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Factors Associated With Daytime Sleep in Nursing Home Residents

Junxin Li, Yu-Ping Chang, and Davina Porock

Abstract

A retrospective, cross-sectional study was conducted to describe the occurrence of daytime sleep (DS) and to examine factors associated with DS in nursing home residents. We used the Minimum Data Set 2.0 records of 300 residents in a nursing home from January 2005 to March 2010. Descriptive statistics, independent *t*-test, chi-square, Pearson correlations, and logistic regression were utilized in analysis. About 71.3% of the residents slept more than 2 hours during the day, and this was significantly associated with residents' comorbidity (t ¼ 2.0, p ¼ .04), cognitive performance (t ¼ 7.3, p ¼ .01), activities of daily living (t ¼ 3.7, p ¼ .01), and social involvement (t ¼ -7.6, p ¼ .01). Cognitive performance and social involvement significantly predicted the occurrence of DS with social involvement being the strongest predictor (odds ratio: .58; 95% confidence interval: [.45, .75]). The findings suggest that interventions to engage nursing home residents in more social activities during the day may be beneficial to minimize their DS, especially for those who have difficulties with engaging socially on their own.

Introduction

Daytime sleep (DS) commonly occurs in residents living in long-term care facilities (Martin, 2010). Approximately 70% of nursing home residents have been shown to experience excessive daytime sleepiness (Martin et al., 2006; Viegas et al., 2006). On average, nursing home residents fell asleep 22 times for a total of 2 hours during the day and did not stay awake continuously for even 1 hour in a 24-hour period (Neikrug & Ancoli-Israel, 2010). Direct care staff in nursing home commonly consider DS or napping as positive for nursing home residents and are not aware of its potentially negative health outcomes (Woods, Kim, & Yefimova, 2013).

Short napping in the early or middle afternoon may be restorative for older people. Studies have shown that napping for less than 30 minutes in the early afternoon (1:00–2:00 p.m.) improved performance and decreased subjective sleepiness and fatigue in older adults (Tamaki, Shirota, Hayashi, & Hori, 2000; Tanaka et al., 2001). However, extended napping during the day (e.g., napping for 30 minutes or longer) results in sleep inertia (Milner & Cote, 2009) and has been shown to have destructive effects on the health of older people (Foley et al., 2007; Gooneratne et al., 2003). DS influences the homeostatic sleep drive and is intercorrelated with sleep interruption at night (Richards, Beck, O'Sullivan, & Shue, 2005; Richards et al., 2011). One study found that napping for an average of 58 minutes between 1:30 and 3:00

p.m. reduced sleep efficiency at night and resulted in an earlier waking time (Monk, Buysse, Carrier, Billy, & Rose, 2001). Furthermore, DS is known to be a serious threat to older adults' health and quality of life (Chaperon, Farr, & LoChiano, 2007). Several studies have found that DS is associated with negative cognitive (Foley et al., 2001) and functional outcomes (Gooneratne et al., 2003; Rao et al., 2005) and increased mortality (Newman et al., 2000; Stone et al., 2006). In addition, extended DS may be a consequence of poor nocturnal sleep, possibly created by other chronic conditions (heart failure, depression, Parkinson's disease, and obstructive sleep apnea, etc.), and/or pre- scription medications (particularly pain medications; Byers, Yaffe, Covinsky, Friedman, & Bruce, 2010; Gooneratne et al., 2003).

Multiple factors may contribute to the disruption of sleep–wake cycles of nursing home residents. Increased age and dementia can objectively weaken the ability to maintain the integrity of the sleep–wake cycle (Bombois, Derambure, Pasquier, & Monaca, 2010; Crowley, 2011). Living in a nursing home setting may further disturb residents' sleep (Lorenz, 2011), for exam- ple, environmental factors (e.g., less exposure to bright light and excessive noise), and nursing home routines, including fewer social activities and extended time in bed (Alessi & Vitiello, 2012). Further identification and better understanding of these factors may be beneficial for the development of effective interventions.

Lack of social involvement characterizes the life of older adults living in nursing home settings (Harper Ice, 2002). Engaging residents in social activities is usually problematic in nursing homes. In an observational study, sleeping was the most common daytime activity of nursing home res- idents being recorded in 36.1% of the observations (Harper Ice, 2002). Other studies have reported that nursing home residents spend about 29% of their day in their rooms (Martin et al., 2006), and 27–40% of their day in bed (Bates-Jensen, Schnelle, Alessi, Al-Samarrai, & Levy-Storms, 2004; Martin et al., 2006). One study showed that residents in nursing homes spent 83% of their day without any social interaction and only about 4% of their day was positively engaged in activities (VanHaitsma, Lawton, Kleban, Klapper, & Corn, 1997). Daytime activity facilitates the circadian sleep rhythm (Martin, 2010), while inactivity results in excessive daytime and nighttime sleep disruption (Harper Ice, 2002; Martin et al., 2006). In addition, inactivity leads to loneliness, depression, social isolation, loss of self-esteem, increased disability, and consequently a low quality of life (Richards et al., 2005). Previous studies have found beneficial effects of social activities on DS in nursing home residents (Richards et al., 2005, 2011). Despite this, an emphasis on social activities that could meaning- fully engage residents has not become a feature of nursing home life. This study aimed to describe the occurrence of DS in nursing home residents and to examine factors associated with residents' DS.

Method

Study Design and Setting

This was a retrospective, cross-sectional study conducted with residents in two units from one nursing home. The study nursing home is a nonprofit 122-bed skilled nursing facility located in

suburban Buffalo. We used resi- dents' Minimum Data Set (MDS) 2.0 records to investigate residents' DS and associated factors.

Data Retrieval

In the study nursing home, residents' MDS data were routinely stored in a software program called "EQUIP". The data for EQUIP are held on a secured server by LeadingAge New York. The research team received an agreement from LeadingAge New York to release the deidentified MDS records of residents living in the two units within the study nursing home dur- ing January 2005 to March 2010. Because only deidentifiable information of residents was available and used, this study determined to be not human subjects research and therefore exempt for review by the Social and Behavioral Sciences Institutional Review Board.

Measures

The MDS is a standardized and comprehensive assessment tool to assess residents health status used in all long-term care facilities in the United States that are certified to participate in Medicare or Medicaid (Chang, Li, & Porock, 2013). It measures residents' functional, medical, cognitive, and psychosocial status (Shin & Scherer, 2009). The MDS has been widely used in out- come and secondary data analysis research due to its wide range of resident information and time efficiency in terms of data collection (Rantz & Connolly, 2004). In general, nursing home facilities regularly perform MDS assessment for residents quarterly, except for the assessments at admission, discharge, a significant change in residents' status, or a significant error in a prior assessment (Centers for Medicare & Medicaid Services, 2003). Demographic information, daytime sleep-related items, the Cognitive Performance Scale (CPS), Activities of Daily Living (ADL) long form scale, Depression Rating Scale, social involvement-related items, and diagnoses found in the MDS were used in this study.

Two MDS items relate to DS: "time awake" in the morning and "time awake" in the afternoon. "Time awake" was defined in MDS as ''resident awake all or most of time (i.e. naps no more than 1 hour per time period).'' DS in this study was defined as napping for more than 1 hour in both morning and afternoon. Therefore, a dichotomous variable "daytime sleep" was generated based on the responses to the 2 MDS items, where 1 represented *daytime sleep* (napping for more than an hour in the morning and more than an hour in the afternoon), and 0 represented *no daytime sleep* (no napping more than 1 hour either in the morning or in the afternoon). In this study, the internal consistency for these 2 items as calculated by the Kuder–Richardson Formula 20 was 0.74.

Residents' cognitive status was measured using the CPS, which classifies all residents into seven cognitive performance levels based on 5 MDS items: comatose, cognitive skills for daily decision making, short-term memory, making oneself understood, and self-performance in eating (Morris et al., 1994). Scores range from 0 to 6. A score of 0–2 represents *being intact to mild impairment,* 3–4 *mild to moderate impairment,* and 5–6 *severe to very severe impairment*. The CPS has been validated against the Mini-Mental Status Examination in a large nursing home population and the Cronbach's a was reported .73 (Gruber-Baldini, Zimmerman, Mortimore, & Magaziner, 2000), in this study the Cronbach's a was .72.

The ADL long form scale was used to measure residents' functional status. It is comprised of 7 MDS items including bed mobility, transfer, locomotion, dressing, eating, toilet use, and personal hygiene. Scores range from 0 to 28 with higher scores indicating greater functional diffi- culty. The MDS-based ADL score has been found to have good interrater reliability ranging from .75 to .94 and demonstrated a good criterion validity ranging from .50 to .98 (range ¼ .50–.98) against other standar- dized instruments (Carpenter, Hastie, Morris, Fries, & Ankri, 2006; Landi et al., 2000; Morris, Fries, & Morris, 1999). Cronbach's a for the ADL score in this study was .88.

The Depression Rating Scale was used to measure depression symptoms. It consists of 7 mood items that capture verbal and nonverbal expressions of distress. Scores range from 0 to 14 with higher scores indicating more emotional distress. It has been validated against the 17-item Hamilton Depression Rating Scale and the 19-item Cornell Scale for Depression in Dementia (Burrows, Morris, Simon, Hirdes, & Phillips, 2000). Cronbach's a for the Depression Rating Scale in this study was .50.

The residents' comorbidity was measured by calculating the total number of medical diagnoses recorded in the MDS. This does not take into consideration the severity of each disease or the resulting burden to the individual.

Six MDS items recording involvement in positive social activities were used to measure the degree of social involvement, including ease in interaction with others, doing planned or structured activities, doing self-initiated activities, establishing goals, pursuing involvement in the life of the facility, and accepting invitations to join in most group activities. Total score ranges from 0 to 6 with higher scores indicating more social involvement. Cronbach's a for this 6 social activity items in this study was .77.

Data Analysis

A total of 320 residents' MDS records were retrieved from LeadingAge New York. The data for residents who had been at the facility for less than 3 months were excluded to allow adequate time for a new resident to adjust to the facility's routine. The first available quarterly MDS records completed after admission were used, providing data from 300 residents. Data analyses were conducted with IBM Statistical Package for the Social Sciences statistics 20.0. Descriptive statistics were used to describe residents' demographic characteristics and DS. An independent *t*-test was conducted to find differences between residents with DS and residents with no DS, as defined in this study. Pearson correlations were used to examine the relationships among the variables. Logistic regression was utilized to examine predictors of residents' DS.

Results

The residents' demographic characteristics, DS, and other variables are presented in Table 1. Residents' mean age was 86.9 (standard deviation [*SD*] + 7.0); 72% were female; 99% were non-Hispanic White; and 1% were Hispanic or Black. Mild or no cognitive impairment was recorded for 26% of residents, 40.7% had mild to moderate, and 33% had moderate to severe. Residents had a mean ADL score of 19.2 of a total possible score of 28 (*SD* + 4.59) and a mean number of 4.4 comorbidities (*SD* + 1.24); the three most common diagnoses in this sample were hypertension, depression, and arthritis (Table 2).

Eighty-five percent (255 of the 300) of the residents spent more than 1- hour asleep during the morning, 72.7% (218 of the 300) spent more than 1-hour asleep in the afternoon, and 71.3% (214 of the 300) of residents experienced DS meeting the established criterion.

The differences in selected variables between residents with and without DS are summarized in Table 3. The comorbidity, CPS, and ADL scores in residents with DS were significantly greater than those without it (t ¼ 2.0, p ¼ .04; t ¼ 7.3, p ¼ .01; and t ¼ 3.7, p ¼ .01, respectively). The findings indicate that, on average, residents with DS had significant higher levels of comorbidity, lower levels of cognitive performance, and lower levels of functional status than residents with no DS. The social involvement of residents with DS was significantly lower than those without it (t ¼ - 7.6, $p < .01$). There were no significant differences in age, gender, or depression scores between residents with and without DS.

Table 1. Demographic and Clinical Characteristics of Residents.

Variables		% (*N*)	*M* + *SD*	Rang
Gender	Female	72 (216)		
	Male	28 (84)		
Race	White	99 (297)		
	Hispanic	.3		
	Black	.7`		
Morning napping		85 (255)		
Afternoon		72.7 (218)		
Daytime sleep		71.3 (214)		
Age			86.9 + 7.02	60–104
Comorbidity			4.41 + 1.24	1–8
CPS	0–2	26.3 (79)		0–6
	3–4	40.7 (122)		
	5–6	33 (99)		
ADL			19.32 + 4.59	3–28
Depression			.26 + .70	0–5
Social involvement			1.52 + 1.45	0–6

Note. *SD* ¼ standard deviation; CPS ¼ Cognitive Performance Scale; ADL ¼ Activities of daily living. *N* ¼ 300.

Table 2. Top 10 Frequent Disease Diagnoses in

Diagnosis	*N* (%)
Hypertension	193 (64.3)
Depression	141 (47)
Arthritis	113 (37.7)
Anemia	109 (36.3)
Dementia other than Alzheimer's disease	96 (32.0)
Hypothyroidism	94 (31.3)
Alzheimer's disease	82 (27.3)
Congestive heart failure	81 (27.0)
Osteoporosis	80 (26.7)
Diabetes mellitus	78 (26.1)

The associations between selected variables are presented in Table 4. Increased social involvement was significantly associated with lower levels of comorbidity (r ¼ -.21; p < .01), higher levels of cognitive performance (r ¼ -.59; p < .01), and higher levels of functional status (r ¼ -.49; p < .01). The lower levels of cognitive performance were significantly correlated with increased age (r ¼ .15; p < .01) and higher levels of comorbidity (r ¼ .15; p < .01). The lower levels of functional status were associated with higher levels of comorbidity (r ¼ .20; p < .01) and lower levels of cognitive performance (r ¼ .42; p < .01).

Table 3. Differences in Selected Variables Between DS and non-DS Residents.

Variables		Non-DS (*n* ¼	DS (*n* ¼	*p*
Age		86.2 + 6.3	87.2 + 7.3	.24
Gender	Male	31	53	.06
	Female	55	161	
Comorbidity		4.1 + 1.3	4.5 + 1.2	.04*
CPS		2.7 + 1.4	4.1 + 1.7	.01*
ADL		17.8 + 4.2	20.0 + 4.2	.01*
Depression		.4 + .7	.4 + .8	.90
Social involvement		2.5 + 1.2	1.2 + .1	.01*

Note. DS ¼ daytime sleep; CPS ¼ Cognitive performance scale; ADL ¼ Activities of daily living. Data on continuous variables are presented as *M* + *SD*; data on categorical variables are presented as number of occurrences.
*$p < .05$. **$p < .01$.

Table 4. Bivariate Correlations Among Predictors.

Variables	1	2	3	4	5	6
1. Comorbidity	1.00					
2. CPS	.15**	1.00				
3. ADL	.20**	.42**	1.00			
4. Depression	.0	−.13	−.07	1.00		
5. Social involvement	−.21**	−.59**	−.49**	.03	1.00	

Note. CPS ¼ Cognitive Performance Scale; ADL ¼ Activities of daily living.
*$p < .05$. **$p < .01$.

CPS score, ADL score, comorbidities, and social involvement were entered as predictors in a logistic regression analysis. Results show that only social involvement (odds ratio [OR] ¼ .58; 95% confidence interval [CI] ¼ [.45, .75]) and CPS (OR ¼ 1.30; 95% CI ¼ [1.06, 1.60]) significantly predicted DS (Table 5). These results indicate that with every unit decrease in social involvement, there is a 72% increased risk of having DS; and with every unit of increase in the cognition performance score, there is a 30% increased risk of DS.

Table 5. Logistic Regression to Predict Daytime Sleep.

	b	*SE*	Wal	OR	95% Confidence	
Constant	.79					
Comorbidity	.09	.1	.5	1.09	.87	1.38
CPS	.26*	.1	6.35	1.30	1.06	1.60
ADL	−.01	.04	.07	.99	.92	1.06
Social involvement		−.55**	.13	17.77	.58[a]	.45 .75

Note. OR ¼ odds ratio; CPS ¼ Cognitive Performance Scale; ADL ¼ Activity of daily living.
[a]In text, this number was inverted to 1.72 for easy interpretation.

Discussion

This study examines the occurrence of DS and associated factors in a nursing home population using MDS comprehensive data. In our sample, 71.3% of residents experienced DS. This result confirms the previously reported high prevalence of DS in residential care settings (Martin et al., 2006). In addition, the occurrence of DS in our sample was much higher than 7–25.2%, which was reported in community-dwelling elders (Foley et al., 2007). It suggests that the high occurrence of DS in nursing

home residents may be attributable to factors associated living in a nursing home environment. Although this study cannot evaluate the exact time and length of residents' DS, the results show that more than two thirds of the residents slept more than 2 hours (more than 1 hour in both morning and afternoon) or about 20% of the daytime.

We found that residents who were more cognitively impaired, had more medical comorbidities, needed more assistance with ADL, and were less involved in social activities were more likely to sleep excessively during the day. However, the logistic regression model indicates that only severity of cognitive function and social involvement were significant predictors of DS; therefore, we suggest that interventions that engage residents in social activities may decrease the occurrence of DS, maintain residents' normative sleep–wake circle, and ultimately improve their quality of life (Richards et al., 2011).

Social involvement was significantly associated with less cognitive impairment, higher level of functional status, and fewer medical comorbidities in this study. These findings indicate that a large proportion of nursing home residents need help engaging in social activities. However, one study reported that most of the activity programs were designed for alert and rela- tively oriented residents (Harper Ice, 2002). Future interventions that aim to improve nursing home residents' social engagement should be geared toward residents who have difficulty engaging in social activities independently, for example, people with cognitive impairment and those who need more assis- tance with ADL.

Although gender was not significantly associated with DS, females were slightly more likely to have DS than males, which was probably due to the higher capacity to perform ADLs in males than in females in the sample. Consistent with findings in other studies conducted in nursing home settings (Ancoli-Israel, Klauber, Jones, & Kripke, 1997; Endeshaw, Ouslander, Schnelle, & Bliwise, 2007), DS was associated with more cognitive impair- ment, lower functional status (ADLs), and increased numbers of medical comorbidities in this study. No significant association between DS and depression was found in this study, although a positive correlation between frequency and duration of daytime napping and depression was found in a study of community-dwelling elders (Paudel et al., 2008).

Given the use of multiple medications for treating chronic conditions in nursing home residents (Field et al., 2001), there is a high likelihood that some of the medications, such as anticholinergics and antidepressants, could negatively impact healthy sleep patterns at nighttime, daytime, or both (Roux & Kryger, 2010). Although 47% of our study sample had a diagnosis of depression, their average depression score measured by Depression Rating Scale was relatively low (.25 ± .69). This may be because the effects of antidepressants on some of the residents' depressive symptoms. However, a large proportion of data on medication use were missing which prevented us from analyzing the effects of medication use on the depression score and how the use of antidepressants may be associated with the occurrence of DS.

This study has several limitations. Although the MDS has established its usefulness in research, there are still possible variations in data collection that may interfere with the validity and reliability of its measures. For exam- ple, the variation in training of MDS data collectors may lead to low inter- rater reliability (Chang et al., 2013). We were unable to determine the quality or quantity of residents' nighttime sleep due to the fact that the two DS- related MDS items only represent the resident's wakefulness in the morning and the afternoon. It is possible that a few residents in no DS group actually slept excessively during the day because we did not have a measure of the resident's exact quantity of DS. Furthermore, we were also not able to determine the inability to stay awake or if residents were intentionally falling asleep. Information regarding nursing home environmental factors that may affect daytime and nighttime sleep, for example, light and noise exposure, was not available in the MDS. Finally, use of the 6 items to measure social involvement cannot be validated due to the retrospective nature of the study and their limited use in other studies.

Despite the limitations mentioned previously, the significance of this study lies in the recognition of a serious health-related problem that often goes under-recognized. Excessive DS is a problem known to diminish residents' quality of life. This study is the first using MDS comprehensive data to evaluate the occurrence of DS and to examine factors associated with DS in a nursing home population. It adds evidence of the usefulness of the MDS's comprehensive data in sleep research in nursing home populations.

Conclusion

In summary, our findings indicate that DS is common in nursing home residents. It is positively associated with nursing home residents' cognitive performance, functional status, and comorbidity, and negatively associated with their social involvement. Cognitive performance and social involvement were significant predictors of the occurrence of DS. In addition, residents with multiple comorbidity and impaired cognitive and functional status had lower levels of social involvement, which most likely contributes to their excessive sleepiness. The findings suggest that interventions aimed to engage residents in social activities that are specifically designed for residents with impaired cognitive and physical status may help to minimize DS in nursing home residents, maintain their normative sleep–wake circle, and ultimately improve their quality of life.

Declaration of Conflicting Interests

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