The Effects of Staffing on In-Bed Times of Nursing Home Residents

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OBJECTIVES: To examine the effect of staffing level on time observed in bed during the daytime in nursing home (NH) residents.

DESIGN: Descriptive, cross-sectional study.

SETTING: Thirty-four southern California NHs.

PARTICIPANTS: A total of 882 NH residents: 837 had hourly observation data, 777 had mealtime observations, 837 completed interviews, and 817 completed a physical performance test.

MEASUREMENTS: Cross-sectional data collected from participants at each NH site included direct observations (hourly and mealtime), resident interviews, medical record review, and physical performance tests.

RESULTS: In multivariate analyses, staffing level remained the strongest predictor of time observed in bed after controlling for resident functional measures (odds ratio = 4.89; $P = .042$). Residents observed in bed during the daytime in more than 50% of hourly observations were observed also to experience increased daytime sleeping ($P < .001$) and less social engagement ($P = .026$) and consumed less food and fluids during mealtimes than those observed in bed in less than 50% of observations, after adjusting for resident function ($P < .001$).

CONCLUSION: In this sample of NHs, resident functional measures and NH staffing level predicted observed time in bed according to hourly observations, with staffing level the most powerful predictor. Neither of these predictors justifies the excessive in-bed times observed in this study. Staff care practices relevant to encouraging residents to be out of bed and resident preferences for being in bed should be examined and improved. Practice recommendations regarding in-bed time should be considered, and further research should seek to inform the development of such recommendations. **J Am Geriatr Soc 52:931–938, 2004.**

Key words: bedfast; quality of care; nursing home residents in-bed time

Several recent reports suggest that nursing home (NH) residents spend excessive time in bed;[1–4] spending excessive time in bed has been associated with detrimental outcomes, including pressure ulcer development, pneumonia, undernutrition, urinary incontinence, infections, and mortality,[4–12] but little information exists about what factors may affect how much time a resident spends in bed or whether spending large amounts of time in bed affects other care processes in NHs. Furthermore, there is no specific regulatory advice or practice guideline recommendations given to NHs about this issue.

The Minimum Data Set (MDS) assessment includes an item for "bedfast," which is defined as an individual who spends 22 of 24 hours in bed or a reclining chair.[13] This definition does not include factors that clinically justify bedfast, and a higher prevalence rate on this measure is widely interpreted as indicating a potential quality problem for a NH. NH staff underestimate the proportion of residents who meet the MDS bedfast criteria,[2] and even NH residents who do not meet the criteria for being defined as bedfast spend excessive time in bed, ranging from 15 to 18 hours a day, according to direct observations.[1,2]

There is an excellent chance that inadequate staffing contributes to this problem because evidence exists that staffing is insufficient to provide good care in a majority of the nation's NHs.[14–16] The results of a study completed for the Centers for Medicare and Medicaid Services (CMS) using computerized staffing simulations suggested that

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failure to get NH residents out of bed early in the morning adversely affected all other care processes because care such as feeding assistance, toileting, or exercise could not be delivered efficiently if the resident was left in bed.[14]

In fact, substandard staffing like spending excessive time in bed has been implicated in multiple bad outcomes, including pressure ulcer development, undernutrition, hospitalization, and mortality.[17–23] A previous study reported that residents in NHs with average total licensed and nonlicensed staffing levels of 4.8 hours per resident day (hprd) according to state-reported data (high-staffed homes) spent significantly less time in bed than residents in NHs with lower staffing levels.[2] One recent study for the CMS, which reported that 4.1 mean total direct care hprd was the minimum staffing level associated with a lower probability of poor resident outcomes such as weight loss and pressure ulcers, supports this finding.[17] An expert panel recommended even higher minimum staffing levels: total nonlicensed and licensed staffing of 4.55 hprd.[22]

The purpose of this study was to describe the effects of two different NH staffing levels, one that meets or exceeds and the other that is below reported staffing recommendations, on the amount of time residents were observed in bed during the day. The hypothesis was that a higher proportion of residents residing in lower-staffed NHs would be observed in bed more frequently because fewer staff would be available to assist residents out of bed. Implications of excessive time in bed, in terms of selected quality-of-life measures (e.g., social engagement, daytime sleeping, and food/fluid intake), were also evaluated. Based on other studies, the hypothesis was that residents who were observed in bed for excessive amounts of time would receive less social engagement, consume less food and fluids, and exhibit more daytime sleeping than residents observed in bed for less time,[9,14]

METHODS

Subjects and Setting

A list of 222 California NHs that were eligible for participation in a larger study to evaluate NH quality of care provided the sampling frame for this study. NHs were contacted until the number of NHs providing consent reached the predetermined sample size and were within the cost constraints of the larger study. Personal contact was established with 88 NHs; 54 declined, and 34 agreed to participate. Only Medicare-covered (i.e., short stay) residents were excluded from participating sites. All 2,651 residents occupying long-stay beds in the 34 participating NHs were approached for consent 2 weeks before data collection at that site; 973 (37%) residents or their designated representative provided written informed consent, of which 882 completed the study. Ninety-one consented residents did not complete the study because of death, transfer, or hospitalization after consent and before data collection occurred or withdrawal of consent before data collection. Complete hourly observation data were obtained for 813 participants, mealtime observations were completed for 777 participants, interview data were obtained for 837 participants, and 817 completed one physical performance test. Reasons for missing data included refusal, being out of the facility, and inability to find a participant in the facility during the observation period. The University of California at Los Angeles office for the protection of research subjects reviewed and approved the study.

To address generalizability issues, efforts were made to determine whether differences existed between the nine high-staffed and 45 lower-staffed homes that declined participation in this project and the six high-staffed and 28 lower-staffed homes that participated. Homes that declined participation and homes that participated were compared on MDS-derived measures of prevalence of weight loss, physical restraint use, and residents' need for assistance with transfer, eating, and toileting characteristics, all of which are available from a new public reporting system in California (www.calnhs.org). In addition, data were available describing homes' profit status, total nursing staff hours, nursing staff turnover, total federal deficiencies cited for 2001–02, and expenditures for direct resident care per resident day.

As part of the larger study, all participating NHs were divided into two groups based on staffing levels according to California cost reports for 2000 and direct interviews with nursing staff during on-site visits. Staffing was defined as the number of licensed and nonlicensed nursing staff hours (contract and regular, full time and part time) divided by the total resident days for the year. Group 1 homes (28 NHs, 746 participants) reported mean total licensed and nonlicensed nurse staffing hprd $\pm$ standard deviation of 3.1 ± 0.3 and mean nurse aide hprd for 2000 and total staffing below 3.4 hprd on consecutive yearly cost reports (e.g., below the 90th percentile of all NHs in the state) of 2.1 ± 0.2. Aides in these homes reported an average resident workload of 10 residents on the 7 a.m. to 3 p.m. and 3 p.m. to 11 p.m. shifts. Group 2 homes (6 NHs, 136 participants) reported mean total licensed and nonlicensed nurse staffing of 4.8 ± 1.1 hprd and nurse aide hprd for the year 2000 of 3.4 ± -0.7; total staffing was above 3.7 hprd on both yearly reports (e.g., upper decile of all NHs in the state). Aides reported an average workload in these homes of 7.6 residents on the 7 a.m. to 3 p.m. and 3 p.m. to 11 p.m. shifts. There was a significant difference between the two groups on total staffing and nurses' aide staffing levels reported for 2000 ($t = 7.29$, $t = 8.53$, both $P < .001$, respectively). The 90th percentile was chosen as the cutpoint based on the larger study, which demonstrated significant differences in care processes between NHs in the upper decile of staffing and those NHs below the 90th percentile according to state-reported data, the CMS staffing simulation study, and the expert panel recommendations for minimum staffing levels.[2,14,22]

This was a descriptive cross-sectional study of long-stay residents living in the participating homes at the time of data collection. Resident descriptive characteristics recorded included age, length of stay, ethnicity, sex, payor status, cognitive status, and functional measures. Cognitive status was measured using the MDS recall score, which has been shown to be an excellent predictor of those residents capable of accurately describing their received care and comparable to the MDS Cognitive Performance Scale, which includes the MDS recall score in addition to other MDS derived cognitive measures, and the Mini-Mental State Examination.[24–27]

Functional measures were chosen for two reasons: they are widely used as acuity measures and for risk adjustment, and residents requiring NH staff assistance to perform activities of daily living might be observed to be in bed more frequently than residents who were independent in activities of daily living because of the increased time and staff effort required to get more physically dependent residents out of bed. Functional measures derived from the most-recent MDS assessment data in the medical record included transfer, bed mobility, and feeding assistance level; presence of fecal or urinary incontinence and pressure ulcers (PUs); and initiation of the PU resident assessment protocol (RAP). The PU RAP is initiated when any one of seven conditions is checked on the MDS assessment (limited bed mobility, bedfast all or most of the time, bowel incontinence, peripheral vascular disease, current PU, history of resolved PU in the last 90 days, or trunk restraint used daily).[13] Independent evaluations of function were also conducted using physical performance tests (described below).

Measures

Research staff collected all data during 2001 and the first 6 months of 2002 over 3 consecutive days from 7 a.m. to 7 p.m. as described below.

Direct Observations: Engagement, Location, Sleep/Wake Status, Percentage of Food Consumed

Research staff observed participants for 1 minute each hour from 7:00 a.m. to 7:00 p.m. on one day to monitor their location (in or out of bed), sleep or awake status, and engagement with others based on methodology used extensively in prior research.[1,28] Each participant was observed an average of 11.0 ± 0.7 times. Percentage of observations in bed was determined by assuming that the location of the resident remained the same for each one-hour period. For example, if a resident was observed in bed at 9:00 a.m. and 10:00 a.m. and out of bed at 11:00 a.m. it was assumed they were in bed for a total of 2 hours (e.g., from 9:00 a.m. to 11:00 a.m.) and out of bed for 1 hour (e.g., 11:00 a.m. to noon).

Each participant's level of social engagement was assessed to determine whether residents who spend a lot of time in bed receive less interaction and therefore were at risk for social isolation.[29,30] Engagement was determined during the hourly observations and included any verbal interaction with NH staff or other persons, presence in any group activity, or presence of NH staff providing feeding assistance with associated interaction. Participants were also scored as awake or asleep during these observations, with sleep defined as eyes remaining closed, without purposeful movements, and with no response when called by name.[1] Interrater reliability testing (365 observations in 272 residents) yielded kappa agreement statistics of 0.98, 0.90, and 0.84 for location, sleep or wake status, and social engagement, respectively. Repeated observations were conducted on a subsample of 166 participants on a second day to assess the stability of the observation data. First, for the main outcome variable, kappa statistics were calculated for each of the three levels of in-bed observations with 0% to 20%, 21% to 50%, and greater than 50% observations in-bed results of 0.61, 0.34, and 0.63, respectively ($P < .001$). Thus, the extreme groups demonstrated stability, with kappa values greater than 0.60. The middle group's (21–50% observations in bed) kappa was low, so additional stability measures were conducted using each hour of daytime observation as the unit of analysis (e.g., 7:00 a.m., 8:00 a.m., 9:00 a.m., etc., to 7:00 p.m.) over 2 days. The results indicated significant kappa values ranging from 0.58 to 0.81, with the exception of 10 a.m. and 1 p.m. (0.49 and 0.51, respectively). Kappa values were also calculated for sleeping and engagement (kappa = 0.41 and 0.31, respectively, both $P < .001$).

Direct mealtime observations were conducted to determine whether decreased percentage of food and fluid consumed occurred for participants observed in bed more frequently. These observations were conducted based on epidemiological data suggesting an association between bedfast residents and low body mass index and the CMS staffing simulation study showing poor mealtime feeding assistance if residents were left in bed for meals.[9,14] The percentage of food consumed was measured using direct continuous mealtime observations (not time-sampled) by research staff. The protocol has been previously described and involves one staff member observing six to eight people.[31] Interrater reliability (116 meal observations in 116 residents) for percentage of food and fluid consumed was 0.96 ($P < .001$). Observations were repeated on all participants on a second day, and correlation between Day 1 and Day 2 of mean percentage of food/fluid intake was 0.47 ($P < .001$).

Direct Observations: Physical Performance Tests

As independent measures of a resident's physical ability, standardized physical performance tests were used to evaluate participants' ability to stand and bear weight and, for a subsample of participants, their ability to sit up in bed. The reliability and validity of these protocols are reported elsewhere.[28,32,33] Briefly, research staff asked participants to stand or sit up in bed and provided graduated levels of assistance ranging from no assistance (able to sit up or stand up on command) to full physical assistance to perform the action. Kappa agreement statistic for two observers classifying participants as able versus unable was 1.0 (44 observations in 22 residents). The performance tests were stable, with 90% agreement for ability to perform the action with no physical assistance on 2 separate days ($P = .007$).

Participant Interviews: Chronic Pain and Depression

Interview responses were analyzed only for participants with MDS recall scores of 2 or higher (where higher scores indicate higher mental status) based on evidence that residents at this level were able to accurately describe the care they received.[24] A total of 837 participants completed interviews; 553 of these had MDS recall scores of 2 or higher.

To evaluate participants for chronic pain, a brief four-item pain interview (yes/no response format for each question) was completed.[34] The four interview questions elicited information about the frequency and functional effect of pain symptoms (Do you have pain now? Do you have pain every day? Does your pain keep you from sleeping? and Does your pain keep you from participating in activities?). Participant responses were scored as 1 (yes)

or 0 (no), with a possible total score range from 0 to 4. Participants with a total pain score of 3 or higher or a report of daily pain were classified as having chronic pain. This chronic pain classification was determined after review of the questions and decision rule by a geriatric nurse practitioner, geriatrician, and research nurse.[34] A total of 553 participants with MDS recall scores of 2 or higher completed the pain interview. Repeated interviews with 43 participants within 24 hours showed good stability in the classification of a resident's chronic pain status (kappa = 0.65, $P < .01$).

Depression was evaluated using the Geriatric Depression Scale short form (GDS). The 15-item short form of the GDS has a total score range of 0 to 15, in which a score greater than 5 is indicative of probable depression.[35] In the 16 NHs in which depression was evaluated, complete GDS interviews were obtained from 255 participants with MDS recall scores of 2 or higher. Repeated interviews with a subsample of 34 participants within 24 hours showed good stability on the classification of probable depression (i.e., total score > 5) (kappa = 0.68, $P < .01$).

Statistical Analysis

The primary outcome variable for each resident was percentage of hourly observations in bed, which was recoded as a three-group categorical variable for most analyses. Based on the roughly U-shaped distribution of observations in bed and clinical judgment, the three groups included 20% or less observations in bed, 21% to 50% observations in bed, and more than 50% observations in bed. Percentage of observations in bed was determined using time-sampled hourly observation of resident location such that the observed location was assumed to be the same for the entire hour. Persons with more than 50% observations in bed (based on daytime observations) were estimated to be spending a minimum of 6 daytime hours (between 7 a.m. and 7 p.m.) in bed according to observations, whereas those with 0% to 20% observations in bed were estimated to be in bed 0 to 2.5 daytime hours according to observations.

T tests and chi-square (χ^2) tests were used to compare all participants in lower- and high-staffed homes on demographic characteristics and cognitive and functional measures. Next, all independent variables were evaluated as predictors of the major outcome variable and observed time in bed and for significant intercorrelations. The independent variables, which were significant predictors of observed time in bed and not highly intercorrelated, were included in the multinomial logistic regression model with the staffing variable. In the multivariate model, main effects for the independent predictor variables, as well as all two-way interaction effects, were included for analysis using SPSS (SPSS Inc., Chicago, IL).[36] Using the coefficients from the final multivariate equation, the effect of the interaction was calculated. Also, based on the final regression model, the probability of being observed in bed in high- and lower-staffed NHs was calculated.[36]

To test for differences between the groups (i.e., categorical groups of observed time in bed) and care process measures, an analysis of covariance was conducted using Scheffe post hoc analysis for multiple comparisons and adjusting for resident function.

RESULTS

The only difference between participating and nonparticipating lower-staffed homes was on expenditures per resident per day, with higher expenditures per resident per day in the nonparticipating homes ($59 vs $68; $t = 2.115$, $P = .04$). The only difference between participating and nonparticipating high-staffed homes was on for-profit status of the home, with all nonparticipating NHs for profit (33% vs 100%, $\chi^2 = 8.182$, $P = .004$). These results should be cautiously interpreted but in general suggest that the homes participating in this project constitute a relatively typical sample.

Table 1. Descriptive Characteristics of Participants in High-Staffed Homes Compared with Those of Participants in Lower-Staffed Homes

Characteristic	Lower-Staffed Homes* (n = 746 Participants)	High-Staffed Homes† (n = 136 Participants)	*P*-value
Age, mean ± SD	80 ± 13	91 ± 6.04	<.001
Length of residency in months, mean ± SD	23 ± 27	27 ± 24	.201
Female, %	68	89	<.001
Payor source, % medical	69	37	<.001
Caucasian, %	63	97	<.001
MDS recall score < 2, %‡	32	45	.013
MDS transfer level of assistance >1, %§	82	84	.677
Bedfast according to MDS, %	7	3	.135
With pressure ulcer resident assessment protocol initiated, %	81	80	.694
With a pressure ulcer present, %	13	9	.349
Able to stand and bear weight, %	35	48	.011

* Below 90th percentile of licensed and nonlicensed staffing hours per resident day.
† Upper decile.
‡ Minimum Data Set (MDS) recall score, item B3a–d rated from 0 to 4; 0 = no recall, 4 = rated by nursing home staff as able to accurately recall four memory items.
§ MDS transfer score, item GB1A rated from 0 to 4; 0 = independent, 4 = total dependence.
SD = standard deviation.

Table 2. Results of Multinomial Logistic Regression Models for Predicting Percentage of Hourly Observations in Bed

Predictor Measure	Model 1 (n = 746) >50%*	Model 1 (n = 746) 21–50%*	Model 2 (n = 640) >50%*	Model 2 (n = 640) 21–50%*	Model 3 (n = 640) >50%*	Model 3 (n = 640) 21–50%*
	Odds Ratio (95% Confidence Interval) *P*-value[†]					
Lower-staffed home[‡]	5.94 (3.19–11.04) <.001	1.24 (0.78–1.96) .350			1.63 (0.43–6.2) .472	0.70 (0.26–2.01) .53
MDS PU RAP initiated			3.24 (2.08–5.04) <.001	1.71 (1.11–2.64) .015	0.75 (0.18–3.2) .698	0.96 (0.33–2.68) .92
Interaction between lower-staffed home and MDS PU RAP initiated					4.86 (1.1–22.4) .042	2.01 (0.62–6.22) .25

* Percentage of hourly daytime (7:00 a.m. to 7:00 p.m.) observations in bed.
[†] Comparison with referent group (in-bed <20% of observations).
[‡] State reported staffing level below 90th percentile for all homes in the state.
MDS = Minimum Data Set assessment; PU RAP = pressure ulcer Resident Assessment Protocol.

Participants were typical of NH residents, 71% were female and 67% Caucasian, with a mean age of 81.0 ± 12.4. Cognitive impairment was common, with a mean MDS assessment recall score of 2.3 ± 1.6, and participants were physically dependent, with a mean MDS transfer score of 2.6 ± 1.2. Table 1 presents sample descriptive characteristics for participants in the two staffing level groups of NHs. Participants in the high-staffing group were more likely to be female, Caucasian, older, and more cognitively impaired and less likely to have Medicaid as a payment source. There were no significant differences between groups on resident functional measures based on the MDS assessment (e.g., transfer level of assistance, presence of PUs, bedfast, PU RAP initiated). A higher proportion of participants in the high-staffed homes were able to stand and bear weight according to independent physical performance tests than participants in the lower-staffed homes. A subsample of participants in both groups was evaluated for independent bed mobility; there was no difference between the high- and lower-staffed homes in the proportion of participants able to independently sit up and turn in bed (40% vs 26%, respectively, $\chi^2 = 1.337$, $P = .242$). A significant difference was identified in the proportion of observations the participants in lower-staffed homes were observed in bed during the day (43%) versus participants in the high-staffed homes (26%; $t = 5.6$, $P < .001$). Thus, participants in lower-staffed homes were observed in bed an estimated average of 5 hours (0.43×12) a day (e.g., 7 a.m. to 7 p.m.) versus an estimated average 3 daytime hours (0.26×12) for participants in the high-staffed homes.

Initial analyses to evaluate the relationship between the independent variables and observed time in bed showed that, when the observed in-bed groups were not adjusted for staffing level, all independent variables except probable depression (odds ratio (OR) = 1.86, 95% confidence interval (CI) = 1.08–3.17, $P = .024$) were significantly predictive of more than 50% observations in bed (all $P < .001$ except chronic pain, OR = 1.53, 95% CI = 1.09–2.14, $P = .014$). However, many independent predictor variables were intercorrelated. The variable MDS PU RAP initiated was highly correlated with MDS transfer level of assistance, MDS bed mobility, ability to sit up in bed, and ability to stand and bear weight ($r = 0.60$, 0.46, 0.30, and 0.42, all $P < .001$, respectively) but not chronic pain or probable depression. Chronic pain was correlated with probable depression ($r = 0.16$, $P = .007$). MDS PU RAP initiated was chosen for subsequent analyses based on its strong intercorrelations with all functional measures. The MDS PU RAP is a composite of functional measures (MDS transfer and bed mobility assessments) and other clinical conditions (e.g., fecal and urinary incontinence). Because chronic pain was correlated with probable depression and was the stronger of the two variables as a predictor of observed time in bed, it also was used for subsequent analyses. Thus, remaining multivariate analyses included MDS PU RAP, chronic pain, and staffing level.

Multivariate Analyses

After evaluation of MDS PU RAP initiated and chronic pain as main effects and in combination with NH staffing level in multivariate models, only the model with MDS PU RAP

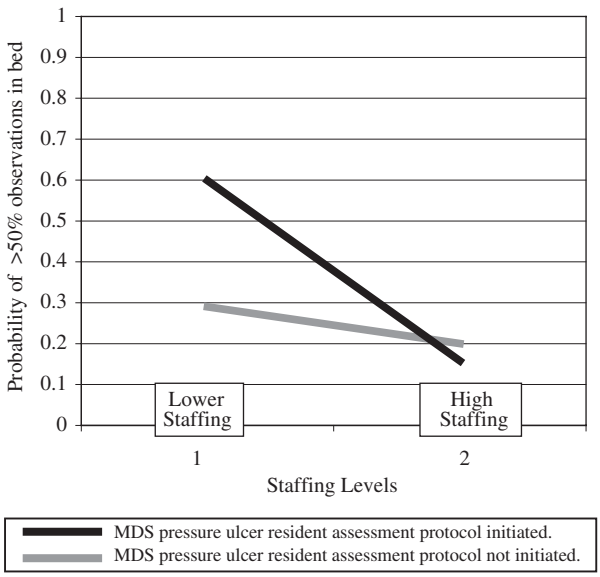

Figure 1. Probability of being observed in bed by staffing and Minimum Data Set (MDS) Pressure Ulcer Resident Assessment Protocol (PU RAP) initiated. The odds ratios have been converted and are presented as probabilities of more than 50% of observations in bed. Participants in high-staffed homes who had (probability = 0.16) and did not have the MDS PU RAP initiated (probability = 0.20) were more likely than any participant (with or without the MDS PU RAP initiated) in lower-staffed homes to be observed out of bed. In lower-staffed homes, participants who had the MDS PU RAP initiated had a much higher probability of more than 50% of observations in bed (probability = 0.60) than those who did not have the MDS PU RAP initiated (probability = 0.29).

initiated was significant. Table 2 presents the multinomial logistic regression models for staffing alone, MDS PU RAP initiated alone, and staffing and MDS PU RAP initiated interaction. The model testing main and interaction effects of lower staffing level plus MDS PU RAP initiated demonstrated that the interaction was significant (OR = 4.87, 95% CI = 1.10–22.40, $P = .042$). The effect of the interaction between staffing level and MDS PU RAP initiated was calculated as the log odds of more than 50% observations in bed for participants residing in lower-staffed homes and those residing in high-staffed homes while controlling for resident physical function using MDS PU RAP initiated. In participants who did not have the MDS PU RAP initiated, participants in NHs with lower staffing levels had 4.9 times the risk of more than 50% observations in bed than participants who did not have the MDS PU RAP initiated in NHs with high staffing levels. Furthermore, in participants who only did have the MDS PU RAP initiated, participants in NHs with lower staffing levels had 6.5 times the risk of more than 50% observations in bed than participants who did have the MDS PU RAP initiated in NHs with high staffing levels.

Figure 1 illustrates the dependency between the MDS PU RAP initiated and NH staffing level on the probability of more than 50% observations in bed. Participants in the lower-staffed homes and who had the MDS PU RAP initiated had a much higher probability of more than 50% observations in bed than those who did not have the MDS PU RAP initiated in the lower-staffed homes and any participant in the high-staffed homes.

Differences Between Observations in Bed and Care Processes

The results of comparing care processes across the three categorical ratings of observations in bed controlling for function are shown in Table 3. Participants with more than 50% observations in bed consumed less food and fluids, experienced less social engagement, and were observed asleep more often than participants who had 21% to 50% and 20% or fewer observations in bed during the daytime.

Differences also existed between participants who had 21% to 50% observations in bed and those with 20% or fewer observations in bed. Participants who had 21% to 50% observations in bed were also observed sleeping more often during the daytime and experienced less social engagement than participants who had 20% or fewer observations in bed during the daytime.

DISCUSSION

MDS PU RAP initiated as a measure reflecting increased frailty and physical dependence of residents was a predictor

Table 3. Differences in Care Processes by In-Bed Observation Group

Care Process or Resident Condition (Sample Size with Available Data)	Group 1 >50%*	Group 2 21–50%*	Group 3 0–20%*	Comparison Groups†
	Mean ± Standard Deviation			
Mean percentage of food and fluid intake (n = 777)	59 ± 21.90	67 ± 22.40	65 ± 20.60	1 vs 2; .001 1 vs 3; .007 2 vs 3; 1.00
Percentage of observations sleeping during daytime (n = 813)	30 ± 23.47	23 ± 20.46	10 ± 14.58	1 vs 2; <.001 1 vs 3; <.001 2 vs 3; <.001
Percentage of observations engaged during daytime (n = 806)	24 ± 25.20	28 ± 25.55	39 ± 27.67	1 vs 2; .095 1 vs 3; <.001 2 vs 3; <.001

* Daytime in-bed time based on research staff hourly observations for one day, 7 a.m. to 7 p.m.
† *P*-values based on analysis of variance with Scheffe post hoc analysis for multiple comparisons and adjusted for resident physical function using Minimum Data Set pressure ulcer Resident Assessment Protocol.

of percentage of observations in bed. Yet arguing that resident functional limitations present a justification for long in-bed times is controversial, because there are no guidelines specifying medical or physical conditions that justify leaving a resident in bed for most of the day. Furthermore, a case could be made that more than 50% observations in bed is contraindicated for physically dependent residents because they may have greater potential for rapid functional decline. The fact that residents with similar physical impairments were observed out of bed more frequently in high-staffed homes suggests in-bed times can be improved.

The strongest predictor of observations in bed was NH staffing, with residents residing in lower-staffed homes being nearly six times more likely to have more than 50% observations in bed than residents residing in high-staffed homes. That staffing remained a predictor of observations in bed even when resident functional level was controlled in multivariate analyses emphasizes the importance of staffing and confirms the results of a recent study completed for CMS.[14] The lower social engagement and food and fluid intake and higher daytime sleep observed in those participants who had more than 50% of observations in bed supports the hypothesis that in-bed time may be related to other detrimental care patterns.[14]

The findings should be interpreted in light of the limitations of this study, including a relatively small regional sample, data that were collected over a limited time at each site, the cross-sectional nature of the study, and lack of data on resident preference for time in bed and medical acuity. Of most concern is the lack of resident preference data on amount of time preferred to be in bed. It is possible that the differences between the two groups of NHs are related to individualizing care according to resident preference. There is some evidence that NH residents are unhappy with existing care practices related to getting in and out of bed, and if they were assured of help getting back in bed when so requested, they would choose to spend more time out of bed in the afternoon.[1,37] However, even existing evidence does not examine resident preferences for total amount of time spent in bed. The lack of data on medical acuity level for participants is also problematic because it is not possible to determine whether in-bed observations are reflective of acute illness indicating medical instability or poor care practices.

Despite the limitations, these data clearly raise questions about the quality of care related to the amount of time NH residents are observed in bed and provides justification for future examination of factors related to NH residents spending excessive time in bed. Research targeted specifically to evaluating the time residents spend in bed and factors related to time spent in bed is needed to inform development of explicit practice guidelines and policy recommendations relevant to the amount of time that residents should spend in bed. Decisions about the amount of time residents spend in bed must take into account medical conditions and resident preferences. Thus, these decisions are complex, and in the absence of guidelines, they require considerable judgment on the part of the provider. For example, it might not be appropriate to allow depressed residents to spend most of the day in bed even if this is their preference. The balance between resident autonomy and provider beneficence becomes difficult in the frail, depressed NH resident, and this decision is even more challenging when a resident prefers to spend most of the day in bed and there is no evidence of depression. Thus, further research to inform the development of such guidelines is critical to providing a framework for making difficult and complex decisions about who should stay in bed. Improvements in getting residents out of bed as a precursor for multiple other basic care practices should be pursued. Adequate staffing and policy or care guidelines to assist providers in making difficult decisions related to how long residents spend in bed and consideration of resident preferences are needed to improve the quality of care related to in-bed time of NH residents.

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