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Brief Report

Sleep in Assisted Living Facility Residents Versus Home-Dwelling Older Adults

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Background. Sleep problems among assisted living facility (ALF) residents are not well understood, and sleep-related differences between ALF residents and home-dwelling older adults have not been examined.

Methods. We compared sleep patterns in 19 ALF residents to sleep patterns in 19 matched home-dwelling older people (age ≥65 years). All were participating in the follow-up portion of a longitudinal study of sleep and functional outcomes following post-acute rehabilitation. Sleep was assessed with the Pittsburgh Sleep Quality Index and 1 week of wrist actigraphy.

Results. By actigraphy, ALF residents awoke earlier in the morning and exhibited more nighttime awakenings compared to home-dwelling participants (06:50 hours ± 1:29 hours vs 07:51 hours ± 1:19 hours and 19.5 ± 8.5 vs 12.9 ± 11.4 awakenings, respectively).

Conclusions. Larger studies are needed to confirm these initial findings that ALF residents have more disrupted sleep than do home-dwelling older persons, and to examine the functional and health consequences of poor sleep among ALF residents.

Key Words: Sleep—Aging—Circadian rhythms—Assisted living.

OLDER people in assisted living facilities (ALFs) are at high risk for functional decline, but the role of sleep disturbance in predicting this decline is unknown. In one study, 69% of ALF residents reported sleep disturbance, primarily insomnia (42%) and daytime sleepiness (35%) (1). In a second study, ALF residents reporting daytime sleepiness also reported more functional impairment than did those without sleepiness (2). Also, it is unknown whether the sleep of ALF residents differs from the sleep of community-dwelling older people.

This pilot study examined subjective and objective sleep patterns among older ALF residents compared to matched home-dwelling adults. All were participants in the follow-up portion of a longitudinal study of older people who had received inpatient post-acute rehabilitation (PAR). Within that larger study, 19 individuals resided in ALFs during one or more ''at home'' follow-up visits after discharge from PAR. Nineteen participants who were living at home at all follow-up visits were selected for matched comparison purposes. We hypothesized that ALF residents would have more impaired sleep than would home-dwelling participants.

Methods

Participants were enrolled in a larger study of sleep and functional outcomes of PAR from two Los Angeles area facilities (one Veterans Administration, one community facility) from 2003–2005 and were followed for 9 months after discharge. Here we compare all 19 individuals who resided in ALFs during follow-up to 19 matched participants (based on age within 3 years, gender, follow-up time point, and rehabilitation facility) selected from the 110 participants who were living at home at all follow-ups. When multiple home-dwelling participants matched an ALF participant, one home-dwelling participant was randomly selected. None of the home-dwelling and only two of the ALF residents resided in ALFs prior to the PAR admission during which they were enrolled into the larger study.

Within the larger study, potential participants were identified and screened at PAR admission. Exclusion criteria were: age < 65 years, living in a nursing home (NH) prior to admission, or being too medically unstable to participate. Written informed consent was obtained from participants or their responsible party. The project was approved by the VA Greater Los Angeles Healthcare System Institutional Review Board. During PAR and at follow-ups, a battery of clinical assessments was completed, and sleep was assessed with questionnaires and wrist actigraphy. Data reported here are from follow-up visits.

After PAR, participants were discharged to home, ALF, or NH by clinical staff depending on their functional abilities and care needs. Follow-up assessments were performed in person, at participants' places of residence (or by phone, if necessary), 3, 6, and 9 months after enrollment. A battery of clinical

Table 1. Comparisons Between Assisted Living Facility (ALF) Residents and Home-Dwelling Participants

Variable	ALF ($N = 19$)	Home-Dwelling ($N = 19$)	p Value*	Effect Size (partial η^2)
Age, y	83.4 (7.7)	83.3 (7.8)	.97	<.01
Race/ethnicity, *n*/% non-Hispanic white	18/95%	18/95%	1.00	.00
Education, y	12.9 (1.9)	15.0 (2.2)	<.01	.23
Mini-Mental State Examination	21.9 (7.3)	24.0 (6.5)	.41	.02
Geriatric Depression Scale, 15-item	6.3 (4.3)	4.5 (2.5)	.14	.07
Geriatric Pain Measure, modified	4.1 (3.1)	2.2 (2.8)	.09	.10
Activities of Daily Living	3.6 (2.1)	3.8 (2.0)	.73	<.01
Instrumental Activities of Daily Living	2.8 (1.8)	4.2 (2.4)	.06	.10
No. of prescribed medications	6.5 (4.4)	7.3 (4.7)	.61	<.01
Pittsburgh Sleep Quality Index, total score	7.50 (4.27)	6.38 (2.99)	.41	.03
Bedtime†	21:37 h (0:56 h)	22:12 h (1:27 h)	.20	.05
Rise time†	6:50 h (1:29 h)	7:51 h (1:19 h)	.049	.12
Hours slept per night†	7.21 (1.45)	7.64 (1.47)	.42	.02
Sleep efficiency (hours slept/hours in bed)†	79.3% (13.4%)	80.0% (12.3%)	.97	.001
Hours in bed (by diary and actigraphy)	9.78 (1.4)	9.65 (1.7)	.83	<.01
Nighttime % sleep, by actigraphy	56.0% (20.1%)	70.4% (19.5%)	.06	.12
No. of nighttime awakenings, by actigraphy	19.5 (8.5)	12.9 (11.4)	.047	.14
Daytime % sleep, by actigraphy	14.4 (13.1)	10.8 (7.0)	.34	.03
Daytime light exposure > 1000 lux, min	30 (61)	48 (45)	.37	.03

Notes: *Independent samples *t* test; assisted living facility versus home-dwelling.
†Based on the Pittsburgh Sleep Quality Index self-report questionnaire.

assessments (Mini-Mental State Examination [MMSE]; 15-item Geriatric Depression Scale [GDS-15]; Geriatric Pain Measure [GPM; pain intensity subscale]; Activities of Daily Living [ADL]; and Instrumental Activities of Daily Living [IADL]) (3–7) was completed, and an actigraph was placed on the participant's wrist. One week later, research assistants returned to the participant's place of residence to complete the Pittsburgh Sleep Quality Index (PSQI; range = 0–21; scores > 5 suggest clinically significant sleep disturbance) (8), to collect the actigraph and sleep diary, and to document medications taken during the 1-week data collection period (with particular attention to psychotropics) (9).

Wrist actigraphs with light sensors (Octagonal-L; Ambulatory Monitoring, Inc. [AMI], Ardsley, NY) were worn on the dominant arm for 1 week in the ALF or at home. Recordings were reviewed visually to eliminate artifacts, then sleep was scored with a validated algorithm (default parameters; time above threshold [TAT]; Action4 software; AMI) (10). Sleep diaries were used to determine bedtimes and rise times. When diary data were missing, PSQI-reported values were used in scoring actigraphy. Daytime was defined as rise time to bedtime. Nighttime was defined as bedtime to rise time. Mean daily minutes of light exposure >1000 lux (consistent with outdoor lighting) (11) was calculated based on light levels recorded by sensors within the actigraphs. Actigraphy measures were averaged across days and nights for each participant.

Data from ALF residents were compared to data from home-dwelling participants with analysis of variance and chi-squared tests. For all tests, $\alpha = .05$. Given the small sample, we also report effect sizes (partial η^2; interpreted as: <.08 = small, .09–.24 = moderate, > .25 = large effect) (12).

Results

Table 1 compares ALF residents and home-dwelling participants. On average, ALF residents reported awakening earlier in the morning than home-dwelling participants. Although 64% of ALF residents and 44% of home-dwelling participants had a PSQI score >5, this difference was not statistically significant ($p = .26$). By actigraphy, ALF residents had more nighttime awakenings than did home-dwelling participants.

Discussion

These results lend support to our hypothesis that ALF residents have more impaired sleep than do home-dwelling participants, although sleep disturbance was seen in both groups. In this study, both ALF residents and home-dwelling participants spent extended time in bed (on average, over 9.5 hours), reported poor overall sleep quality on the PSQI, and showed low sleep efficiency. Based on actigraphy, ALF residents awoke more frequently at night than home-dwelling participants, suggesting more fragmented sleep.

ALF residents reported going to bed earlier and rising earlier than home-dwelling participants. One possible reason for this difference is related to the structured daily schedule at the ALFs, such as the timing of breakfast, which was served around 8:00 AM in these facilities. These differences may also reflect underlying circadian rhythm differences; perhaps an exaggeration of the well-described age-related ''advance'' (i.e., shift earlier) in circadian rhythms (13,14). This shift may result from environmental factors in the ALF such as reduced bright light exposure and/or less physical activity.

Both groups had more severe sleep disturbance than that reported in prior actigraphy studies of healthy home-dwelling older adults (15,16). In this study, ALF residents exhibited nighttime sleep disruption similar to what has been reported in actigraphy studies with long-stay NH residents (17). It remains unclear whether a full cross-section of ALF residents would have similarly severe sleep

disturbance; however, comparison to our home-dwelling participants suggests that they might.

There are methodological limitations to consider in interpreting our results. First, by design this small study focused on residents with a prior rehabilitation admission, who likely have more functional impairment (and greater risk for further functional decline) than the ALF population as a whole. Second, we did not perform polysomnography, so we do not have information on sleep architecture or primary sleep disorders (e.g., sleep apnea). Finally, the cross-sectional design does not allow us to make causal inferences about the origin of sleep disturbance in ALFs. We believe that both characteristics of ALF residents (e.g., more functional limitations and medical comorbidities) and the ALF environment (e.g., daily schedules) contribute to sleep disturbance in this setting.

Considering the potential impact of sleep on mental and physical well-being in older people in general, and the high risk of functional decline and NH placement among ALF residents in particular, it is important to examine sleep patterns and sleep problems among ALF residents. Larger studies are needed to further characterize sleep patterns, examine the consequences of poor sleep, and identify modifiable factors that contribute to sleep disturbance in the growing population of ALF residents.

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