

Development of Staffing Quality Measures – Phase I Final Report

Executive Summary

Introduction

The Centers for Medicare & Medicaid Services (CMS), the National Quality Forum, and the Institute of Medicine have all called for nursing home staffing measures that are rigorously defined, based on accurate data, and associated with quality of care. Although short-term modifications to the Online Survey Certification and Reporting System (OSCAR) are being implemented to improve the existing nurse staffing data, limitations exist in this system that cannot be overcome even with these interim modifications. OSCAR data lack the necessary information to generate measures other than staffing ratios (e.g., turnover/retention, tenure), that many argue are critical markers for nursing home quality. In addition, OSCAR data are limited to a two-week period, have been found to be inaccurate particularly for the lowest staffed facilities, and discrepancies exist in reporting certain elements. The purpose of this project was to investigate a wider array of staffing measures, and to assess alternative data sources that could be used for reporting staffing measures in the future. Early in the project, the decision was made to collect payroll data from several national corporations so that a large payroll record database could be constructed to test quality measures derived from payroll data. This report presents the methods and results from the initial analysis of staffing measures derived from payroll data, which examined measure properties across all facilities in which data were obtained.

Methods

An initial project task was to specify a set of staffing constructs (or attributes) that were considered to be associated with nursing home quality and meaningful to consumers and nursing home providers. The focus was not on precise definitions, rather identifying the constructs such as staffing ratios, staff turnover, presence of registered nurse (RN) staff, etc. These constructs were identified through a comprehensive literature review that served as the basis for a stakeholder meeting with 42 stakeholders including representatives from national

organizations, nursing home corporations, and individual nursing facilities. Stakeholders addressed the following issues: 1) the aspects of nursing home staffing most important to their constituencies; 2) how improvements could be made to the measures of staffing information currently presented on CMS's Nursing Home Compare; and 3) how staffing measures could be presented to the public. Following the stakeholder meeting, the nine-member technical expert panel (TEP) met and generated a list of constructs for the research team to pursue. In addition, the TEP was instrumental in the decision to pursue payroll data as the preferred data source for development of staffing measures because of its potential to generate the most accurate staffing measures with the lowest possible burden on nursing facilities.

Eight national nursing home corporations agreed to provide payroll data from their systems to support the development of staffing quality measures for this project. As a result, a database was constructed with payroll records from 1,453 facilities representing 48 states. Due to the receipt of annual census data from two corporations, staffing ratio measures could only be computed for 1,028 facilities. In total, over 11.6 million individual payroll records and 172,563 individual personnel records were received. Although data extraction specifications were sent to each corporation, construction of the database was complicated by the fact that no standards currently exist for job title categorization, duration of pay periods, and reporting of daily census data. Nevertheless, even with this lack of standardization, we were able to construct an identical set of measures for all facilities that provided the necessary data for the measures. Because this was the first time payroll data had been collected for computing staffing measures, unanticipated difficulties arose in constructing the database and associated measures. For example, we requested data for calendar year 2003; however, to compute turnover for the entire year of 2003, data from the first quarter of 2004 were necessary to determine if an employee was no longer being paid and thus employed by the facility. Through these analyses, we learned a great deal about payroll data systems and how to structure a data request that would eliminate many of the difficulties we encountered.

We were able to construct a wide array of measures pertaining to staffing ratios, staff mix, full-time employees, RN shift coverage, turnover/retention, and tenure. Many of these measures have never been calculated before or have not been calculated with the level of precision that we were able to obtain because prior studies lacked the raw data from which to construct the

measures. However, other measures of interest to policy makers required data items that simply could not be provided by the corporations. These measures include: direct hands-on nursing care hours distinguished from indirect activities (e.g., documentation, reporting, phone calls, etc.), hours worked by contract agency staff (except for one corporation), staffing ratios by shift or day of week, staffing levels by unit, and frequency of use of overtime for nursing staff. We are therefore unable to report these measures for the facilities in our database. However, we did receive data from one corporation that allowed us to investigate shift-level measures relating to coverage by RNs, though we could not calculate staffing ratios by shift because appropriate census data could not be obtained from that facility. Analysis of the data from the one corporation regarding the use of contract agency nursing staff is beyond the scope of this report.

Results

The analyses presented in this report were aimed at determining if equivalent measures could be computed across payroll systems, testing various measure definitions, and examining distributions of the measures and associations between measures. Highlights of these findings are presented below, organized by the different types of measures that were computed across all facilities.

Staffing ratio measures: The payroll data findings suggest that nurse staffing ratios can be captured most efficiently in three measures including CNA hours per resident day, all licensed nursing hours per resident day, and RN hours per resident day for direct care staff. Based on payroll data, hours per resident day averaged 1.97 for CNAs and 1.10 for licensed nursing staff including all RNs and LPNs in the facility (including management staff). One advantage of payroll data is that we were able to exclude nurse managers, such as directors of nursing (DONs) and assistant directors of nursing (ADONs) from some of the computations in order to calculate RN ratios that included only those RNs involved in resident care. This staffing ratio of 0.29 hours per resident day for RNs involved in resident care is considerably lower than estimates of RN time from other sources (that include DONs and ADONs), and yet is important to examine because these individuals have a different functional role than management staff. A substantial inverse correlation between RN and LPN hours per resident day ($r = -0.45$) suggests that considerable substitution occurs between these two types of licensed staff providing direct

patient care. The finding that higher RN hours per resident day was associated with lower turnover in all types of nursing staff as well as all nursing home employees highlights the importance of RN direct care time. Payroll data provided the first opportunity to examine all nursing home employees, of which approximately two-thirds of the FTEs are nursing staff. Although staffing levels for all employees are highly correlated with nurse staffing levels ($r = 0.86$), the database provides an opportunity to identify and examine facilities that may substitute non-nursing staff time for CNAs.

Measures of percent of full-time employees: Payroll records provided a unique opportunity to examine the proportion of full-time employees relative to the proportion of part-time employees. Using a definition of greater than 35 hours per week, approximately 50% of nursing staff were full-time, and these full-time staff provided about 75% of all nursing hours. These proportions were relatively similar on average for all staff, with the exception of management, which had a higher proportion of full-time employees. An important finding in these analyses was that turnover rates for part-time employees were far greater than turnover rates for full-time employees, twice as high for several categories of staff. These findings suggest that facilities ought to specifically consider the needs of part-time employees when trying to reduce turnover and perhaps consider incentives to encourage staff to commit to full-time employment. Because of the high turnover for part-time staff and the wide distribution in percent of staff that are part-time ranging from approximately a third of staff in the top 10th percentile to three-quarters of staff in the bottom 10th percentile, further investigation of a measure of percent full-time employees seems warranted. Only a database derived from payroll records, however, can be used to uniformly compute such a measure.

RN shift coverage measures: Measures of RN shift coverage were examined for one corporation that provided shift-level data. A unique finding from this analysis was that RN coverage was greater on average than might be expected, with one RN available in three-quarters of daytime hours, two-thirds of evening hours, and almost half of nighttime hours (excluding DONs, ADONs, other nurse managers, and contract staff). However, these measures varied substantially with 10% of facilities having RN coverage less than 25% of evening hours and less than 10% of nighttime hours, whereas 10% of facilities had RN coverage about 90% of the time. An RN was covering the floor an average of 61% of the time for every 24-hour period, and this

finding was consistent for both weekdays and weekends. Although 10% of facilities had less than 8 hours of coverage per 24-hour period, this analysis did not include coverage from contract nurses and management nurses who may have been covering these shifts. Because coverage was highly correlated across shifts and days, a single variable of RN coverage might be adequate for reporting purposes. These illuminating results are not available from any data source other than payroll data, and many extant payroll systems cannot readily extract these data at this time. However, payroll systems do contain the necessary data if each employee's work hours are submitted for each day they work and presumably could be extracted.

Turnover/Retention measures: Payroll data provided an opportunity to calculate turnover and retention using several methods, including the most traditional measure calculated as the rate of departures during a time period relative to the average number of positions. Rates of CNA turnover reported here (about 80%) were comparable to other findings for CNA turnover in previous studies (CMSO "Appropriateness of Minimum Nurse Staffing Ratios in Nursing Homes, Phase II", 2001). Unlike in previous studies, however, RN turnover was higher than CNA turnover at 88%. Several issues may explain this result including: the more current data available in this study during a time of nursing shortages; the more accurate nature of RN payroll data in contrast to other unaudited surveys; the exclusion of administrative nurses (e.g., DONs) who generally have lower turnover; and the possibility that corporations move nurses from one site to the next fairly frequently increasing RN turnover based on payroll data. Interestingly, the higher rate of RN turnover was not associated with an exceptionally high rate of very short-term employees (<60 days), i.e., "short-term turnover", a new turnover measure we were able to construct from payroll data. LPN turnover was lower than both CNA and RN turnover, with somewhat lower turnover in administrative nursing.

Using payroll data to compute turnover measures has multiple advantages relative to other methods. Use of personnel data were problematic because of variation in the way facilities defined termination of an employee, whereas we were able to use a uniform definition based on whether an employee received any salary for a period of 60 days or more. Personnel records also were not adequate for tracking an employee through multiple departures, rehires, or job classification changes. Finally, payroll data included employees who were employed by the facility during the time period of interest rather than measuring historically how many

employees had terminated from personnel files. Nevertheless, even with payroll data the complexity of the turnover/retention construct requires that a precise measure definition is followed or the measures will not be comparable across facilities. If properly computed, turnover measures offer an important dimension of staffing for public reporting and quality improvement.

Tenure measures: To calculate tenure, only hire/rehire dates were used from the personnel data because facilities had different definitions of termination and held files open for varying periods after employees stopped working. Thus, payroll data were matched with the personnel data files and termination information was obtained from payroll records using a uniform definition. One-year and five-year tenure measures were calculated for both departed staff and employed staff. Of the employed staff, about 60% of CNAs and two-thirds of licensed staff were employed at least one year, with figures in the 20%-30% range when looking at tenure of five years or more. DONs and ADONs had longer tenure: 80% at 1 year and 40% at 5 years. Although the numbers were much lower in total for departed staff, they followed the same trend. The correlation between these tenure measures and turnover measures ($r = -0.19$ for 1 year and $r = -0.12$ for 5 years) shows that these measures capture a different dimension of staffing than turnover; however, they are modestly associated with one another. The stronger associations between the employed staff tenure measures and turnover ($r = -0.46$ for 1 year and -0.25 for 5 years) suggest that employed staff measures may be more beneficial in characterizing current quality of care.

Conclusions And Recommendations

Strengths of payroll as a data source for staffing quality measures: These analyses demonstrated that payroll data can be used to generate uniformly defined quality measures that are not available from other data sources. Staffing measures that were unique because of payroll data included: RN staffing ratios for RNs providing direct resident care (non-management); staffing ratios for all employees; percent of staff that were full-time; turnover and retention measures defined in new ways (e.g., short-term turnover); and turnover and tenure measures with uniform termination definitions. Because payroll data originate from employees and are used to pay their salaries, there is an incentive for both the employers and employees to ensure accurate data, and therefore they are more accurate than reporting systems such as OSCAR where facilities calculate and report the required information. Payroll data are susceptible to

audit and would be extremely difficult to alter based on incentives. By building on raw data elements in payroll records to construct the measures, variation in definitions and non-comparability between sites can be avoided. Thus, CMS should consider pursuing payroll data in generating staffing measures for public reporting, quality monitoring, research, and demonstrations.

Feasibility of using a payroll record database for computing nursing home staffing measures:

Our major difficulties encountered in using payroll data resulted from lack of standards for data extraction and problems with our data specifications. For the most part, payroll systems collect the same raw information and are typically capable of extracting the set of data that is necessary to compute the various staffing measures included here. Although this project involved nursing homes affiliated with chains, survey findings from the continuation of the CMSO “Appropriateness of Minimum Nurse Staffing Ratios in Nursing Homes, Phase II” (2001) study supported the ability to provide payroll data among nursing home facilities that were not affiliated with major nursing home chains. Furthermore, these 180 facilities from five states that varied in size and payroll systems reported that they would be able to report resident census, nursing hours by licensure type, distinguishing hours worked and hours paid, and provide the information necessary to calculate turnover and retention. Thus, reporting staffing data through standardized extraction from all systems likely offers the least burdensome and most accurate method that would not require survey agency audit.

Because of the exploratory nature of this study, we accepted payroll data in any format we could obtain it and encountered problems that could have been prevented by tighter specifications. If CMS were to use payroll data, a set of requirements or standards could be prepared based on our current knowledge from this study so that facilities extracted the same information in the same format rendering the calculations more uniform. For example, we collapsed 1,551 job classifications from facilities into 11 categories, which could be defined so that all payroll systems could map to the standard job categories while retaining whatever job classifications the nursing home or payroll company chose. The actual number of data elements required in the extract would be relatively modest for each employee payroll record. The experience gained in this analysis could be used to generate data requirements for payroll data extraction that would standardize the necessary data elements across facilities, corporations, and payroll companies.

Because a requirement would standardize the extraction of payroll data without necessarily changing payroll systems, we believe that most systems could adapt without much burden. However, we recommend that a feasibility study be conducted of a payroll-based reporting system to examine the feasibility, burden, and costs associated with extracting payroll data from various nursing homes and companies according to uniform specifications, obtaining standardized contract staff data from invoices or other sources, and establishing and maintaining a payroll database.

Use of staffing quality measures developed from payroll data for public reporting and quality improvement: The findings from these analyses suggest that an array of measures are possible for examining nursing home staffing. Many of the staffing measures calculated from payroll data have never been generated precisely in a sample of over 1000 facilities because the necessary data were never available. This initial phase of the project has resulted in the identification and construction of many candidate measures that will need to be further analyzed in order to identify the optimal measures for public reporting. This essential work, planned for Phase II of this study, would address issues such as comparisons among facilities, relationships between facility characteristics and staffing measures, the use of these measures in nursing homes that utilize alternative types of staffing models, and the association between various staffing measures and nursing home quality of care measures. Furthermore, the multiple dimensions of staffing (e.g., staffing ratios, turnover, tenure, proportion of full-time staff) suggest that an array of measures may be of interest for in-depth understanding of staffing problems and staffing improvement activities, even if a more parsimonious selection of measures is used for public reporting. One could envision a profile of staffing measures for facility use in quality improvement. Thus, we have a unique opportunity to build on the substantial investment made to produce this rich data file by conducting a more rigorous analysis than has been possible of staffing differences across corporations, regions, and facilities and of the association between staffing and quality of care.