Brief Report

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

Jennifer L. Martin,1,2 Tarannum Alam,1 Judith O. Harker,1 Karen R. Josephson,1 and Cathy A. Alessi1,2

1VA Greater Los Angeles Healthcare System, Geriatric Research, Education and Clinical Center, California. 2David Geffen School of Medicine, University of California, Los Angeles.

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.
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 collected 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. 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.

### 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.

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

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

### 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.

ACKNOWLEDGMENTS

This work was supported by National Institute on Aging (NIA) grant K23AG028452, the VA Special Fellowship Program in Advanced Geriatrics, VA Health Services Research and Development Service grants IIR01-053-1 and AIA03-047, UCLA Older Americans Independence Center (OAIC) grant 5-P60-AG010415, and by the VA Greater Los Angeles Healthcare System Geriatric Research, Education and Clinical Center. Portions of this article were presented at the 2005 American Geriatrics Society meeting, Orlando, Florida.

CORRESPONDENCE

Address correspondence to Jennifer L. Martin, PhD, VA Sepulveda GRECC (11E), 16111 Plummer Street, North Hills, CA 91343. E-mail: jennifer.martin@va.gov

REFERENCES