Quality Care Indicators and Staffing Levels in a Nursing Facility Subacute Unit

Andrew D. Weinberg, MD, FACP, CMD, A. Jefferson Lesesne, MD, Chesley L. Richards, MD, MPH, and Jean K. Pals, RN,C, BSN

Objective: To determine whether admissions to a subacute unit in a university-affiliated nursing facility received equivalent care on weekdays as opposed to on weekends with regard to certified nursing assistant (CNA) and licensed nurse staffing levels.

Design/Setting: A 6-month prospective analytical study conducted from January to July 2000. All subacute unit residents admitted to this unit were monitored for the presence of specific outcome measures that were correlated to CNA and licensed nurse staffing levels during the day shift. The setting was a 14-bed subacute unit within a 150-bed skilled nursing facility in Atlanta, GA.

Primary Outcome Measures: The quality care indicators used were measured by objective data obtained prospectively from the chart and medication administration record. The parameters monitored included medication errors, falls, presence of required daily nursing note and documentation of meals eaten. Each resident served as his or her own control for analyses conducted between Tuesdays and Thursdays (weekdays) as opposed to Saturdays and Sundays (weekends). Median staffing ratios compared the number of CNAs and licensed nurses on duty between weekdays with the number who were on duty on weekends during each resident’s stay.

Results: From January until July 2000, a total of 31 residents (25 women, 6 men) were admitted to the subacute unit. Among these residents, the total of weekday and weekend 24-hour reviews was equal to 1,044 resident care days during this 6-month study. The age range of these residents was 65 to 104 years, with a mean age of 82.0 years. Median nurse staffing levels were lower on weekend than on weekday day shifts (3 vs. 4; \( P < 0.001 \)). Median CNA staffing levels were also lower on weekend than on weekday day shifts (4 vs. 5; \( P < 0.001 \)). A total of 12 (39%) of 31 of residents were missing a total of 22 of 1,044 total required notes. This was 2 (0.3%) of 522 for weekdays as compared with 20 (3.8%) of 522 for weekends (\( P < 0.001 \)). With regard to documentation of food intake, data were omitted for 199 of 1,884 meals on weekdays as compared with 343 (18.2%) of 1,884 meals on weekends (\( P < 0.001 \)). The rate for falls was 1 (0.19%) of 522 on weekdays as compared with 4 (0.77%) of 522 on weekends (\( P < 0.05 \)). There was no significant difference in medication errors detected.

Conclusions: There was a significant decrease in staffing levels for both nurses and CNAs during the day shift on weekends. Increased omission of required daily nursing notes, of meal documentation and increased falls appears to be associated with lower levels of weekend staffing. There were no significant differences in medication errors during this study. Whether the lapses in documentation actually resulted in a lower level of delivered care cannot be determined at this time. (J Am Med Dir Assoc 2002; 3: 1–4)

Keywords: Quality care indicators; subacute nursing home care; staffing levels; documentation
for the purpose of maximizing a resident's rehabilitative recovery and promoting independence before their return to a lower level of care setting or to a custodial long-term care facility.

What constitutes "quality of care" in subacute care is difficult to define. Quality is multidimensional and has both subjective and objective criteria for many of the typical indicators currently used in its measurement. In addition, the definition may vary dramatically, depending on who is asked to define these parameters—the resident, a family member, facility staff or a facility administrator. Resident and family satisfaction levels can potentially be used as subjective quality indicators, however. There also may be geographical variations in staffing patterns that affect the quality of care.2

Higher staffing levels in nursing facilities and hospitals have been found to be associated with higher quality of care.3-5 Fottler et al.6 found nursing staff hours per resident to be a possible indicator of quality, and Spector and 'Takada'7 found that low staffing levels in Rhode Island nursing facilities were associated with decreased clinical improvement among residents. Studies have consistently demonstrated the positive relationship between higher nursing staffing levels, including registered nurses (RNs) and licensed practical nurses (LPNs), and the outcomes of nursing home care.8-10 The presence of RN staff is especially correlated with better nursing home outcomes.8,10

Munroe11 found a positive relationship between the number of deficiencies recorded in a survey and higher ratios of RN and LPN hours per resident day and concluded that higher nursing ratios may be more important than total nursing hours. Beyond the one RN and one LPN requirement, there are currently no federal guidelines on minimum staffing.12 Studies have also found that nursing assistants cut corners to handle large workloads and do not have adequate time to provide high-quality, individualized care.13,14

In 1986, the Institute of Medicine15 stated that higher staffing levels were needed in nursing facilities because of the association of poor quality of care with lower staffing levels in some facilities. Frequent rotation of staff and unfamiliarity with frail, unstable residents also can be an impediment to the provision of high-quality care 24 hours per day, 7 days per week. Having adequate staff to appropriately admit and evaluate new residents while caring for those already in the unit also can be a challenge.

This study was designed to test the usefulness of several quality indicators and to assess their correlation to staffing levels on weekends as compared with weekdays. These indicators were selected so that they could be monitored objectively by performing a prospective review of medical records. The overall aim of this study was to evaluate the impact of potentially varied staffing levels on weekends and on weekdays against several objective quality indicators.

METHODS

For our quality indicator screens, we used objective measures that could be obtained by direct review of the facility, which is affiliated with an academic institution. The attending physicians are full-time academic faculty, and this sub-acute unit also has the services of a physician assistant covering the 14 Medicare-certified beds. All patients admitted to the unit were hospitalized for a minimum of 3 days before their admission to subacute care, allowing them to be eligible for Medicare Part A coverage.

The primary independent variables in this study were staffing levels of certified nursing assistants (CNAs), LPNs, and RNs during the day shift on weekdays (Tuesdays and Thursdays) as compared with the subsequent weekends (Saturdays and Sundays) during the 6-month study. An equal total number of weekdays and weekends were examined. The primary process outcomes reviewed included medication errors, falls with and without injury, presence of required daily nursing notes, and documentation of food intake at meals. Daily documentation of food intake and a nursing note are required under federal regulations for each resident in any Medicare subacute unit. It must be stressed that we did not assess the quality of the nursing note itself; we assessed only whether it was present in the chart. A brief, very poorly written note was counted as acceptable for the purposes of this study, even though a state inspector might have questioned the quality of such an entry.

Eligibility criteria included all admitted patients who spent at least 1 week in the subacute unit between January and July 2000. One of the primary authors (A.D.W. or A.J.L.) obtained information by prospectively reviewing charts and medication administration records at least three times per week. A standard data form was used to collect information, and staffing levels were ascertained by direct observation or by telephone inquiry during the day shift on the reviewed days. This facility typically staffed the subacute unit with full-time LPNs and CNAs every other weekend and on 3 weekdays. LPNs in the subacute unit had received no special training before being assigned to this area of the facility. We did not verify staffing levels at the end of the shift; therefore, we could not ascertain whether any staff were "floated" to other floors. To avoid introducing any bias into the outcomes, the staff were not informed of the results of our data recording. The attending physician of record made rounds at least twice a week.

All data were analyzed using exploratory univariate and stratified analyses of continuous and categorical variables. For continuous variables, medians were calculated and compared using the Kruskal-Wallis test. Categorical variables were compared using the chi-squared test.

RESULTS

A total of 31 residents were admitted to the subacute unit of this skilled nursing facility between January and July 2000. The age range of the residents was 65 to 104 years (mean age, 82.0 yr). Length of stay ranged from 8 to 100 days (mean stay, 59 d), and a total of 1,044 resident-days were reviewed for weekday versus weekend analysis. The vast majority of nurses assigned to this unit were LPNs.

The majority of residents were admitted for rehabilitation after a fracture (15/31, 48%) or after a stroke (9/31, 29%). Regarding mobility, the preponderance of residents were completely dependent (15/31, 48%) or partially dependent (12/
31, 39%) on staff for ambulation. Seven residents (23%) received nutrition through percutaneous gastrostomy tubes, and three residents (10%) died before discharge from subacute care.

A total of 60% of weekends had decreased numbers of LPNs assigned to work in the subacute unit. Overall, the number of LPNs was greater on weekdays than on weekends (median, 4 vs. 3; P < 0.001). A total of 72% of weekends also had decreased numbers of CNAs assigned to the unit. Overall, the number of CNAs was greater on weekdays than on weekends (median, 6 vs. 4; P < 0.001).

With regard to daily documentation of patient condition, 12 (39%) of 31 of residents had missing required daily nursing notes, equal to a total of 22 of a total of 1,044 notes. This was 2 (0.3%) of 522 on weekdays vs. 20 (3.8%) of 522 on weekends (P < 0.001) (Table 1).

Regarding documentation of food intake, staff omitted required data for 199 (10.6%) of 1,884 meals on weekdays and for 343 (18.2%) of 1,884 meals on weekends (P < 0.001) (Table 1). These data exclude a total of seven residents with feeding tubes and one chart with missing data sheets.

There was a total of five falls, one of which occurred on a weekday and four of which occurred on weekends. Only one of the falls on a weekend had an associated injury. The rate for falls was therefore 1 (0.19%) of 522 on weekdays as compared with 4 (0.77%) of 522 on weekends (P < 0.05) (Table 1). Only two omitted medications or medication errors occurred, both on a weekend. No documented significant clinical change resulted from these medication omissions.

**DISCUSSION**

The results of this study reveal that overall staffing levels in this subacute unit were lower on weekends than on weekdays and suggest that this lower level of staffing may have a negative impact on certain health care quality indicators. Inspection deficiencies in nursing facilities have consistently been associated with decreased staffing levels. Furthermore, the U.S. General Accounting Office in 1998 found that poor quality existed in many nursing facilities and reported that one-third of California's nursing facilities had deficiencies that had seriously jeopardized the health and safety of residents during a 2-year period. In addition, an expert panel concluded that the average RN, LPN, and CNA staffing levels in nursing facilities are too low to provide quality care in some facilities.

Although all nursing facilities are required by regulation to furnish sufficient staff to provide all nursing and related services to meet the needs of their residents 24 hours per day in accordance with established resident care plans, most states do not have mandated minimum staffing levels. As such, the number of RNs, LPNs and CNAs present on any given floor remains at the discretion of the nursing administrative staff and is limited by the availability of personnel for any particular shift.

A study of 399 Michigan nursing facilities in 1999 found that, despite federal regulatory changes instituted under the Omnibus Budget Reconciliation Act of 1987, major variations in care patterns for residents existed by both ownership type and geographic region. No conclusions were reached, however, with regard to whether the variations noted in the study actually affected the quality of care delivered to the residents. In nonsubacute settings (standard long-term care units) during the period from 1991 until 1996, the average amount of LPN care per day delivered per resident was 36 minutes, and the average amount of RN care per day delivered per resident was 18 to 24 minutes. The average CNA time documented was 2 hours of care per resident day, even though these individuals were responsible for the grooming, bathing, feeding, dressing, toileting, and most ambulation activities of residents at the nursing facility.

In our study, we looked at both process outcomes (e.g., documentation notes) and resident outcomes (e.g., falls, medication errors). The study examined the potentially highest staffing levels, which typically occur on the day shift. Whether the lower staffing ratios that we found on the majority of weekends was directly related to the findings of omitted nursing notes and increased falls is impossible to determine but is highly suggestive of such a conclusion. The significant increase in the rate of falls during weekends in this unit could be expected if lower CNA staffing were directly related to an increased risk for such falls in this setting. Better staffing can potentially lead to better process outcomes, which can lead to better resident outcomes (i.e., lower rate of falls). The staffing levels themselves, however, did not seem to affect medication errors. Whether other quality of care factors were affected by staffing levels cannot be determined from this study.

Although fewer LPNs and CNAs were on duty on the vast majority of weekends (60 and 72%, respectively, as compared with staffing of the same shifts on weekdays), staffing was not reduced on all weekends. This finding may be attributable to staffing fluctuations due to resignations, scheduling difficulties, illnesses, or vacations. In nursing facilities that staff their units according to a pattern other than the typical every-

**Table 1. Quality Indicators in a 14-Bed Subacute Unit of a Skilled Nursing Facility: January–July 2000**

<table>
<thead>
<tr>
<th>Quality Indicators</th>
<th>Weekdays (WD)</th>
<th>Weekends (WE)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Omitted nursing notes*</td>
<td>2 (0.3%)</td>
<td>20 (3.8%)</td>
<td>P&lt;0.001</td>
</tr>
<tr>
<td>Missing meal documentation†</td>
<td>199 (10.6%)</td>
<td>343 (18.2%)</td>
<td>P&lt;0.001</td>
</tr>
<tr>
<td>Falls*</td>
<td>1 (0.19%)</td>
<td>4 (0.77%)</td>
<td>P&lt;0.05</td>
</tr>
</tbody>
</table>

*WD (n = 522); WE (n = 522)
†WD (n = 1884); WE (n = 1884)
other-weekend-off rotation, LPN and CNA staffing levels may be more stable.

Although we observed a tenfold increase in the number of omitted nursing notes on weekends, the total number of missing entries was only 22 of a minimum 1,044 notes. Also, whether these nursing note omissions resulted in a decrease in clinical care delivered or represented only poor documentation on the part of the nursing staff cannot be determined from this study. The probability of a missing note in the sample is clearly extremely low. However, the omission of any required daily note is considered below standard of care and may subject the facility to loss of Medicare reimbursement for that time period.

The limitations of this study need to be addressed. First, although more than 1,800 resident-days involving all 31 patient admissions to the subacute unit were studied, these numbers are still relatively small. The decision to compare day shift staffing levels on weekdays with the same shift on weekends was arbitrary and represented our attempt to compare equivalent shifts that normally have the greatest number of staff on duty. We also did not track any variations in personnel working in the unit within an 8-hour shift; we recorded only the actual number of staff reporting for work at the beginning of the day shift. These numbers were verified by direct contact with the unit and did not rely on posted schedules, which are subject to constant change and may prove incorrect. Thus, it is difficult to accurately assess the impact of personnel changes within any given shift without having specifically designed the study to track this variable.

With regard to meal documentation, the day shift was responsible for tracking breakfast and lunch intake, and the evening shift reported supper intake. We did not break out the data collection between these two shifts. Because staffing levels in the evenings are scheduled at equivalent levels on both weekdays and weekends, we saw no reason that there might be a difference with regard to evening meal documentation as it related to staffing level.5 Also, we did not specifically evaluate actual food intake on weekdays and weekends; rather, we simply examined the required documentation of such intake. Regarding the number of falls reported, we did not calculate a fall risk index for these residents on the basis of the number of residents with chronic disabilities, as others have done.19 Because each resident was in essence serving as his or her own control, we assumed that disabilities would have a neutral effect on outcomes. Medication errors were not increased in this study and may relate to factors other than staffing levels.

The definition of quality and its assessment is an ongoing concern in the long-term care industry.20 These results, though limited to a single subacute unit, are suggestive of decreased weekend staffing being associated with decreased documentation, as represented by two potential quality indicators. The presence of nursing notes would be considered a process outcome, whereas falls and medication errors would be considered a resident outcome. We recommend that future studies of quality include assessments of the impact of variability in staffing on quality indicators.

Further research could have significant economic impact on proposed legislation mandating minimum nursing staff levels in U.S. nursing facilities, either in support or disputing the concept altogether. The long-term care industry in the United States needs to focus additional research on whether current staffing levels are adequate or detrimental to providing high-quality care to long-term care residents.

REFERENCES