



Development of Staffing Quality Measures- Phase I: Continuation

Final Report May 2, 2008

Submitted on May 2, 2008 to:

Mr. Martin Rice, CMS, Government Task Leader
Dr. Jean Scott, CMS, Government Task Leader
Mr. Randy Poulsen, CMS, Project Officer
Ms Christina Heller, CMS, Contract Specialist

Prepared by:

University of Colorado at Denver and Health Sciences Center:
Andrew Kramer, MD, Division Head
Theresa Eilertson, BS, Research Associate
Nancy Donelan-McCall, PhD, Senior Analyst
Murray Cote, PhD, Research Analyst
Ron Fish, MS, Research Analyst
Stacey Elder, MS
Glenn Goodrich, MS, Research Assistant

Colorado Foundation for Medical Care:

Laura Palmer, MT, ASCP, CQA, BS, Project Director
Kristine Mattivi, PT, CCM, MS, Analytic Manager
Ann Romaglia, RN, NHA, MEd, Project Manager
Jennifer Regensburger, MS, Biostatistician
Thomedi Ventura, MS, Health Data Analyst

CMS Contract: HHSM-500-2005-CO001C; Modification No. CO0027

Table of Contents

	<u>Page</u>
1. Introduction	1
2. Project Tasks and Associated Reports	2
2.1 Relationship Between Staffing Measures and Community Discharge, Rehospitalization, and Post-Acute Care Quality Measures for Short-Stay Residents	2
2.2 Relationship Between Staffing Measures and Outcome Quality Measures for Long-Stay Residents	3
2.3 Documentation of the Payroll Data Specifications	4
2.4 Specifications for Submission of an Electronic Payroll Data Extract File.....	4
2.5 Feasibility Assessment of Electronic Submissions of Shift Level Payroll Data from Nursing Homes	5
2.6 Description of the Sample of Nursing Facilities to be Included in the Feasibility Test of the Use of the Electronic Payroll Data Extract File	6
2.7 Feasibility Test for Obtaining Payroll Data from Nursing Facilities According to Reporting Requirements	7
2.8 Analysis of Contract Staff Hours	7
3. Summary and Next Steps	8
4. References	11

5. Appendices.....12

- Appendix A Relationship Between Staffing Measures and Community Discharge, Rehospitalization, and Post-Acute Care Quality Measures for Short-Stay Residents
- Appendix A Addendum
- Appendix B Relationship Between Staffing Measures and Outcome Quality Measures for Long-Stay Residents
- Appendix C Documentation of the Payroll Data Specifications
- Appendix D Specifications for Submission of an Electronic Payroll Data Extract File
- Appendix E Feasibility Assessment of Electronic Submissions of Shift Level Payroll Data from Nursing Homes
- Appendix F Description of the Sample of Nursing Facilities to be Included in the Feasibility Test of the Use of the Electronic Payroll Data Extract File
- Appendix G Feasibility Test for Obtaining Payroll Data from Nursing Facilities According to Reporting Requirements
- Appendix G Addendum
- Appendix H Analysis of Contract Staff Hours

1. Introduction

Staffing is a vital component of quality care for nursing home residents. Associations have been found between higher staffing levels in nursing homes and fewer hospitalizations, fewer infections, fewer pressure ulcers, less skin trauma, less weight loss, decreased resistance to care, and improved functional status. An increasing number of groups and organizations are calling for the identification of staffing quality measures. In 2003, the National Quality Forum Nursing Home Steering Committee recommended that a nurse staffing quality measure be included in the set of nursing home quality measures that are publicly reported by the Centers for Medicare & Medicaid Services (CMS) (1). In 2004, the Institute of Medicine (IOM) report, entitled “Keeping Patients Safe: Transforming the Work Environment of Nurses” cited evidence for a relationship between nurse staffing and quality of care. The report also included recommendations for the collection and reporting of staffing data (2). In November 2007, individuals representing long-term care research, the National Association of State Long-Term Care Ombudsman Programs, and a long-term care employees union, testified before the Senate Select Committee on Aging, recommending that CMS collect payroll data from nursing facilities to monitor staffing levels, turnover, and retention.

In 2003, CMS funded the initial phase of the Development of Staffing Quality Measures - Phase I (SQM) project, contracting with the Colorado Foundation for Medical Care (CFMC). The project was designed to investigate staffing measures for the purposes of public reporting that may be related to quality of care, including staffing levels (staff hours per resident day), staff turnover, staff tenure, and staff mix. The Colorado Foundation for Medical Care partnered with the University of Colorado at Denver and Health Sciences Center (UCDHSC) to carry out the SQM project.

Following the recommendations of the SQM project’s Technical Expert Panel (TEP) during the initial phase of the project to develop staffing measures based on payroll information to achieve the highest level of accuracy, the project team collected payroll data from eight national nursing home corporations. This activity led to the construction of a database with payroll records from 1,453 nursing facilities representing 48 states. The database consisted of more than 11.6 million individual payroll records and 172,563 individual personnel records. One national nursing home corporation also provided limited information on the use of contract staff from 52 facilities. Analysis of the submitted records demonstrated that payroll data can be used to generate uniformly defined staffing quality measures (3).

In July 2006, CMS provided funding for the continuation of the SQM project. Again, CFMC partnered with the UCDHSC to accomplish the work. The main tasks of the continuation phase of the project were to: 1) evaluate the relationship between staffing measures and quality for the short-stay and long-stay population (including risk adjustment strategies), 2) develop payroll data specifications, 3) test the feasibility of collecting payroll data according to detailed specifications, and 4) analyze the contract staffing data submitted in Phase I of the project.

2. Project Tasks and Associated Reports

This section of the final report contains a brief overview of the purpose, approach, and findings of each project task. The full reports for all project tasks from the Development of Staffing Quality Measures Phase I: Continuation project are provided at the end of this report as Appendix A through Appendix H:

- Appendix A Relationship Between Staffing Measures and Community Discharge, Rehospitalization, and Post-Acute Care Quality Measures for Short-Stay Residents
- Appendix B Relationship Between Staffing Measures and Outcome Quality Measures for Long-Stay Residents
- Appendix C Documentation of the Payroll Data Specifications
- Appendix D Specifications for Submission of an Electronic Payroll Data Extract File
- Appendix E Feasibility Assessment of Electronic Submissions of Shift Level Payroll Data from Nursing Homes
- Appendix F Description of the Sample of Nursing Facilities to be Included in the Feasibility Test of the Use of the Electronic Payroll Data Extract File
- Appendix G Feasibility Test for Obtaining Payroll Data from Nursing Facilities According to Reporting Requirements
- Appendix H Analysis of Contract Staff Hours

2.1 Relationship Between Staffing Measures and Community Discharge, Rehospitalization, and Post-Acute Care Quality Measures for Short-Stay Residents

This report analyzed the relationship between payroll-based staffing measures and the skilled nursing facility (SNF) quality measures of community discharge and rehospitalization, as well as the three publicly reported post-acute care quality measures (QMs) of moderate/severe pain, pressure ulcers, and delirium. Results from earlier studies found relationships between staffing measures (using OSCAR data, Medicaid cost reports, surveys, etc.) and both community discharge and rehospitalization. The payroll, personnel, and census data used in this report, however, allowed the computation of a richer set of quality measures, including turnover and tenure, that were more precisely defined and presumably more accurate.

In addition to the short-stay outcome measures, this report considered stay level case mix measures, facility characteristic measures, and payroll-based staffing measures. The analytic approach included descriptive analyses for facility case mix, multivariate analyses for the

relationship between payroll-based staffing measures (including quintiles of staffing measures) and outcome measures.

The findings of the report concluded that for public reporting, a high priority should be placed on measures of RN staffing levels, turnover, and tenure, in addition to licensed staff turnover and tenure. The report also determined that the percent of short-term employees (employees who departed within 60 days from their start date during the reporting period) did not add sufficient new information about turnover to be included in measures for public reporting. The research demonstrated that staffing measures from payroll data provided the opportunity to investigate staffing issues in ways that are not possible when using any other databases.

The full text of the report “Relationship Between Staffing Measures and Community Discharge, Rehospitalization, and Post-Acute Care Quality Measures for Short-Stay Residents” can be found in Appendix A.

2.2 Relationship Between Staffing Measures and Outcome Quality Measures for Long-Stay Residents

This report used the same payroll, personnel, and census data included in the “Relationship Between Staffing Measures and Community Discharge, Rehospitalization, and Post-Acute Care Quality Measures for Short-Stay Residents” report (Appendix A) to examine the relationship of staffing measures to outcome measures for long-stay residents. The outcome measures evaluated in the study consisted of hospitalizations per 100 resident days and 12 chronic care QMs developed for the Nursing Home Quality Initiative (NHQI): percent of residents who have worsening late loss ADLs, moderate to severe pain, physical restraints, indwelling catheter, urinary tract infection (UTI), decline in locomotion, and high risk residents who have pressure sores, low risk residents who have pressure sores, low risk residents who lose control of their bowels or bladder, are bedfast, depressed or anxious, or residents who experience weight loss.

In addition to these long-stay outcome measures, this report considered resident characteristics/covariates, facility characteristic measures, and payroll-based staffing measures. The analytic approach included descriptive and multivariate analyses of the relationship between payroll-based staffing measures and outcome measures.

Calculation of the association between the QMs and staffing levels, turnover, and tenure identified the possible impact of case mix on the results, as evidenced by the large number of QMs where higher scores (worse quality) were associated with higher levels of RN or licensed staffing. The turnover results (higher turnover associated with higher QM scores) could be interpreted in two ways. Either higher turnover was associated with worse quality, or worse case mix was associated with higher turnover. Similarly, the tenure results could also be interpreted one of two ways: lower QM scores (better quality) could be attributable to longer tenure for CNAs, LPNs and RNs for some of the measures; or it may be possible that nurses stay longer in facilities where the residents are easier to care for.

The findings in this report recommended an array of staffing measures for public reporting: 1) RN/DON staffing levels; 2) CNA staffing levels; 3) a composite turnover measure (RN/DON,

LPN, and CNA); and 4) RN/DON tenure. These four measures would be more easily understood by the consumer, capture the different dimensions of staffing performance, and represent staffing issues relevant to both short-stay and long-stay residents.

The full text of the report “Relationship Between Staffing Measures and Outcome Quality Measures for Long-Stay Residents” can be found in Appendix B.

2.3 Documentation of the Payroll Data Specifications

During the initial phase of the SQM project, payroll data were collected from eight national nursing home corporations to determine if common elements necessary for constructing staffing measures could be obtained. This effort resulted in the construction of a large payroll record database designed to develop and test quality measures derived from payroll data. Detailed data specifications needed to be established to ensure uniform submission of payroll data in preparation for development of a national system to generate nursing home staffing quality measures. Activities related to this task focused on the development of a set of payroll data reporting requirements that could be used to collect uniform data across nursing home facilities for calculating nursing home staffing quality measures suitable for public reporting. This report provides information on the development of the draft specifications, an overview of the specifications, and next steps for testing the feasibility of collecting payroll data using the draft specifications.

The draft payroll data specifications are included in the report and contain field definitions and data layouts for the submission of Census, Pay Period, and Shift Level (raw time-clock) data. The Shift-Level specifications were tested during the feasibility study as described in the attached report “Feasibility Assessment of Electronic Submissions of Shift Level Payroll Data from Nursing Homes” (Appendix E). The Census and Pay Period payroll data specifications identified in this report were tested in the feasibility study as described in the report “Feasibility Test for Obtaining Payroll Data from Nursing Facilities According to Reporting Requirements” (Appendix G).

The full text of the report “Documentation of the Payroll Data Specifications” can be found in Appendix C.

2.4 Specifications for Submission of an Electronic Payroll Data Extract File

This task provided a set of recommendations for system specifications associated with the submission of an electronic payroll data extract file. The feasibility of submitting data according to the data specifications were examined through a series of structured interviews with nursing home corporations, individual nursing homes, and payroll vendors (Appendix E). The data specifications developed for an electronic payroll data extract file allows the data file to be submitted in a flat file format, similar to the process used by CMS to receive files for MDS assessments. Thus, the proposed system specifications were developed with an expectation that they would be used within the existing CMS systems. Relevant aspects of the system submissions were examined including: 1) expected flat file size (in megabytes), 2) frequency of

submission, 3) data file verification, 4) options for delivering payroll data to CMS electronically, and 5) submission system requirements.

The following findings were noted:

- The storage requirements for the payroll data file (either at the nursing home level or state server level) are modest even for large nursing homes. Consequently, the data specifications do not place an undue burden on either the nursing home or states in terms of electronic data storage.
- In the short-term, a modified QIES-system could be used to upload the payroll data files. The justification for this recommendation is twofold. First, the system is already in place for other types of flat files (i.e., MDS submission). Second, users are already familiar with the system.
- The modified QIES-system should have additional capabilities to inform users and CMS about flat file submission and verification, deadlines for submission, end-user support, and report generation.
- While there could be considerable flexibility associated with how much payroll data and how often the payroll data should be submitted, a pragmatic requirement would be to submit one quarter (i.e., three months) of payroll data per submission with the submission occurring two months at the end of the quarter. The submission size and frequency represents a reasonable compromise between the size of the flat file and activity on the submission system.
- Given that the ultimate use of the payroll data is to create publicly reported performance measures for nursing homes, the submission process should be regular and continuous to ensure fair and consistent reporting of quality measures and to facilitate identification of quality improvement in nursing home performance.

The full text of the report “Specifications for Submission of an Electronic Payroll Data Extract File” can be found in Appendix D.

2.5 Feasibility Assessment of Electronic Submissions of Shift Level Payroll Data from Nursing Homes

This task examined the feasibility of the electronic submission of shift level (i.e., raw time clock) payroll data from nursing homes. This task followed the development of payroll data specifications (Appendix C) and represented an opportunity to evaluate the data specifications for shift level payroll and census data. A convenience sample of four nursing home corporations who participated in the previous phase of this project, along with three individual nursing homes (associated with the four different nursing home corporations), and two payroll vendors participated in a semi-structured interview. The study team asked the nursing home corporations and individual nursing homes for information regarding their payroll process, shift level data (including for salaried employees), productive and nonproductive shift level data, the conceptual and technical data elements in the draft shift payroll data specifications, the anticipated resources needed for such an electronic submission, and their overall reaction to the draft shift level specifications. The payroll vendors were asked about their services and products for the long-term care community, service and product customization, the conceptual and technical data

elements in the draft shift payroll data specifications, anticipated resources needed for the specified electronic data submission, and their overall reaction to the draft shift level specifications. Note that the size of the data files, frequency of submission to CMS, and other issues such as storage, retrieval, and the query of the data files are addressed in a separate task report (Specifications for Submission of an Electronic Payroll Extract File) that can be found in Appendix D.

Based upon the nine interviews, the following findings were noted:

- The majority of data elements required in the specifications are already available in electronic format, but do not necessarily reside in the same database.
- Some (possibly non-trivial) amount of effort will be required to obtain all data elements as per the data specifications. It was generally viewed that the initial effort to assemble the data elements and to format them to conform with the data specifications would be viewed as a one-time activity. The ongoing collection, submission, and maintenance, however, will require ongoing resources for both the nursing homes and their corporations.
- Corporate-owned nursing homes appear to have little involvement in the development and maintenance of a system to support the data specifications. Given the size and complexity of the corporations, extensive information technology support is available to handle the data specifications.
- While the payroll vendors are fully capable of developing a product for the data specifications, sufficient demand or changes in federal regulations (i.e., make data specifications a requirement) have to exist to drive product development.

The full text of the report “Feasibility Assessment of Electronic Submissions of Shift Level Payroll Data from Nursing Homes” can be found in Appendix E.

2.6 Description of the Sample of Nursing Facilities to be Included in the Feasibility Test of the Use of the Electronic Payroll Data Extract File

This report outlines the selection process used for the identification of nine nursing facilities to be included in the payroll data extract file feasibility test. The sample included nursing facilities of varying size, geographical location, profit status, ownership type, payroll vendor support, and involvement with culture change. Two of the nursing facilities were part of a large corporation, three were part of a small corporation, three nursing facilities were independently owned, and one was a hospital based nursing facility. This final selection of facilities provided a broad array of homes to test actual submission of a payroll data file according to specifications.

The full text of the report “Description of the Sample of Nursing Facilities to be Included in the Feasibility Test of the Use of the Electronic Payroll Data Extract File” can be found in Appendix F.

2.7 Feasibility Test for Obtaining Payroll Data from Nursing Facilities According to Reporting Requirements

This report discusses the feasibility test to obtain submissions of payroll and census data from nine nursing facilities. The feasibility test was divided into three phases: (1) recruitment; (2) distribution of the payroll and census data specifications and support of the nursing facilities as they organized and prepared their data; and (3) receipt of the payroll and census data from the nursing facilities.

A post-study questionnaire distributed to the nursing facilities participating in the feasibility test captured the individual payroll processes used by each nursing facility for exempt, non-exempt, and contract staff, as well as the processes used to collate, create, process, and submit the census and payroll data. The questionnaire gathered feedback from nursing facility staff on the clarity of the definitions and data elements contained in the payroll and census data specifications. Information regarding the burden and cost encountered by each nursing facility during the study was also collected. Lastly, recommendations for improvement or alternative approaches to the specifications or data collection processes were gathered.

Five of the nine nursing facilities were capable of producing and submitting payroll data according to the data specifications. Four nursing facilities were associated with corporations with in-house IT departments and one facility had the support of a national payroll vendor. Eight of the nine nursing facilities were capable of producing census data, but only four were able to format the data according to the data specifications. One nursing facility was not able to produce either payroll or census data. This was a freestanding facility that produced their payroll in-house with the support of an IT consultant. The study team was able to successfully calculate quality measures for staffing levels, turnover, and tenure for four of the five facilities that submitted payroll data during the feasibility test. Census data from the remaining facility lacked proper formatting.

The post-study questionnaire revealed that some definitions and data elements contained in the data specifications might require revisions. Detailed recommendations for revisions are contained within the report. Information gathered from the participants regarding the burden and cost to the nursing facilities indicated the most significant cost was incurred during the initial data gathering and file set up process. Once these processes were established, the cost decreased significantly.

The full text of the report “Feasibility Test for Obtaining Payroll Data from Nursing Facilities According to Reporting Requirements” can be found in Appendix G.

2.8 Analysis of Contract Staff Hours

One of the nursing home corporations that submitted payroll data for building of the original database for the first phase of this project also provided limited data on the use of contract staff for 52 individual nursing facilities. These data provided the opportunity to study the mean, distribution, and variability of contract hours and non-contract staffing levels for RNs, LPNs, and CNAs. The percent of total hours accounted for by contract staff, as well as the associations

between contract staff measures and other staffing and facility characteristics, were also explored.

The report revealed that the use of contract staff seemed to be generally consistent; if a facility used high amounts of one type of contract staff, it also used high amounts of other types of contract staff. Facilities in the highest quartile of contract staff usage used contract staff to fill one-quarter to one-third of their total RN and LPN needs, and 13% to 15% of total nursing needs. High use of contract staff was strongly associated with turnover rates, especially in skilled and leadership positions. Facilities that used very little contract staff had low turnover rates and a high percentage of staff employed as LPNs. Facilities that had a limited amount of contract staff use tended to be located in Southern states and were less likely to be in urban areas, than facilities that used more contract staff.

The full text of the report “Analysis of Contract Staff Hours” can be found in Appendix H.

3. Summary and Next Steps

Summary

The Development of Staffing Quality Measures Phase I project was funded to develop staffing quality measures that could be used for public reporting. The initial activities began at CMS in 2004 with convening a Technical Expert Panel and Stakeholder meeting. Subsequently, obtaining payroll data, file building, creation of payroll and census data specifications, feasibility testing, and analyses related to relationships between staffing measures and quality outcomes were conducted in collaboration with CMS staff.

Based on the analyses of the relationship between payroll-based staffing measures and measures of quality for both short-stay and long-stay residents, we recommend the following four staffing measures for public reporting:

1. RN/DON hours per resident day;
2. CNA hours per resident day;
3. Nursing staff turnover (composite of RN, LPN, and CNA turnover); and
4. Licensed staff tenure (composite of RN/DON and LPN).

These four measures encompass the dimensions of staffing that were most strongly associated with a range of quality measures. Because staffing is measured across the entire facility, even with payroll data it is not possible to specify separate staffing measures for post-acute care and chronic care residents. However, it is essential to risk adjust the two staffing level measures before public reporting in order to take into account the differences in case mix among facilities.

The justification for each of these measures is provided below:

1. *RN/DON hours per resident day*: RN/DON hours per resident day were more strongly associated with lower rates of rehospitalization and higher rates of community discharge in the short-stay population and with lower rates of hospitalization in the long-stay

population than any other single staffing measure in risk-adjusted analysis. LPN hours per resident day were inversely related to RN levels and were not favorably associated with community discharge or hospitalization rates, and total licensed staff (RN and LPN) was less strongly associated with quality than RN/DON alone.

2. *CNA hours per resident day*: CNA hours per resident day were strongly associated with better scores for three of the chronic care QMs in long-stay residents including high-risk residents with pressure sores, indwelling catheter, and weight loss. CNA levels were also associated with lower hospitalization rates for long-stay residents and higher community discharge rates for short-stay residents.
3. *Nursing staff turnover (composite of RN, LPN, and CNA turnover)*: Higher staff turnover for RNs and LPNs was associated with higher hospitalization rates and worse scores for six of the chronic care QMs for long-stay residents, as well as lower community discharge rates for short-stay residents, after risk adjustment. Higher CNA turnover was associated with worse scores for four of the chronic care QMs. The three turnover measures (RN/DON, LPN, CNA) are correlated, rendering them appropriate for a single composite measure. Weighting for the different types of staff in the measure should be derived from how strongly turnover for each staff type is associated with quality.
4. *Licensed staff tenure (composite of RN/DON and LPN)*: RN/DON tenure, LPN tenure, and combined RN and LPN tenure, were associated with higher community discharge rates in short-stay residents. They were also associated with lower hospitalization rates and better QM scores for several chronic care QMs in long-stay residents. These tenure measures are strongly correlated, rendering them appropriate for a composite licensed staff tenure measure. Weighting for LPNs and RNs should be derived from how strongly tenure for each staff type is associated with quality.

Next Steps

Analyses:

1. Develop the weighting for RN/DON, LPN, and CNA in the composite turnover measure and between RN/DON and LPN in the composite tenure measure based on associations with quality.
2. Develop and validate risk adjustment models for RN/DON staffing level and CNA staffing level measures.
3. Examine the relationship between these recommended staffing measures (that do not include contract staff hours) and the number of contract staff hours in a facility.

Measures Management:

1. Obtain CMS and Technical Expert Panel reviews of the measures.
2. Harmonize the measures across health care settings.
3. Prepare NQF packages for the staffing measures.
4. Coordinate activities with the Measures Management Contractor

Payroll Data Collection System Development/Refinement:

1. Develop a method for collecting accurate contract staff data.
2. Revise the payroll and census data collection specifications.
3. Refine the payroll data collection process.
4. Develop production code for calculating the measures from the payroll database.

4. References

- (1) National Quality Forum. *National Voluntary Consensus Standards for Nursing Home Care*. 2005.
- (2) Institute of Medicine, Committee on the Work Environment for Nurses and Patient Safety. 2004. Page, Ann., editor. *Keeping Patients Safe: Transforming the Work Environment for Nurses*. Washington, DC, National Academies Press.
- (3) Kramer AM, Eilertsen T, Donelan-McCall N, Palmer L, et al. *Development of Staffing Quality Measures – Phase I, Final Report*. Centers for Medicare & Medicaid Services, Baltimore MD. 2004.

5. Appendices

- Appendix A Relationship Between Staffing Measures and Community Discharge, Rehospitalization, and Post-Acute Care Quality Measures for Short-Stay Residents
- Appendix A Addendum
- Appendix B Relationship Between Staffing Measures and Outcome Quality Measures for Long-Stay Residents
- Appendix C Documentation of the Payroll Data Specifications
- Appendix D Specifications for Submission of an Electronic Payroll Data Extract File
- Appendix E Feasibility Assessment of Electronic Submissions of Shift Level Payroll Data from Nursing Homes
- Appendix F Description of the Sample of Nursing Facilities to be Included in the Feasibility Test of the Use of the Electronic Payroll Data Extract File
- Appendix G Feasibility Test for Obtaining Payroll Data from Nursing Facilities According to Reporting Requirements
- Appendix G Addendum
- Appendix H Analysis of Contract Staff Hours