal disturbances in AFH residents with dementia. The SEP was derived conceptually from evidence-based non-pharmacological interventions to improve sleep in older adults,¹⁰⁻¹² but adapted for the unique circumstances of the AFH environment, so particular emphasis was placed upon monitoring and evaluating SEP treatment fidelity. Second, we examined the relative efficacy of the SEP compared to usual care in a pilot randomized controlled trial. Since AFH residents vary widely in their sleep schedules and durations, our primary outcome was actigraphically-measured nocturnal sleep percent. It was hypothesized

that residents in SEP would have greater sleep percent at 1-month (**post-treatment**) and 6-month follow-up than residents receiving usual care. We also sought to examine whether SEP would be associated with greater resident improvements in daytime activation, mood, and ratings of disruptive behavior at **post-treatment** and follow-up compared to the control condition.

METHODS

Study recruitment

A total of 633 adult family homes were contacted about participation in the study. Homes were identified from published directories of AFH residences, and from contacts made at annual AFH educational conferences. Of these, 37 homes with a total of 47 residents were enrolled. Enrollment began in June 2006 and follow-up ended in August 2009. The flow of subjects through the study is shown on Figure 1.

The University of Washington IRB approved the study. Written consent was obtained from residents' legal guardians or powers of attorney as well as participating staff-caregivers. Additionally, residents provided written consent or verbal assent, which was reaffirmed at each assessment point. The study was designed in keeping with CONSORT guidelines for randomized clinical trials, and registered at ClinicalTrials.gov (Identifier: NCT00393627).

Participants

Residents ranged in age from 64-101 years, and were predominantly female, white, and college educated (Table 1). Most, but not all, were severely cognitively impaired (Mini-Mental State Examination score mean: 8.1, SD: 7.6, range:0-26). All residents had one or more sleep problems (mean: 4.3, SD: 1.6) on the Sleep Disorders Inventory;¹³ twenty-one (45%) were taking sedating medications at night. Residents were excluded if they had a preexisting diagnosis of a primary sleep disorder (sleep apnea, restless legs syndrome, REM behavior disorder) or major medical illness that awakened them at night (severe pain, emphysema, uncontrolled incontinence). Residents were also excluded if their dementia was caused by alcohol abuse or Parkinson's disease, if they had a history of severe psychiatric disease (schizophrenia, bipolar disease), or if their medical status was considered fragile by AFH staff. The dementia diagnosis was confirmed by residents' primary care physicians.

Thirty-one (84%) participating AFHs were family owned. Homes had an average of 4.5 residents (SD: 1.3, range:1-6). Staff-caregivers were typically middle-aged women from a diversity of ethnic backgrounds (Table 1). Seven (19%) caregivers were certified nursing aides, 23 (62%) were registered nursing aides, and 6 (16%) had a professional degree (RN, LPN). Thirty (64%) had worked at the current AFH for longer than two years; 8 (22%) resided full-time at the AFH. The average number of hours worked per week at the AFH by staff-caregivers was 54.5 hours (SD: 22.5, range:12- 98).

Randomization

Residents were randomly assigned after the baseline assessment to receive training in a 4-session Sleep Education Program (SEP) or to usual care control (CONT), according to a 2:1 simple allocation ratio designed to maximize recruitment and increase our experience with the experimental Sleep Education Program (N=31 SEP; N=16 CONT). All residents in homes with more than one participating resident were assigned to the same treatment condition.

Treatment Groups

Sleep Education Program—The SEP was designed to teach AFH caregiver-staff about non-pharmacological strategies to improve sleep in older adults with dementia,^{10,14,15} and to help them implement a realistic, individualized sleep plan for each resident. SEP sessions were held with the AFH owner/operator or staff-caregivers responsible for developing and following through with resident sleep plans. Table 2 shows the general outline of treatment sessions. A more detailed description of the theoretical rationale underlying the SEP and its development is available elsewhere.⁹

Usual Care Control—Residents in CONT received routine medical care as typically provided by their AFH or personal health care providers. Control AFHs did not receive training in SEP or any other type of behavioral sleep improvement strategies.

Study Trainer

All SEP sessions were conducted at the AFH by an MSW trainer (DML) with 15 years experience working with cognitively impaired older adults in residential care settings. The trainer had worked on previous research studies with this team delivering behavioral sleep interventions to caregivers of persons with dementia. He received an initial 2-hr orientation with the Principal Investigator (SMM) in which the study aims, treatment protocol, and outcome measures were reviewed, followed by completion of a training case that included weekly supervision meetings and audiotape review.

Feasibility/Treatment Fidelity

One of the primary aims of this study was to assess our ability to train AFH staff-caregivers to develop and implement behavioral sleep plans with their residents. SEP feasibility and implementation were evaluated following a framework developed by the Treatment Fidelity Workgroup of the NIH Behavioral Change Consortium to enhance reliability and validity of behavioral interventions.¹⁶ We collected data on treatment delivery (whether the SEP could be implemented in a standardized way across AFH settings), receipt (whether SEP concepts and components were understood by participating staff-caregivers), and enactment (whether staff-caregivers followed treatment recommendations with their residents).

Delivery—The trainer used a written manual with all materials necessary to conduct each session. A checklist was completed after each session indicating which of 13 SEP treatment topics had been covered (keeping a sleep log; assigned readings; sleep changes in dementia; behavioral treatment rationale; developing a sleep plan; monitoring problematic sleep behaviors; identifying activators for problem behaviors; changing caregiver responses to behaviors [consequences]; implementing sleep plans; improving communication with residents; and effects of light, daytime activity, and pleasant events on sleep and mood). All sessions were audiotaped and reviewed by the Principal Investigator, who provided feedback regarding adherence to the treatment protocol.

Receipt—Staff-caregiver attendance at SEP sessions (treatment dose) and clinical impressions (staff interest, understanding, willingness to make changes, conduciveness of the AFH environment to implementing the SEP) were rated by the trainer after each session. The trainer also recorded whether staff-caregivers were able to identify sleep-related target behaviors for change, potential activators and consequences for these behaviors, and develop behavioral sleep plans for the upcoming week.

Enactment—The trainer reviewed homework at every SEP session, rated homework compliance (attempted/not attempted), and assisted staff-caregivers in problem-solving

difficulties following treatment recommendations. Success implementing specific SEP components was also rated for: resident sleep schedule changes, reduced napping, increased exercise, light changes (increase daytime, decrease nighttime), changes in other environmental triggers for awakenings, use of behavior management problem-solving strategies (ABCs), and increased pleasant events.

Assessment

Assessments were conducted at baseline, 1-month (**post-treatment**), and 6-month follow-up by interviewers blind to treatment assignment.

Primary sleep outcomes: Actigraphy—One week of sleep-wake activity was measured at each assessment using a Micro-Mini Motionlogger actigraph (Ambulatory Monitoring, Inc., Ardsley, NY) worn on residents' non-dominant wrist. Data were collected in one-minute epochs using the Proportional Integrating Measure (PIM, low sensitivity) operation mode. The Action4 software package (Ambulatory Monitoring, Inc.) was used to score sleep/wake.

The primary actigraphy outcome was resident percent sleep at night. The night (in-bed) period was defined as "lights out" at bedtime until the final morning rising. Bed and rising times were derived from a daily sleep log kept by AFH staff-caregivers during weeks when residents wore the actigraphs. Secondary actigraphic outcomes included number of awakenings, total sleep time, total wake time, and daytime inactivity.

Staff-caregiver reports—Additional secondary outcomes included ratings of resident mood, behavior, daytime sleepiness, and sleep hygiene practices.

1. The Cornell Scale for Depression in Dementia¹⁷ is a 19-item, clinician-rated scale of depression symptoms designed for use with dementia patients. Suggested cutoff scores are 8 for mild depression and 12 for moderate depression; 32 residents (68%) scored in the depressed range at baseline.
2. The Revised Memory and Behavior Problems Checklist (RMBPC)¹⁸ provided staff-caregiver reports of 24 resident dementia-related behaviors. Items were rated on a 5-point Likert scale (0-4) indicating how frequently disruptive and depressive behaviors had occurred in the past week (no occurrence to daily or more often). In addition, in Session 1 staff-caregivers in the SEP condition were asked in an open-ended way to identify one resident individualized target sleep behavior that they would like help problem-solving (Table 3). Once this behavior was identified, staff caregivers rated it using the same 0-4 frequency scale as used for the RMBPC, and also rated how disturbing they found the behavior on a 0-4 scale (not at all to extremely disturbing). These target behaviors provided an individualized focus for behavior management training in the SEP, and were rated again at the final Session 4.
3. The 8-item Epworth Sleepiness Scale (ESS)¹⁹ provided staff-caregiver ratings of resident daytime sleepiness during the past month. ESS scores of 16 or higher indicate high levels of daytime sleepiness. Fourteen residents (30%) scored high on daytime sleepiness at baseline.

Resident and staff caregiver demographics—Demographic characteristics included resident and caregiver age, gender, education, ethnicity, and resident MMSE score.²⁰

Statistical Methods

We used descriptive statistics to describe the sample and conducted between-group comparisons of baseline covariates using chi-square tests, Fisher exact tests for categorical variables, or t-tests for continuous variables, as appropriate. For the randomized trial, primary analyses were based on intent-to-treat, using all residents, regardless of adherence to the intervention. Missing data were not imputed and complete case analysis was used in this pilot study. We compared **post-treatment** scores controlling for baseline values on primary and secondary measures for SEP and CONT groups using ANCOVA. We used paired t-tests for continuous variables and McNemar's test for binary outcomes to measure changes in resident target behaviors within the SEP group comparing initial and final sessions. Our longitudinal analyses used generalized estimating equations with a normal link function and robust standard errors. Our longitudinal models used all available participant cases and included both **post-treatment** follow-ups (1 and 6 months) and time, controlling for the baseline value of the outcome, and Time X Group interactions. All analyses were conducted using Stata (version 11.1, StataCorp LP, College Station, TX) statistical software.

RESULTS

Demographics and Baseline Scores

There were no significant pretreatment group differences on any resident or staff-caregiver characteristics (Table 1). There were also no group differences in baseline actigraphic or caregiver-reported measures of resident mood or behavior.

Compliance with Actigraph Recorders

The majority (88%) of residents provided six or more days of actigraphy data at each of the three sampling points. One resident refused to wear the actigraph at 6-month follow-up. All other enrolled residents provided at least three days of data at every assessment, the minimum recommended to get an adequate representation of a subject's sleep patterns.²¹

Feasibility/Treatment Fidelity of the SEP

Delivery—Overall, the Sleep Education Program was delivered as intended to AFHs in active treatment. Twenty-seven (73%) AFH caregivers participated in all four individual sessions (mean: 3.6 sessions, range:1-4). Sessions averaged 41.5 minutes (range:6-80 minutes). Over the four-week period, each of the thirteen treatment topics were covered in every AFH, although the amount of coverage varied by session. Sleep log monitoring and resident sleep plans were discussed in each home at every visit. The relationship between sleep and dementia, monitoring behaviors and identifying activators, and activating residents during the day were discussed in 60% or more of homes every session. Remaining topics were covered in each home as prescribed by the treatment protocol, emphasizing treatment rationale, communication, and reducing environmental light at night in the first two sessions, and examining staff caregiver responses to behaviors, behavioral problem-solving, and increasing pleasant events in the last two sessions.

Receipt—Trainer ratings of staff-caregiver understanding of the SEP significantly improved over time. Staff-caregiver understanding was rated on a 0-3 scale (0=not at all, 3=fully). In Session 1, only 2 (7%) caregivers were rated as “fully” understanding the SEP behavioral concepts, but 67% (N=16) were rated “fully understanding” in Session 4 (mean difference=0.625 ± 0.494, t=6.19, df =23, p<.0001). All caregivers in the SEP were able to identify one or more resident sleep/wake disturbances that they wanted to change. After treatment completion, the trainer rated staff-caregiver interest, willingness to participate, and supportiveness of the AFH environment on a 1-5 scale (1=not at all, 5=extremely). Sixty-

two percent (N=18) of staff in the SEP condition were rated as extremely interested in the study, 48% (N=14) were extremely willing to participate, and 69% (N=20) were rated as having an extremely supportive environment.

Enactment—There was a significant increase over time in staff-caregivers' ability to identify activators and consequences of nocturnal behaviors (ABCs of behavior), develop behavioral plans, and implement daytime pleasant events with residents. Sixteen percent (N=4) of caregivers established ABC plans in Session 2 compared to 88% (N=22) in Session 4 (McNemar's exact, $p<.0001$). Thirteen percent (N=3) scheduled increased pleasant events in Session 2 compared to 92% (N=23) in Session 4 (McNemar's exact, $p<.0001$). Resident sleep behavior plans consistently included key SEP treatment components, and staff-caregivers consistently attempted to implement treatment recommendations (Table 4).

Site Effects

Twenty-seven AFHs (73%) had only one resident study participant, and 10 AFHs had two resident participants. Analysis of variance components indicated that including site effects did not enhance the explanatory power of models. For example, for total sleep time, the likelihood ratio chi-square test=0.39, $df=1$, $p=0.53$, indicated that the simpler model without site effects was appropriate.

Actigraphic Sleep Outcomes

At **post-treatment**, there were no significant differences in actigraphic measures of resident sleep (Table 5). However, there was a tendency for resident nightly percent sleep to improve for subjects in the SEP, relative to CONT subjects, $F(1, 41) = 2.18$, $p = 0.148$, with a moderate effect size ($d = .54$). Longitudinal analyses over 6 months of follow-up showed significant differences between residents in the SEP and CONT conditions on sleep percent (estimate=9.66, robust SE=4.71, $Z=2.05$, $p = 0.040$) and total sleep time (estimate=1.48, robust SE=0.59, $Z=2.49$, $p = 0.013$). Similar patterns of improvement for SEP subjects and decline in CONT subjects were observed for total wake time; at six months, CONT subjects were awake an average of 24 minutes more each night than subjects in the SEP condition. Additionally, whereas SEP subjects had stable daytime inactivity measurements throughout the follow-up period, CONT subjects had a 24% average *decrease* in daytime activity during the same period, with the end result that they were asleep (or inactive) 36 minutes more during the day at 6-month follow-up than SEP subjects (Table 5).

Secondary Resident Outcomes

The most common target resident sleep behaviors identified by staff-caregivers in the SEP treatment group were: wandering with inappropriate behavior at night (40% of cases); angry, anxious, or delusional behavior during nocturnal awakenings (30%); and excessive daytime napping associated with poor night sleep (28%). Within the SEP treatment group, there were significant reductions in caregiver ratings of the frequency (3.38 vs. 2.19 at Sessions 1 and 4, respectively, $t=5.37$, $df=25$, $p<.0001$) and disturbance levels (1.64 vs. 0.44, respectively, $t=4.65$, $df=24$, $p=.0001$) associated with resident sleep-related target behaviors. Comparing the two treatment groups, residents in SEP were significantly less depressed at **post-treatment** on the Cornell (Table 5) than CONT subjects, ($F(1, 41) = 9.61$, $p=.0036$, $d = .61$), but there were no differences between groups in daytime sleepiness on the ESS, or resident behaviors on the RMBPC.

DISCUSSION

This study demonstrated the feasibility of training AFH staff-caregivers to use behavioral strategies to improve resident sleep. The majority of caregivers were rated as extremely

interested in the Sleep Education Program, and willing to learn and practice the behavioral concepts. AFHs were highly supportive of program recommendations. Staff-caregivers learned to identify sleep scheduling, daytime activity, and environmental factors that could contribute to nocturnal disturbances, and developed and implemented plans for modifying these factors. High attendance rates and adherence to treatment protocols indicated successful treatment delivery. As the “dose” of training (number of treatment visits) increased, there was a significant staff-caregiver “response” (increased ability to develop sleep behavioral plans), demonstrating treatment receipt and enactment.

The study provides preliminary evidence that the SEP improved resident nocturnal behaviors. Caregivers reported a significant reduction in the frequency of target nocturnal behavior problems and how disturbing they found these problems were to deal with. There was a trend for residents to show improvement on actigraphically measured sleep percent at **post-treatment**, and significant improvements in total sleep time and nocturnal sleep percent at 6 months compared to CONT. The pattern of data also suggested that SEP residents had less daytime inactivity and depression over time than CONT residents. Our data suggest that residents in AFHs are spending on average over 50% of their time either asleep or in very sedentary activity, a finding that is comparable to some studies of dementia residents in skilled nursing homes.^{22,23} Additional research is needed to determine whether these findings are representative of AFHs overall. However, given the association between napping and negative health outcomes in older adults,²⁴ if the SEP can reduce daytime inactivity and improve mood it could have great benefits on resident quality of life.

This research did have several limitations. Residents were not screened with polysomnography, and given their advanced age and dementia severity, it is likely that some had undiagnosed primary sleep disorders such as sleep apnea contributing to their nocturnal disturbances.²⁵ We also did not have access to information about residents’ past sleep patterns or history of psychiatric syndromes (e.g., depression and anxiety) that might increase risk for current sleep problems.^{26,27} However, the inclusion of all eligible residents increases generalizability of study findings, and since subjects with such morbidities might be less likely to respond to a behavioral sleep intervention, our results may underestimate the potential efficacy of SEP in the AFH setting. Lastly, although research interviewers were blinded to treatment condition, the participating adult family homes and SEP trainer were not, which raises concern about the potential for response biases in self-report outcomes. This limitation is offset by the fact that actigraphy showed differences in objective sleep characteristics. Nevertheless, future studies should consider additional blinding strategies, including use of a placebo control rather than usual care to minimize risk for subjective outcomes being influenced by staff or interventionist awareness of treatment assignment.

It should be noted that the adult family home setting is not an easy one in which to intervene. There was often only one caregiver in a home at any given time, so training sessions were frequently interrupted or postponed while staff attended to resident needs. AFHs vary widely in how they schedule direct-care staff, and it can be difficult to coordinate nocturnal behavioral plans with staff-caregivers who work alternating or multi-day rotating shifts. Many homes are owned and staffed by persons with diverse educational, sociocultural, and linguistic backgrounds. All of these issues must be taken into consideration when developing a training program suitable for teaching staff-caregivers behavioral strategies to improve resident sleep-wake patterns (Table 6).

Recruitment of AFHs into studies such as this one is also challenging. Only 6% of the 633 homes contacted for participation in this study over 2½ years were eligible for and interested in participation. Similar to clinical research conducted in nursing homes,²⁸ recruitment for this study required a multi-step education and consenting process that involved AFH owner-

operators, direct-care staff, family surrogate decision makers, and the residents with dementia themselves. However, compared to nursing homes, the recruitment effort was greatly amplified because AFHs care for much smaller numbers of residents who could potentially participate. Had we been able to recruit a larger number of homes and residents into this pilot study, we would have had greater statistical power to examine between-group differences on actigraphic and caregiver report outcomes. Nevertheless, the fact that we achieved as high a level of treatment fidelity as we did and showed longitudinal improvement in resident outcomes suggests that the Sleep Education Program merits further investigation as a promising intervention for the treatment of sleep problems in AFH residents with dementia.

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Figure 1.
Enrollment and Randomization Flow Diagram

TABLE 1**Baseline Resident and AFH Staff Caregiver Characteristics**

	AFH Residents (N = 47)	AFH Staff Caregivers (N = 37)
Age, years, mean (SD)	86.6 (7.2)	48.2 (9.7)
Sex		
Female, N (%)	28 (59.6)	33 (89.2)
Male, N (%)	19 (40.4)	4 (10.8)
Education		
High School or less, N (%)	9 (25.7)	4 (10.8)
Some College, N (%)	23 (65.7)	27 (73.0)
Post-Graduate, N (%)	3 (8.6)	6 (16.2)
Race		
White, N (%)	42 (93.3)	13 (35.1)
Black, N (%)	1 (2.2)	4 (10.8)
Asian/Pacific Islander, N (%)	1 (2.2)	17 (46.0)
Other, N (%)	1 (2.2)	3 (8.1)

AFH: Adult Family Home. SD: standard deviation.

TABLE 2**Sleep Education Program Treatment Outline**

Session 1	Introductions. Discuss causes of sleep problems in dementia. Identify potential sleep scheduling, daytime napping/inactivity, dietary, environmental, or health causes for night awakenings. Develop behavioral sleep plan for the next week.
Session 2	Review success with sleep plan. Describe overall A-B-C approach to behavioral change. ²⁹ Use ABCs to problem-solve any challenges that emerged in past week adhering to sleep plan. Set goals for upcoming week.
Session 3	Review success with sleep plan and problem-solve challenges that emerged in past week. Develop individualized list of pleasant activities that can be implemented daily with resident during peak napping times in the afternoon and evening. Set goals for upcoming week.
Session 4	Review success with sleep plan and pleasant event scheduling, and problem-solve challenges that emerged in past week. Discuss sleep improvements observed in residents since beginning treatment. Develop maintenance plan for continued adherence to behavioral program, and use of ABCs to deal with patient nocturnal disturbances.

TABLE 3

Sample Individualized “Target” Sleep-Related Problems Identified by AFH Staff Caregivers in the Current Study

Circadian/Scheduling Behaviors	Agitated Behaviors	Other
Stays up all night and sleeps during the day	Screams in the middle of the night between 2 – 4 am	Auditory hallucinations – talks to people at night who aren't there
Only sleeps an hour or two at a time then up for a while	Gets up and bangs on walls, slams doors	Continually slaps self and says she wants to die
Goes to bed after lunch and stays there until breakfast the next day	Wants to go home and becomes aggressive with staff who try to reorient	Afraid to be alone at night, crawls into bed with caregiver
Stays up for 24 – 36 hours every 7-10 days, then sleeps on relatively normal schedule	Turns lights on and off, especially in other residents' rooms	Thinks the building is on fire and tries to escape
	Rummaging through things, stripping sheets off beds	Taking off undergarments and smearing feces on bedroom wall

TABLE 4

Use of Sleep Education Program Treatment Components

Treatment Component	Assigned as Homework	Attempted by Staff
	Percent(Range) N	Percent(Range) N
Sleeping schedule changes	90% (89-92%) 75	76% (71-87%) 63
Reduced napping	89% (83-92%) 74	66% (57-73%) 55
Increased exercise	64% (61-67%) 53	45% (39-56%) 37
Light changes (increase or decrease)	48% (40-54%) 39	41% (39-45%) 34
Other environmental changes	26% (23-32%) 22	23% (21-24%) 19

Component estimates are averaged over all patient-treatment sessions N=83.

TABLE 5

AFH Resident Actigraphy and Caregiver Reported Outcomes

	Baseline Mean (SD)	1-Month Post-Treatment Mean (SD)	Effect size	6-Month Follow-up Mean (SD)	Effect size
<i>Actigraphy</i>					
Time in bed/night, hours					
Sleep Education Program	10.8 (2.1)	10.8 (2.0)	.14	11.4 (2.1)	.28
Usual Care Controls	10.9 (1.6)	11.0 (1.6)		10.1 (1.8)	
Total sleep/night, hours					
Sleep Education Program	8.0 (1.9)	8.7 (2.1)	.25	9.6 (1.9) ^a	.72
Usual Care Controls	8.4 (1.8)	8.5 (2.1)		7.8 (2.3)	
Total wake time/night, hours					
Sleep Education Program	2.8 (1.5)	2.1 (1.3)	.39	1.9 (1.5)	.45
Usual Care Controls	2.5 (1.3)	2.4 (1.3)		2.3 (1.1)	
Sleep percent (efficiency)					
Sleep Education Program	74.6 (11.9)	80.3 (11.1)	.54	84.2 (9.8) ^b	.70
Usual Care Controls	77.2 (11.1)	77.3 (12.2)		75.8 (14.7)	
Daytime sleep, hours					
Sleep Education Program	5.3 (2.6)	5.1 (2.3)	.38	5.2 (2.8)	.42
Usual Care Controls	4.4 (2.2)	4.9 (2.0)		5.8 (2.5)	
<i>Caregiver Reported</i>					
Epworth Sleep Scale					
Sleep Education Program	12.9 (6.0)	10.6 (6.3)	.09	10.5 (6.9)	.13
Usual Care Controls	10.8 (5.8)	9.1 (5.5)		11.9 (8.4)	
Cornell Depression Scale					
Sleep Education Program	9.1 (4.6)	6.6 (4.9)	.61	5.9 (3.6)	.29
Usual Care Controls	10.7 (6.0)	12.3 (5.0)		10.2 (6.0)	

Actigraphy: Baseline (SEP, N = 30; UCC, N = 16). 1-Month **Post-Treatment** (SEP, N = 29; UCC, N = 14). 6-Month Follow-up (SEP, N = 23; UCC, N = 10).Caregiver Reported: Baseline (SEP, N = 31; UCC, N = 16). 1-Month **Post-Treatment** (SEP, N = 27; UCC, N = 14). 6-Month Follow-up (SEP, N = 20; UCC, N = 8).

RMBPC = Revised Memory and Behavior Problem Checklist.

^a $Z = 2.49$, $p = 0.013$ from longitudinal estimating equations analysis, using both **post-treatment** visits (1 and 6 months), and controlling for baseline value.

^b $Z = 2.05$, $p = 0.040$ from longitudinal estimating equations analysis, using both **post-treatment** visits (1 and 6 months), and controlling for baseline value.

TABLE 6

Special Considerations for Cognitive-Behavioral Strategies (CBT-I) to Improve Sleep When Training Adult Family Home Staff Caregivers to Improve Sleep in Residents with Dementia (adapted from Fiorentino and Martin³⁰)

Treatment component	Standard practice/goal	Considerations for adult family homes
Sleep diaries and other forms/materials used in therapy	Establish baseline sleep patterns, track progress in therapy, remind patients of sleep plan	<ul style="list-style-type: none"> ■ Materials should be suitable for non-native English speakers ■ Make logs short enough that they can be completed quickly and kept in resident chart for completion by rotating caregiver staff ■ Write prescribed recommendations directly on sleep diary so multiple caregivers have shared knowledge of behavior goals
Sleep education	Education regarding the two-process model of sleep regulation (using appropriate vocabulary), sleep stages, and insomnia Rationale for behavioral treatment	<ul style="list-style-type: none"> ■ Caregiver education about how aging, dementia, and other comorbid conditions impact sleep should be included ■ Evaluate possible medication side effects, including scheduling of medications that have stimulating properties or that increase nocturia ■ Ensure all caregivers are included in education and development of sleep plans to ensure consistent buy-in and follow-through across shifts
Sleep restriction	Improve sleep continuity by limiting time spent in bed	<ul style="list-style-type: none"> ■ Establish a consistent bed and rising routine gradually, especially if residents have been allowed to set their own sleep schedule ■ Daytime bed restriction is more important than nighttime restriction in this setting ■ Shortened bed schedules can be problematic for homes without multiple overnight caregivers ■ Brainstorm strategies for caregivers to keep resident activated throughout the day that do not involve intensive 1-on-1 time ■ Altering bed/rising schedules can trigger agitation in persons with dementia, so good communication and dementia behavior management training should be incorporated into sleep plans ■ Medical morbidity factors (pain, nocturia, medication schedules) as well as advanced age need to be considered when shortening in-bed times
Stimulus control	Associate the bed/bedroom solely as a place for sleep.	<ul style="list-style-type: none"> ■ Encourage a consistent morning rise time by engaging the resident with a pleasant event (preferred food, music, activity) upon waking ■ Identify other chairs, wheelchairs, or locations in the AFH that have become associated with sleep, especially during the day ■ Reduce daytime television time that leads to dozing ■ Reorient the confused resident back to bed at night
Sleep hygiene education	Address daytime habits and sleep environment that may be interfering with sleep	<ul style="list-style-type: none"> ■ Assess for light and noise activators of nocturnal awakenings ■ Check for frequently overlooked sources of caffeine (hot chocolate, soda) ■ Talk with family to determine whether the resident is reverting to nighttime habits and/or work schedules from earlier in life ■ Remove environmental cues for nocturnal wandering (e.g., daytime shoes, doors in line of sight)
Cognitive therapy	Develop realistic expectations about sleep	<ul style="list-style-type: none"> ■ Discuss feasibility of alternative approaches to managing nocturnal behaviors (e.g., supervision by awake AFH staff) ■ Explore caregiver cultural expectations about sleep that may differ from the mainstream
Treatment duration	Typically 6-8 sessions for CBT-I although briefer (1-2 sessions) versions for use have been developed	<ul style="list-style-type: none"> ■ Timing of sessions must work around key AFH activities (meals, bed/rising times, etc) ■ Sessions should be as short as possible because of competing staff demands, and may need rescheduling or phone follow-ups if resident needs arise unexpectedly
Treatment location	Typically held in sleep clinic, psychotherapy or primary care office	<ul style="list-style-type: none"> ■ Training sessions need to be held in-home with staff who have no backups so cannot leave the AFH

Treatment component	Standard practice/goal	Considerations for adult family homes
		■ Ensure conversations about residents can be done in confidential setting (without other residents around)