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DATAWATCH

Daily Nursing Home Staffing Levels Highly Variable, Often Below CMS Expectations

Staffing is an important quality measure that is included on the federal Nursing Home Compare website. New payroll-based data reveal large daily staffing fluctuations, low weekend staffing, and daily staffing levels often below the expectations of the Centers for Medicare and Medicaid Services (CMS). These data provide a more accurate and complete staffing picture for CMS and consumers.

Staffing is an important quality measure used to profile nursing homes on the federal Nursing Home Compare website. Since staffing data were first reported on the website in 1998, Nursing Home Compare has relied on facility-reported data that describe staffing during the two weeks before each nursing home's annual recertification survey.[1] Researchers have questioned the completeness and accuracy of these rarely audited facility-reported staffing data.[1–4] In 2016 the Centers for Medicare and Medicaid Services (CMS) introduced the Long-term Care Facility Staffing Payroll-Based Journal (PBJ) system, to which nursing homes are required by Section 6106 of the Affordable Care

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EXHIBIT 1

Percent of nursing homes that met the staffing levels expected by the Centers for Medicare and Medicaid Services (CMS) for all staff categories and total staffing time, by percent of days when expected levels were met, April 2017–March 2018

SOURCE Authors' analysis of data from the Long-term Care Facility Staffing Payroll-Based Journal (PBJ) and Nursing Home Compare. **NOTES** $N = 15,331$. From Nursing Home Compare, we obtained expected staffing levels for each nursing home, which are calculated by CMS after adjusting for the acuity of residents in each facility, based on the Staff Time and Resource Intensity Verification Project Study (see note 7 in text). "RN" includes the categories of registered nurse, RN director of nursing, and RN with administrative duties. "LPN" includes the categories of licensed practical nurse and LPN with administrative duties. "NA" includes the categories of certified nurse aide (CNA), nurse aide in training, and medication aide or technician. For each facility, we used the monthly expected staffing level as a threshold for the entire month. We then compared the reported staffing level on each day to the threshold for that month and calculated what proportion of the time during a year facilities met or exceeded the expected level of staffing.

Act to submit auditable payroll-based staffing and resident census data quarterly.[5] With their detailed daily snapshots, PBJ data permit deeper insights into staffing patterns than was previously possible. Importantly, the data suggest that a large proportion of nursing homes often have daily staffing below CMS's case-mix-adjusted expected staffing levels (exhibit 1).

Reflecting the potential value of the PBJ data, CMS began using them as the source for staffing information in Nursing Home Compare and the Five-Star Quality Rating System in April 2018. In this article we showcase the more granular PBJ staffing data as a new and valuable resource to expand the evidence base on nursing home staffing by analyzing PBJ and facility-reported staffing levels, staffing at the time of the annual inspection relative to the rest of the year, staffing across different days of the week, facility factors associated with low weekend staffing, observed versus expected staffing based on resident acuity, and compliance with federal nurse staffing standards.

EXHIBIT 2

Hours per resident day of direct care staffing across nursing homes, by ownership type, staff category, and data source, April 2017–March 2018

Ownership type (number of facilities) and data source	Mean hours per resident day			
	RN	LPN	NA	Total direct care staff
For profit (8,882)				
CASPER	0.420	0.871	2.315	3.606
PBJ	0.359	0.811	2.161	3.331
Government (856)				
CASPER	0.492	0.844	2.638	3.974
PBJ	0.431	0.789	2.452	3.672
Nonprofit (2,904)				
CASPER	0.557	0.834	2.658	4.050
PBJ	0.502	0.785	2.545	3.832
All (12,642)				
CASPER	0.455	0.861	2.411	3.727
PBJ	0.394	0.804	2.264	3.463

SOURCE Authors' analysis of data from the Long-term Care Facility Staffing Payroll-Based Journal (PBJ), the Certification and Survey Provider Enhanced Reports (CASPER), and Nursing Home Compare. **NOTES** We included the same staffing categories for the PBJ and CASPER data to facilitate direct comparison across the measures. Using payroll data for each facility, we calculated total direct care staffing levels by summing the staffing hours of the categories registered nurse (RN), licensed practical nurse (LPN), and nurse aide (NA). "NA" includes the categories of certified nurse aide (CNA), nurse aide in training, and medication aide or technician. Payroll-reported mean hours per resident day (HPRD) for each facility were calculated by dividing the aggregate reported hours by the aggregate resident census for the study period. Using CASPER data, we calculated total direct care staffing levels by summing contract, part-time, and full-time hours for each staff category. We included facilities whose CASPER survey dates were in the period April 14, 2017–April 1, 2018. The CASPER-reported mean HPRD for each facility was calculated by converting the full-time-equivalent information in CASPER using the following formula: (total direct care staffing level times 70) divided by (number of residents times 14). For a facility that had more than two surveys within the period, the CASPER-reported mean hours per resident day was calculated by this formula: (70 times the aggregate reported hours) divided by (14 times the aggregate number of residents). We included only facilities that had reported hours for the selected period in payroll data and CASPER. The means and standard deviations (reported in appendix exhibit B; see note 8 in text) were weighted by the numbers of residents in facilities. All differences between PBJ data and CASPER or facility-reported data were significant ($p < 0.001$) according to paired two-sample *t*-tests of 95% confidence intervals.

Study Data And Methods

We obtained facility-level data from the Long-term Care Facility Staffing Payroll-Based Journal for the one-year period of April 2017–March 2018. We used data on daily resident census and payroll-based measures of nurse staffing to calculate hours per resident day by staff category. For comparison, we obtained facility-reported staffing and resident census data and annual inspection survey dates from the Certification and Survey Provider Enhanced Reports (CASPER) for calendar years 2017 and 2018. For PBJ and CASPER data, we applied inclusion and exclusion criteria consistent with those used in the CMS Five-Star Quality Rating System.[6]

From Nursing Home Compare, we collected additional facility information, including ownership type, size, overall five-star rating, and expected staffing levels. CMS calculates expected staffing levels for each facility, adjusting for the acuity of residents in the facility and based on the Staff Time and Resource Intensity Verification Study.[7] This information is updated monthly, and we used the information available as of March 2018 to categorize facilities based on their organizational characteristics.

For each analysis, we excluded facilities with missing information and reported the resulting sample size. For additional details on our data and methods, see the online appendix.[8]

Our study was limited in several ways. First, PBJ and CASPER staffing data are measured with potential error. Because CASPER data are facility-reported over a two-week look-back period, they are susceptible to upcoding by facilities and have not been subject to audit. Also, staffing around the time of the annual survey could exceed typical staffing levels if facilities increase staffing during their anticipated survey window.

Second, PBJ collects data only on paid hours. Therefore, it might not accurately reflect salaried staff hours (for example, if salaried staff work more or less than forty hours per week) or distinguish between hours worked and hours paid but not worked (such as sick leave and vacation).[1] Data from the Current Population Survey suggest that people in higher-paid staffing categories in nursing homes are more likely to be salaried; nonetheless, four out of five nursing staff (registered nurses [RNs] and licensed practical nurses [LPNs]) in nursing homes are paid hourly (Kezia Scales and Stephen Campbell, PHI, personal communication based on their unpublished analyses of data from the Current Population Survey, March 13, 2019).

Finally, although we converted the payroll-based and facility-reported staffing measures to comparable units (hours per resident day), each measure collects staffing hours and resident census information through different processes.

Study Results

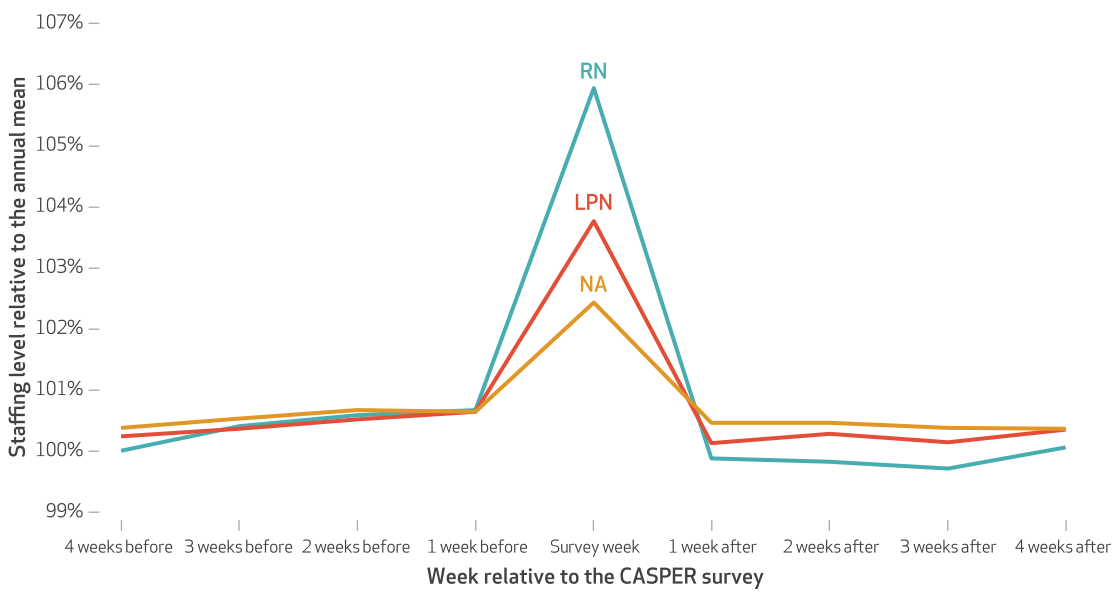
PAYROLL-BASED JOURNAL–REPORTED AND FACILITY-REPORTED STAFFING We compared staffing in the PBJ data with facility-reported staffing (in CASPER) over the same two-week period. On average, the discrepancy between PBJ and CASPER staffing hours per patient day was greatest in for-profit facilities, followed by nonprofit and then government facilities. For each staffing type and across all ownership categories, the mean PBJ-reported hours per resident day were lower than reported in CASPER (exhibit 2). Overall, 70 percent of facilities reported higher total direct staffing time per resident in CASPER than in PBJ data—specifically, 71 percent of for-profit, 69 percent of government-owned, and 66 percent of nonprofit facilities (appendix exhibit A).[8]

STAFFING AROUND THE TIME OF THE INSPECTION SURVEY Using PBJ data, we examined staffing fluctuation around the time of facilities' annual inspection surveys relative to their annual staffing average (exhibit 3). In the weeks before and after the survey week, mean staffing levels were higher than annual staffing levels. Staffing levels increased before the survey week, reached a peak during the survey week, and then dropped following the survey. Trends were consistent across staffing categories (RN, LPN, and nurse aide), but RN staffing had the largest increase around the time of the survey.

STAFFING DIFFERENCES ACROSS DAYS OF THE WEEK Using payroll staffing information, we examined nurse staffing differences across the days of the week. Across staffing categories (RN, LPN, and nurse aide), staffing levels were stable during the weekdays but dropped on Saturdays and Sundays, especially in the case of RN staffing (exhibit 4). On average, RN, LPN, and nurse aide weekend staffing time per resident day was 17 minutes (42 percent), 9 minutes (17 percent), and 12 minutes (9 percent), respectively, less than weekday staffing time (data not shown).

EXHIBIT 3

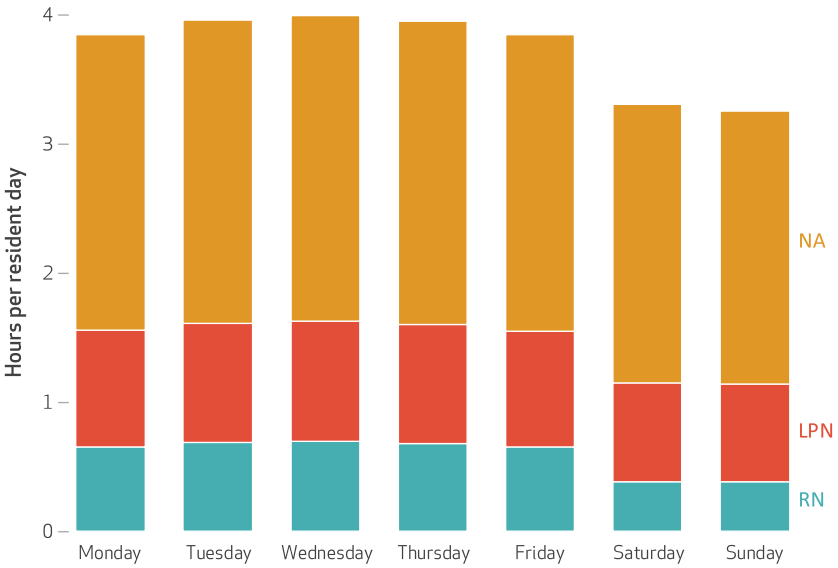
Staffing levels of nursing homes as percent of the annual mean level around the time of the inspection survey, by time and staff category, April 2017–March 2018



SOURCE Authors' analysis of data from the Long-term Care Facility Staffing Payroll-Based Journal (PBJ) and the Certification and Survey Provider Enhanced Reports (CASPER). **NOTES** $N = 9,419$. For each facility, we identified the days within the period starting four weeks before the CASPER survey week and ending four weeks after the survey week. Based on the PBJ, we calculated the mean registered nurse (RN), licensed practical nurse (LPN), and nurse aide (NA) (categories explained in the notes to exhibit 1) staffing hours per resident day of all facilities for each week during the nine-week period. The mean staffing hours per resident day were calculated by dividing the aggregate reported hours of all facilities of all days in a given week by the aggregate resident census of all facilities in all days in that week. Facilities with any missing entry for any day in the nine-week period were excluded from this analysis. We then calculated the relative length of staffing time for each week, compared to the mean staffing time that corresponded to the whole study period.

EXHIBIT 4

Staffing hours per resident day at nursing homes across days of the week, by staff category, April 2017–March 2018



SOURCE Authors' analysis of data from Long-term Care Facility Staffing Payroll-Based Journal (PBJ). **NOTES** $N = 15{,}399$. We calculated the mean hours per resident day of all facilities for each day of the week by dividing the aggregate reported hours for a certain day of the week by the aggregate resident census for that day of the week. "Registered nurse (RN)," "licensed practical nurse (LPN)," and "nurse aide (NA)" are explained in the notes to exhibit 1. We calculated the resident-to-staff ratio for a certain day of the week by dividing 24 hours by the mean hours per resident day for that day of the week.

WEEKEND STAFFING BY FACILITIES WITH DIFFERENT ORGANIZATIONAL CHARACTERISTICS To understand which facilities decreased staffing on weekends, we classified facilities by size, overall five-star rating, ownership type, and proportion of residents on Medicaid, and we compared the weekend and weekday mean staffing levels (exhibit 5). For LPN and nurse aide staffing, the decrease in weekend staffing was similar across the different facility categories of interest. However, the percentage decrease in RN staffing during weekends varied across facilities of different sizes, star ratings, and shares of residents on Medicaid. Larger facilities, on average, had a bigger decrease in staffing time during weekends. Facilities with higher five-star overall ratings had smaller RN decreases during the weekends. And facilities with lower shares of Medicaid residents had smaller decreases, compared to facilities with higher Medicaid shares.

ACTUAL VERSUS EXPECTED STAFFING We compared daily PBJ staffing levels to CMS-calculated expected staffing levels for each month (exhibit 1). During the study year, for total staffing, 54 percent of facilities met the expected level less than 20 percent of the time. For RN staffing, 91 percent of facilities met the expected level less than 60 percent of the time: 28 percent of facilities for LPN staffing and 70 percent of facilities for nurse aide staffing.

FACILITY COMPLIANCE WITH NURSE STAFFING STANDARDS Given the low proportion of facilities that met the expected staffing threshold for RNs, we used the PBJ data to investigate whether facilities had at least one RN on site for at least eight hours a day—a federal requirement that applies to almost all nursing homes nationwide. For RN staffing, 96.05 percent of facilities met the requirement for at least 80 percent of the days during the study year (exhibit 6).

Discussion

Staffing data from the Long-term Care Facility Staffing Payroll-Based Journal offer researchers, policy makers, and advocates an improved tool to use in monitoring nursing home staffing and assessing its potential importance to resident outcomes. For decades, publicly reported nursing home staffing measures have relied on facility-reported information during the narrow window of time around each facility's annual inspection survey. Not only were these older data subject to reporting bias, but they also were rarely audited to ensure accuracy. Although not without limitations (described above), PBJ data offer a much fuller picture of nursing home staffing throughout the year, including on weekends and at times when state surveyors are not on site. Because PBJ data are a newly available resource, their validity is relatively understudied. Nonetheless, our confidence in the data is bolstered by the fact that they are easily auditable and reflect the hours paid (as opposed to reported) by the nursing home. Comparing nursing home staffing levels with PBJ and older CASPER data, we found that the older facility-reported staffing levels were higher than those in the PBJ data, especially among for-profit nursing homes.

In previous studies of nursing home staffing, researchers and policy makers typically focused on average staffing levels, which potentially mask large fluctuations in daily staffing. We found nursing home staffing to be much lower on weekends—particularly RN staffing in facilities that cared for a higher share of Medicaid residents. Adverse events such as falls and medication errors might be more likely to occur during those understaffed days, regardless of whether the facility has high levels of staffing at other times. For this reason, CMS should leverage the daily payroll data to incorporate staffing variation over time, in addition to average staffing levels, in its calculation of star ratings.

Consistent with anecdotal accounts,[9] we found that nursing homes "staff up" in advance of—and during—surveyor visits. CMS could encourage greater randomness in the timing of inspections

EXHIBIT 5

Mean weekend staffing in nursing homes, by staff category and selected organizational characteristics, April 2017–March 2018

Organizational characteristic	No. of facilities	RN		LPN		NA	
		Mean HPRD	Percent of weekday average	Mean HPRD	Percent of weekday average	Mean HPRD	Percent of weekday average
SIZE (MEAN NUMBER OF BEDS)							
Small (52)	5,039	0.504	61	0.711	83	2.255	92
Medium (102)	5,840	0.358	57	0.771	83	2.125	92
Large (174)	4,438	0.360	57	0.771	84	2.086	91
OVERALL RATING (STARS)							
1	1,831	0.258	52	0.776	82	1.907	90
2	2,842	0.328	55	0.78	83	2.043	91
3	2,448	0.348	56	0.768	83	2.065	91
4	3,347	0.403	57	0.761	84	2.184	92
5	4,347	0.496	59	0.734	85	2.295	92
OWNERSHIP TYPE							
For profit	10,732	0.349	56	0.765	83	2.030	91
Government	1,028	0.420	57	0.745	83	2.295	90
Nonprofit	3,557	0.485	58	0.755	86	2.393	92
MEDICAID PERCENTAGE (MEAN)							
Low (30%)	4,411	0.492	58	0.789	84	2.278	92
Middle (64%)	4,530	0.356	55	0.754	83	2.116	92
High (82%)	4,435	0.319	57	0.755	83	2.006	91
Overall	15,399	0.384	57	0.763	83	2.130	91

SOURCE Authors' analysis of data from the Long-term Care Facility Staffing Payroll-Based Journal (PBJ), the Certification and Survey Provider Enhanced Reports (CASPER), and Nursing Home Compare. **NOTES** "Registered nurse (RN)," "licensed practical nurse (LPN)," and "nurse aide (NA)" are explained in the notes to exhibit 1. Staffing is presented in hours per resident day (HPRD). For each staff category, mean weekend staffing was calculated by dividing the aggregate reported weekend hours by the aggregate weekend resident census for that category for the study period. For each category, weekday mean staffing was calculated in the same way. Weekend staffing as a percentage of weekday average is the mean weekend mean staffing divided by the mean weekday staffing. Medicaid percentage is the percentage of residents who were enrolled in Medicaid, based on the CASPER data.

by surveyors to prevent this type of gaming on the part of facilities. CMS could also use PBJ data to monitor whether the staffing in place around the time of the survey is typical for the facility.

One troubling aspect of our findings is that 75 percent of nursing homes were almost never in compliance with what CMS expected their RN staffing level to be, based on residents' acuity. Still, almost all nursing homes met the federal eight-hour RN staffing requirement for the majority of days. These conflicting results suggest that the eight-hour requirement does little to ensure adequate RN staffing levels needed to care for people who live in nursing homes.

Policy makers are already beginning to use PBJ data in their oversight and monitoring of facilities. CMS used PBJ data to lower the quality star ratings at one out of eleven facilities on Nursing Home Compare, because of both low RN staffing and failure to submit data.[10] In November 2018 CMS announced actions that will help state surveyors identify facilities with especially low weekend staffing or no on-site RN during several days in a quarter. States are also now required to conduct at least half of the required off-hour surveys on weekends at these facilities.[11] In the wake of a *New York Times* story that documented discrepancies between payroll and administrative data,[12] Sen. Ron Wyden (D-OR) issued a letter demanding that CMS fully implement the transition to using PBJ data and pursue in-

EXHIBIT 6

Percent of days that registered nurse (RN) staffing in nursing homes met the minimum federal standard in April 2017–March 2018

Percent of days facilities met the standard	Facilities meeting the standards	
	Number	Percent
0–<20%	20	0.13
20–<40%	52	0.34
40–<60%	83	0.54
60–<80%	454	2.95
80–100%	14,790	96.05

SOURCE Authors' analysis of data from the Long-term Care Facility Staffing Payroll-Based Journal (PBJ) and Nursing Home Compare. **NOTES** $N = 15,399$. "RN" includes the categories of RN, RN director of nursing, and RN with administrative duties. The minimum standard is eight RN hours per day.

creased protections for nursing home residents.[13] Similarly, the Office of Inspector General of the Department of Health and Human Services has announced that it will monitor CMS's collection of the payroll data and enforcement of related staffing standards.[14]

Conclusion

Payroll-Based Journal staffing data have the potential to revolutionize efforts to monitor and study the key role of nursing home staffing. By offering a more objective and detailed characterization of nursing home staffing, PBJ data have several important strengths relative to facility-reported administrative data. These features will benefit public reporting, monitoring, and value-based purchasing efforts and, more generally, help advance understanding of how staffing potentially contributes to improved resident outcomes and quality of care. ■

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NOTES

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8 To access the appendix, click on the Details tab of the article online.

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