



Abt Associates Inc.

Cambridge, MA
Bethesda, MD
Chicago, IL
Durham, NC
Hadley, MA
Lexington, MA

Abt Associates Inc.
55 Wheeler Street
Cambridge, MA 02138-1168

Nursing Home Value- Based Purchasing Demonstration

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Design Refinements

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Prepared for
Ron Lambert
Centers for Medicare & Medicaid
Services
7500 Security Boulevard
Baltimore, Maryland 21244-1850

Prepared by
Alan White
Donna Hurd
Terry Moore
Andrew Kramer
David Hittle
Ron Fish

Contents

Executive Summary	i
1. Introduction.....	1
2. Performance Measures	2
2.1. Staffing Levels and Turnover	2
2.2. Potentially Avoidable Hospitalizations	5
2.3. MDS Based Performance Measures	10
2.4. Outcomes from State Health Inspections	12
2.5. Developmental Measures	15
3. Performance Payments.....	15
3.1. Linking Performance Scores to Performance Payments	15
3.2. Determining the Size of the Performance Payment Pools	17
3.3. Example of Performance Award	21
References	23
Appendix A: Specifications for Long-Stay Measures	26
Appendix B: Specifications for Short-Stay Measures	28

Executive Summary

Under the Nursing Home Value Based Purchasing (NHVBP) Demonstration, the Centers for Medicare & Medicaid Services (CMS) will assess the performance of nursing homes based on selected quality measures and make additional payments to those nursing homes that achieve a higher performance or improvement over time based on those measures. NHVBP offers the opportunity to test whether a performance-based reimbursement system can improve the quality of nursing home care while reducing overall Medicare expenditures.

Performance Measures

In the first year of the demonstration, quality will be assessed based on the following four domains: staffing, appropriate hospitalizations, outcome measures from the minimum data set (MDS), and survey deficiencies. Additional quality measures may be added in the second and third years of the demonstration as deemed appropriate. Specific performance measures include:

- **Staffing:** Low nurse staffing levels and high turnover can seriously compromise quality of care. The staffing level measures will be adjusted for nursing home case mix.
 - Registered nurse (RN) and Director of Nursing (DON) hours per resident day
 - Licensed staff (RN/DON/LPN) hours per resident day
 - Certified Nurse Aide (CNA) hours per resident day
 - Nursing staff turnover (RNs, Licensed Practical Nurse (LPN), CNA)

- **Potentially avoidable hospitalizations:** Reducing the rate of avoidable hospitalizations is a measure of improved quality of care that also results in savings to the Medicare program. This measure will be risk-adjusted.
 - Rate of potentially available hospitalization per resident day for long-stay residents
 - Rate of potentially available hospitalization per stay for short-stay residents

- **MDS-based quality measures:** A set of MDS-based quality measures will be used as performance measures. Initially these will include the following MDS 2.0- based measures:
 - Measures for long-stay residents:
 - Percentage of residents whose need for help with daily activities has increased
 - Percentage of residents whose ability to move in and around their room got worse
 - Percent of high-risk residents with pressure sores
 - Percentage of residents who had a catheter inserted and left in their bladder
 - Percentage of residents who were physically restrained
 - Measures for short-stay residents
 - Percentage of residents with improved level of ADL functioning
 - Percentage of residents who improve status on mid-loss ADL functioning
 - Percentage of residents with failure to improve bladder incontinence

For all these measures, the exclusion criteria, minimum required sample, and risk adjustment methodology will be the same as that used in the publicly reported measures.

When MDS 3.0 is implemented, CMS will review this domain and will transition to the new outcome measures.

- **Survey deficiencies:** Findings from state surveyors provide a broad perspective of the quality of care furnished by the nursing home. Survey deficiencies will be used in two ways:
 - o As a screening measure that would disqualify any nursing home that, in the demonstration year, received a citation for substandard quality of care or that had one or more citations for actual harm or higher in certain regulatory groups.
 - o As part of nursing homes' performance scores. Individual citations, both health and life safety, will be assigned values according to their scope and severity. Within each demonstration state, homes will be ranked based on their survey deficiencies.

There are a number of other potential performance measures, including measures related to resident perspectives on their nursing home care and staff immunizations. These measures are conceptually appealing as performance measures, but they cannot be used in the first year because of a need for additional developmental work. As part of the nursing home application process, we will collect information on these potential measures so that CMS can evaluate whether it is appropriate to add one or both to the demonstration after its first year.

Determining Performance Score

Performance payments will be determined based on overall performance across all the measures rather than the performance on individual measures. Overall performance will be measured using a set of scoring rules in which the staffing and potentially avoidable hospitalization domains will each count for 30 points (out of 100 total points) and the MDS quality measure and survey domains each count for 20 points.

For each performance measure, a continuous scoring system that awards points over a large range of values will be used. This approach avoids having large changes in scores depend on small changes in performance (i.e., the cliff effect) and should motivate improvement for homes with all types of performance at baseline.

Linking Performance Scores to Performance Payments

The demonstration is intended both to reward high performing homes and to encourage improvement for homes that may not have good quality initially. As a result, qualification for an award will be determined based on the level of performance or improvement in performance over time.

- Nursing homes with an overall performance that is in the 80th percentile or above in terms of performance level will qualify for a performance payment.
- Nursing homes in the top 20 percent in terms of improvement would qualify for a performance payment in recognition of their improved performance, as long as their performance level was at least as high as the 40th percentile among all nursing homes in the State in the demonstration year.

- Nursing homes in the top 10 percent in either performance level or improvement will receive a larger performance payment that is 20 percent higher (adjusted for differences in resident days) than those in the next 10 percent.
- Nursing homes that qualify for a performance payment based on both performance level and improvement will receive payment for either performance or improvement but not both and will receive the higher of the two performance payments for which they qualified.
- Performance payments will be weighted based on the number of resident days for residents who are Medicare beneficiaries, including beneficiaries whose nursing home stay is not covered by Medicare.
- Performance payments will be the same (adjusted based on resident census) for high performers and improvers.

Determining the Size of the Performance Pool

The demonstration is designed to ensure budget neutrality, using an approach similar to the CMS Physician Group Practice and Home Health Pay-for-Performance Demonstrations. CMS anticipates that avoidable hospitalizations may be reduced as a result of improvements in quality of care, potentially generating savings to the Medicare program that can be used to fund performance payments. A performance payment pool will be estimated each year for each State in the demonstration. If the payment pool is zero, then no performance payments will be made to any nursing home regardless of the nursing home's performance.

To provide an example of the potential performance payment to participating nursing homes, we used simulation analyses to estimate the payments. We randomly selected nursing homes for "demonstration" and "comparison" groups and ran 100 simulations. The average reduction in hospitalizations across all simulations was 6.6 percent. Sixty percent of the simulations yielded a payment pool. Among nursing homes that qualified for a performance payment within the simulations with a payment pool, the average payment amount was about \$115,000.

1. Introduction

In its report *Crossing the Quality Chasm* (Institute of Medicine (IOM), 2001) the IOM argued that payment incentives should be aligned with quality improvement, with providers given the opportunity to share in the benefits of quality improvement and incentives aligned with the achievement of better outcomes and the use of good processes of care or other desired actions. The report recommended that all purchasers reexamine payment policies to remove barriers that impede quality and build in stronger incentives for quality enhancement, calling for government agencies such as CMS to “identify, pilot test, and evaluate various options for better aligning current payment methods with quality improvement goals.”

The Nursing Home Value-Based Purchasing Demonstration (NHVBP) includes incentives that will encourage Medicare skilled nursing facilities (hereinafter referred to as “nursing homes”) to improve the quality of services that they provide. This is in contrast to the current system where relative quality is not a factor in determining Medicare payment to nursing homes. Thus this Nursing Home Value-Based Purchasing (NHVBP) Demonstration is one response to the IOM’s challenge and is part of CMS’ broader long-term care quality initiative.

Like other value-based purchasing programs, the demonstration will offer incentives to providers who meet certain quality objectives. These incentives are expected to promote the quality of care provided to all Medicare beneficiaries in nursing homes, both those receiving Part A benefits as well as those receiving only Part B benefits, many of whom are also eligible for Medicaid. The incentives provided through the demonstration can then be used to help offset the financial investments needed to support quality improvement, for example related to increasing staffing levels. In the first year of the demonstration, quality will be assessed based on the following four domains: staffing, appropriate hospitalizations, outcome measures from the minimum data set (MDS), and survey deficiencies. Additional quality measures may be added in the second and third years of the demonstration as deemed appropriate.

CMS has selected four States to host the demonstration: Arizona, Mississippi, New York and Wisconsin. Hospital-based and free-standing nursing homes in these States may apply to participate. Nursing homes that apply to participate in the demonstration will be stratified based on criteria including nursing home type (e.g., hospital-based or freestanding), urban/rural status, ownership type, and bed size and then randomly assigned to either the demonstration or to a comparison group. CMS will select approximately fifty applicants in each State to participate in the demonstration. These nursing homes will be required to submit information on an ongoing quarterly basis over the three years of the demonstration in order to determine their eligibility for performance payments. An equal number of applicants in each State will be assigned to the comparison group.

The demonstration will be budget neutral to Medicare. CMS anticipates that certain avoidable hospitalizations may be reduced as a result of improvements in quality of care. The reduction of avoidable hospitalizations and subsequent skilled nursing home stays is expected to result in savings to Medicare. These savings will constitute a pool for each State from which we will make the performance payments.

In 2006, Abt Associates presented its recommendations for the NHVBP demonstration design. The Design Report included recommendations about which performance measures to use, scoring rules, weights, linking of performance to performance payments, and methods for determining the size of the performance pool. Development of the demonstration design has continued, addressing design issues that were unresolved in 2006 and making refinements to the design so that it can incorporate the latest research and recommendations from experts and stakeholders. The purpose of this report is to update the earlier design report, focusing on the changes to the design that have occurred since 2006.

2. Performance Measures

In the initial year of the demonstration, the system will include four main types of performance measures:

- Nursing home staffing (nurse staffing levels and staff turnover)
- Rate of potentially avoidable hospitalizations
- Resident outcomes (MDS-based quality measures)
- Outcomes from state survey inspections

There are several other types of performance measures that may be added as performance measures in the second year of the demonstration, pending further development. These include staff influenza immunization rates, rate of community discharge for short-stay residents, and nursing home use of resident care experience surveys.

So that improvement during the first year of the demonstration can be measured, we will calculate these measures for the period prior to the beginning of the demonstration (i.e., the base period). For all but the staffing performance measures, base year performance can be calculated using data from available sources (e.g. MDS assessments, inpatient claims data, survey deficiency data), and we will calculate values for the year prior to the beginning of the demonstration. Base period performance on the staffing measures will be calculated using nursing home payroll records, which will be obtained directly from participating nursing homes as part of the process for applying for the demonstration. We anticipate that baseline staffing information will be available only for a 3 month period prior to the beginning of the demonstration.

2.1. Staffing Levels and Turnover

2.1.1. Measure Specifications

There is considerable evidence of a relationship between nursing home staffing levels, staffing stability, and resident outcomes. Low staffing levels place residents at increased risk of hospitalizations and poor quality outcomes. Based on previous studies, higher staffing levels in nursing homes has been found to be associated with fewer hospitalizations (Kramer, 2000 and 2001; Dorr et al., 2004), fewer infections (Dorr et al., 2004; Zimmerman et al., 2002), fewer pressure ulcers (Kramer, 2000 and 2001, Dorr et al., 2004; Bostick, 2004), less skin trauma (Kramer, 2000 and 2001), less weight loss (Kramer, 2000 and 2001) decreased resistance to care (Kramer, 2000 and

2001), higher levels of assistance (Schnelle et al., 2004) and improved functional status (Kramer, 2000 and 2001).

The 2006 Design Report recommended that three staffing measures be included as performance measures: RN hours per resident day, total nurse staffing hours per resident day, and nursing staff turnover. The Design Report also recommended that the staffing level measures be risk-adjusted based on the RUG-III nursing index.

Findings from the CMS Staffing Quality Measure study (Kramer et. al, 2008) and the CMS Staffing Study (Kramer et. al, 2001) suggest that some refinements to the staffing performance measures are appropriate. The NHVBP demonstration will include four staffing performance measures:

- ***RN/DON hours per resident day:*** The RN/DON measure will include all RN hours including Directors of Nursing (DON) and Assistant Directors of Nursing (ADON) hours. Both the CMS Staffing Quality Measures Study, and the CMS Staffing Study found a significant relationship between RN staffing levels and rates of re-hospitalization. In the CMS Staffing Quality Measures Study, RN/DON hours per resident day were more strongly associated with lower rates of re-hospitalization 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 staffing measure that the study analyzed.
- ***Certified Nurse Aide (CNA) hours per resident day:*** The CMS Staffing Study found that CNA hours per resident day were found to be strongly associated with better scores for several MDS-based quality measures, including functional improvement, weight loss and the incidence of pressure sores. It also found that higher CNA staffing levels were associated with lower rates of potentially avoidable hospitalization.
- ***Licensed staff (RN/DON/LPN) hours per resident day:*** The CMS Staffing Quality Measures Study found that higher levels of licensed staff hours per resident day were significantly associated with higher odds of community discharge. The CMS Staffing Study identified a significant relationship between licensed staff levels and potentially avoidable hospitalizations.
- ***Nursing staff turnover (composite of RN, LPN, and CNA turnover):*** The CMS Staffing Quality Measure found that 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, nurse aide) are correlated, rendering them appropriate for a single composite measure.

Note that agency staff will be counted in the staffing level measures, but they will be counted at 80% of their hours worked. This is because, while the use of agency staff is preferable to being understaffed, the use of agency staff may impact the continuity of care that residents receive and make it more difficult for residents to form relationships with the staff who provide their care.

2.1.2. Scoring Rules

The staffing performance measures will count for 30 percent (30 points) of a nursing home's performance score. The RN/DON measure and turnover measure will count for 10 points each while the licensed staff and CNA measures will count for five points each. (Essentially, the 10 points formerly allocated to the total nurse hours measure are split evenly between the licensed staff and CNA measures.) As discussed in section 2.1.5, a relative ranking approach will be used to assign points to the nursing home for each measure.

2.1.3. Risk Adjustment of Staffing Levels

Given differences in resident care needs, nursing homes with the same staffing level but differences in resident case mix could differ substantially in how well their staffing levels meet resident needs. Failure to adjust for resident case mix raises concerns about whether reported differences in staffing levels reflect differences due to the care needs of a nursing home's residents (i.e., differences in patient acuity or frailty) or actual, case mix adjusted differences in the amount of care provided to residents.

We plan to use data from the Staff Time and Resource Intensity Verification (STRIVE) study to develop the case mix weights. The STRIVE data are currently being used to update the Medicare Skilled Nursing Facility Prospective Payment System (the RUGs-III system).

Case- mix adjusted measures of hours per resident day will be calculated for each facility for each staff type using this formula:

$$\text{Hours}_{\text{Adjusted}} = (\text{Hours}_{\text{Reported}} / \text{Hours}_{\text{Expected}}) * \text{Hours}_{\text{State Average}}$$

where Hours State Average is the mean across all demonstration facilities in a state of the reported hours per resident day for a given staff type. The expected values will be based on the distribution of expected RN, licensed staff, and nurse aide hours that are based on data from the STRIVE study. The risk adjustment model may also include an additional adjuster for the RN/DON and licensed staff measures to account for differences in staffing levels that the RUGs-based case mix adjuster does not capture. This adjuster may include variables such as the percent of a nursing home's residents who are in a Medicare Part A stay. The additional adjuster would address the large differences in RN staffing between hospital-based and freestanding nursing facilities that remain after adjusting for case mix differences. This adjuster would supersede the approach described in the 2006 Design Report, which recommended that points for the RN measure be assigned separately for hospital-based and freestanding nursing homes.

2.1.4. Data Sources for Staffing Measures

All nursing homes applying to participate in the NHVBP Demonstration will be required to submit extracts of payroll information for their nursing staff and resident census information for the previous quarter to CMS. Nursing homes that use agency staff must report this information using information from agency invoices. Each data submission will consist of an Excel file that contains the information necessary to calculate the staffing performance measures. Payroll extract data will include information on each employee's job category (e.g., RN, LPN, nurse aide) and the hours worked in each pay period during the previous quarter. These data must also include an encrypted

employee identifier (e.g., an internal code that is used by the nursing home that does not contain the employee's name or social security number).

Using payroll data as the source for the staffing measures is an important part of ensuring that accurate staffing data is used. Nursing homes selected to participate in the demonstration will be required to submit payroll and agency staff data and resident census information on a quarterly basis.

More information on the data collection specifications is available at: www.nhvbp.com.

Calculation of Staffing Performance Measures

The payroll, agency and census data will be used to calculate the four staffing measures. As a specific example, to determine RN/DON hours per resident day, CMS will sum the productive hours (i.e., hours actually worked) by RNs and DONs, the hours worked by agency RNs, and the resident days as reported by each nursing home for the entire year. CMS will then calculate the ratio of RN/DON hours per resident day for each nursing home. Then CMS will rank the nursing homes from highest to lowest in each demonstration state and will assign a score to each nursing home according to its ranking. A similar process will be used for licensed staff and CNA hours per resident day. Turnover will be determined by looking for gaps in employee pay records that indicates a break in their employment with the nursing home.

Data Verification

Each year, a subset of nursing homes will be asked to submit copies of raw payroll records for data verification purposes. Nursing homes that submit aberrant data may be targeted for data verification. Types of data irregularities that may trigger the data verification process include extremely low or high turnover, aberrant staffing levels or distribution of staff by job category, missing data for some payroll periods, high rates of errors on individual employee records (e.g., negative hours or working more hours than expected (e.g., more than 80 hours in a week)). The raw data must include encrypted employee identifiers as above.

2.2. Potentially Avoidable Hospitalizations

Research suggests that a substantial proportion of hospitalizations of nursing home residents may be avoidable through careful management of patients with certain kinds of conditions. Conditions such as heart failure and respiratory infections, while sometimes requiring hospitalization are conditions that can some of the time be managed in the nursing home. Walker et.al (2009) found that about half of hospitalizations for a sample of nursing home residents in Canada were potentially avoidable based on the ambulatory care sensitive conditions developed by the Agency for Healthcare Research and Quality (AHRQ). Previous studies have found that a substantial percentage of hospitalizations of nursing home residents in the United States are potentially avoidable (e.g., Saliba et al., (2000)) and that there are actions that nursing homes can take to reduce rates of hospitalizations. Kane et. al (2003) found that the Evercare demonstration, a program which used nurse practitioners that was focused on long-stay nursing home residents, reduced hospitalization rates by close to 50 percent. Previous studies have also found that, for some conditions, there is no significant difference in outcomes between residents treated in nursing homes and those hospitalized (e.g., Loeb et. al (2006), Boockvar et al. (2005), Naughton and Mylotte (2000). Boockvar et al. (2008) found that average

Medicare expenditures were more than \$4,000 per case lower for nursing home residents with acute infection care who were triaged to nursing homes than for those triaged to the hospital.

The intent of performance measures based on hospitalization rates is to give homes a direct incentive to reduce the rate of potentially avoidable hospitalizations. It is important that the system include this type of direct incentive since determination of the size of the performance payment pool in each state depends on the overall savings achieved by homes in the demonstration, not the savings generated by individual homes.

2.2.1. Definition of Short and Long Stayers

Nursing homes care for both short and long stay residents. Short stay residents typically enter a nursing home following a hospital stay and need short term skilled nursing care or rehabilitation before being able to return to the community. Long stay residents require chronic care for extended periods and typically do not return to the community.

Because the hospitalization patterns of short and long stayers are different, the hospitalization rate measure will be defined differently for short and long stayers. The 2006 Design Report defined short-stay residents as those in a Medicare Part A nursing home stay. But for the purposes of the demonstration, the definition of short- and long-stay residents will instead be based on whether the individual is a “permanent” resident of a nursing facility as determined by the length of the nursing home episode. For the demonstration, an episode begins with an admission to a nursing home and ends when the individual resides in the community for at least 30 days. If the individual spends at least 90 days of the episode as a nursing home resident, then that person will be considered a long stay resident for the entire episode. If the person spends less than 90 days of the episode in the nursing home, than that person will be a short stay resident for that episode.

Permanent nursing home residents have different hospitalization and cost patterns than patients in a short nursing home stay who reside in the community. Using the current definition of short and long stayers, permanent residents who are hospitalized and return to the nursing home in a Part A stay will remain classified as long stayers. This will allow CMS to make proper comparisons for the short and long stay populations with respect to hospitalization rates and Medicare expenditures.

2.2.2. Definition of Potentially Avoidable Hospitalizations

In the CMS Staffing Studies (Kramer et. al, 2001), potentially avoidable hospitalizations included hospitalizations for congestive heart failure, electrolyte imbalance, respiratory infection, UTI, and sepsis. These are conditions that are prevalent in the short stay nursing home population and that previous research has found are sensitive to the quality of nursing home care. Additionally, for long-stay residents, hospitalizations for anemia will be included. Inclusion of this condition was based on further clinician input and a review of the literature concerning the prevalence of anemia in the elderly population and morbidity associated with under-treatment. Progressive anemia resulting in hospitalization is considered to be a condition that may be avoided for long-stay residents with optimal nursing care. It is not included for the short-stay measures because it is unlikely that the nursing home would be able to have an impact on anemia during a short nursing home stay.

Note that the specification of potentially avoidable hospitalizations is different than what was proposed in the 2006 Design Report, which recommended that potentially avoidable hospitalizations

be defined based on the list of ambulatory-care sensitive conditions developed by the Agency for Healthcare Research and Quality (AHRQ). The AHRQ list of ambulatory-care sensitive conditions was initially developed for community residents and not developed specifically for the nursing home population. Research suggests that rather than focusing on ambulatory-care sensitive conditions, the conditions for which hospitalization is considered to be potentially avoidable are restricted to a subset of conditions that are prevalent in the nursing home population and indicated by previous research to have been sensitive to the quality of nursing home care (Hutt, Lin, & Kramer, 2000; Kramer, et al., 2000, 2001; Decker, 2008).

2.2.3. Measure Specifications

Note the following regarding the hospitalization rate measure definition:

- The short-stay hospitalization measure will be calculated based on the rate of hospitalizations for short stay residents per *stay*. See Table 1 for a description of the short-stay hospitalization measure.
- The long-stay hospitalization measure will be defined based on the number of potentially avoidable hospitalizations for long-stay residents per long-stay *day*. For the purpose of calculating resident days, only the portion of the stay that was in the demonstration year will be included. See Table 2 for the specifications of the long-stay hospitalization measure.

For long-stay residents, the risk of hospitalization increases as the length of the observation period increases, and a measure of hospitalizations per resident day is appropriate. However, among short-stay residents, whose nursing home use is more transitory, the risk of hospitalization is highest during the first days or weeks of the nursing home stay. Because the risk is not proportional to the number of days at risk, it is more appropriate to use a simple per stay measure for short-stay residents.

Note that, for both the short- and long-stay measures, we include hospitalizations that occur within three days of discharge from the nursing home. These days are also included in the denominator for the long-stay measure. The three-day gap between nursing home discharge and hospital admission is used to ensure that the hospitalization is counted in those situations where it is likely related to the nursing home stay. If a hospital admission occurs within a few days of discharge to the community, it is reasonable to attribute the hospitalization to the nursing home stay.

Re-hospitalizations that occur within 24 hours of hospital discharge will be excluded from the calculation of hospitalization rates, regardless of the diagnosis. This is because re-hospitalizations which occur so soon after nursing home admission may not be related to the care provided by the nursing home but instead may occur because the patient was discharged from the hospital too soon, thus making it unfair to include in the calculation of the nursing home's hospitalization rate.

Table 1: Measure Description – Short-Stay Potentially Avoidable Hospitalization

Numerator	Number of short-stay nursing home stays during which resident was admitted to an acute care or critical access hospital for any of five conditions for which hospitalization is considered potentially avoidable: heart failure, respiratory infection, electrolyte imbalance, sepsis, or urinary tract infection. Numerator includes transfers directly from the nursing home to the hospital and admissions to the hospital within three days after NH discharge.
Denominator	Total number of short-stay nursing home stays occurring within the demonstration year.
Exclusions	Stays meeting any of the following criteria are excluded from the numerator and denominator: <ul style="list-style-type: none"> • Resident was not a Medicare beneficiary for the entire stay. • Resident was enrolled in Medicare managed care during any portion of the stay. Resident died in the nursing home.
Comments	<ul style="list-style-type: none"> • Because each stay is counted separately, an individual with multiple short stays would contribute to this measure multiple times. • Because sample selection does not require a 14-day MDS assessment, the measures capture more short-stay residents than the current post-acute care quality measures.

Table 2: Measure Description – Long-stay Potentially Avoidable Hospitalization

Numerator	Number of admissions to an acute care or critical access hospital occurring while the individual is a long-term nursing home resident for a condition for which hospitalization is considered potentially avoidable, including heart failure, respiratory infection, electrolyte imbalance, sepsis, urinary tract infection, or anemia. Numerator includes hospitalizations occurring within three days of discharge from the nursing home.
Denominator	Total number of days (in hundreds) during the demonstration year that residents are in the nursing home facility during long-stay episodes. A long-stay episode is defined as a single stay or sequence of stays during which an individual resides in the nursing home for a total of 90 days or more without a gap of 30 contiguous days living in the community. If a nursing home resident transfers to another nursing home, the episode of care is terminated and a new episode of care in the second home is started. If the episode of care spans either the beginning or end of the reporting period, only the days that are within the reporting period are counted in the denominator.
Exclusions	Episodes of care meeting any of the following criteria are excluded: <ul style="list-style-type: none"> • Resident was not a Medicare beneficiary for the entire demonstration year • Resident was enrolled in Medicare managed care for during any portion of the stay.
Comments	<ul style="list-style-type: none"> • Measure accounts for multiple hospitalizations per resident. • An episode of care is defined as long stay irrespective of the level of care or payer during the episode. Therefore, a resident may have one or more post-acute stays during a single long-stay episode.

2.2.4. Risk Adjustment

For both hospitalization measures, risk models will be used to adjust for differences in the medical acuity, functional impairment, frailty of nursing home residents, and geographic variations in use of hospital. The use of risk adjustment models is important given the potential for the demonstration to have unintended effects on nursing home willingness to admit patients at high risk of hospitalizations. The risk adjustment model is intended to align the incentives of nursing homes with those of the demonstration since a nursing home will receive greater “credit” for avoiding a hospitalization of a high-risk patient (e.g., someone with a high predicted hospitalization rate based on the risk adjustment model) than for avoiding a hospitalization for a low-risk resident. Data for risk factors will be derived from a combination of MDS and Medicare claims data, including SNF and hospital claims.

The 2006 Design Report did not recommend a specific risk model, and the risk-adjustment model has not been finalized. Risk factors will be selected using the criteria of statistical performance (i.e., contribution to the explanatory power of the model) and clinical/policy relevance. Clinical and policy relevance were assessed based on two criteria: 1) Whether there was a plausible clinical reason why the risk factor should affect the risk of hospitalization; 2) Whether the risk factor reflects the resident’s clinical condition, functional abilities, and care needs, and is under the influence of the nursing home. MDS items considered to be subjective, having poor reliability, or susceptible to “gaming” to increase payment are avoided.

We anticipate that the risk models will include these types of covariates:

- A comorbidity index that is derived from seventeen disease conditions (e.g. CHF, Dementia, COPD, etc.). This index, which is based on the approach developed by Romano (Romano, et al. 1993) is constructed from hospital claims ICD-9 primary/secondary diagnoses codes and fourteen matched disease conditions constructed from MDS Section I. For each of the diagnoses included in the comorbidity index, if the diagnosis was indicated as being present on either an MDS assessment or a hospital/SNF claim, the resident was considered to have the diagnosis.
- Resident functional status. This is defined using the Barthel functional index.
- Individual disease conditions that significantly affect the risk of hospitalization, including pneumonia, urinary tract infection, pressure ulcer, and indwelling catheter.
- Presence of a feeding tube.
- Receipt of parenteral/IV nutrition
- Community indicators of hospital utilization patterns. These measures are compiled by the Dartmouth Atlas Project, utilizing Medicare claims data.

Once the model is finalized, a technical user’s guide will be prepared that will explain the models in more detail.

2.2.5. Scoring Rules

The hospitalization performance measures will count for 30 percent (30 points) of a nursing home’s performance score. The relative weight of the short- and long-stay hospitalization measures will vary by nursing home, and will be calculated using information on the number of short and long-stay

resident days and the overall relative avoidable hospitalization rate for short-stay residents compared to long-stay residents.

Points will be assigned using the relative ranking of nursing homes in each state and during each year of the demonstration. Points will be distributed proportionately for hospitalization rates between the 1st (i.e., highest rate of potentially avoidable hospitalizations) and 75th percentiles:

- No points for the nursing home with the highest rate of risk adjusted potentially avoidable hospitalizations among demonstration participants in the state.
- The maximum number of points if the potentially avoidable hospitalization rate is in the bottom 25 percent of all homes in the state.
- Points will be allocated proportionately to nursing homes that are between the lowest quartile and the nursing home with the highest rate of potentially avoidable hospitalizations.

No points will be awarded above the top quartile (i.e., lowest hospitalization rates) to minimize the incentive for homes to avoid appropriate hospitalizations. It is important that the demonstration not cause homes to be so aggressive in avoiding hospitalizations that they are providing poor care, and the truncation of hospitalization performance measure is intended to recognize that some hospitalizations are not avoidable.

2.3. MDS Based Performance Measures

2.3.1. Measures Based on MDS 2.0

A set of measures has been developed from MDS-based indicators to describe the quality of care provided in nursing homes. These measures address a broad range of functioning and health status in multiple care areas. The use of performance measures based on resident outcomes is consistent with the IOM's recommendations that financial incentives be aligned with the achievement of better patient outcomes.

Initially, the NHVBP demonstration will use a subset of measures based on MDS 2.0. These measures were selected based on their validity, reliability, statistical performance, and policy considerations:

- Long-Stay Residents
 - Percent of residents whose need for help with daily activities has increased;
 - Percent of residents whose ability to move in and around their room got worse;
 - Percent of high-risk residents who have pressure ulcers;
 - Percent of residents who have had a catheter left in their bladder; and,
 - Percent of residents who were physically restrained.
- Short-Stay Residents
 - Percent of residents with improving level of ADL functioning;
 - Percent of residents who improve status on mid-loss ADL functioning; and,
 - Percent of residents experiencing failure to improve bladder incontinence.

See Table 3 for a brief description of these measures. More detailed technical specifications are provided in Appendix A.

For the long-stay measures, we will use the same specifications as for the measures on the CMS Nursing Home Compare web site. Consistent with the specifications used for Nursing Home Compare, we will only include long-stay measures if the measure can be calculated for at least 30 assessments. The three short-stay measures are not included on Nursing Home Compare. Note that we will only calculate the long-stay measures if data are available for at least 30 assessments and will only include the short-stay measures if data are available for at least 20 assessments.

Table 3: MDS-Based Performance Measures

Long-Stay Measures	Comments
Percent of residents whose need for help with daily activities has increased	Maintenance of ADLs is also related to an environment in which the resident is up and out of bed and engaged in activities. The CMS Staffing Study found that higher staffing levels were associated with lower rates of increasing dependence in activities of daily living.
Percent of residents whose ability to move about in and around their room got worse	This is a change measure that measures nursing home rules/practices related to use of mobility aides like eating, dressing, or getting to the bathroom. Residents who lose mobility may also lose the ability to perform other activities of daily living, like eating, dressing, or getting to the bathroom.
Percent of high-risk residents who have pressure sores	The QM Validation Study identified a number of nursing home care practices that were associated with lower pressure sore prevalence rates including more frequent scheduling of assessments for suspicious skin areas, observations on the environmental assessment of residents, and care practices related to how the nursing home manages clinical, psychosocial, and nutritional complications. The CMS Staffing Study found that higher staffing levels were associated with lower pressure sore incidence rates.
Percent of residents who have/had a catheter inserted and left in their bladder	Using a catheter may result in complications, like urinary tract or blood infections, physical injury, skin problems, bladder stones, or blood in the urine. Our analysis indicates that this measure tends to be relatively stable across time at the nursing home level.
Percent of residents who were physically restrained	A resident who is restrained daily can become weak, lose his or her ability to go to the bathroom by themselves, and develop pressure sores or other medical complications. This is a measure that is more directly under the nursing home's control than some of the other measures. Our analysis indicates that, at the nursing home level, this measure tends to be relatively stable across time.
Short-Stay Measures	
Percent of residents with improving level of ADL functioning	These are change measures that we recommend including given that a primary focus of post-acute care is on the restoration of residents' function.
Percent of residents who improve status on mid-loss ADL functioning (transfer, locomotion) or remain completely independent in mid-loss ADLs	
Failure to improve bladder incontinence	

2.3.2. Measures Based on MDS 3.0

We anticipate that CMS will implement MDS 3.0 after the demonstration begins. We will review the new MDS 3.0-based quality measures when they are defined. CMS will assess the appropriateness of the measures for inclusion in the demonstration, and will transition to these measures as soon as they are available.

2.3.3. Scoring Rules

The MDS-based performance measures will count for 20 percent (20 points) of a nursing home's performance score. The 20 points will be allocated evenly across either 3 short stay, 5 long stay, or all 8 measures, depending on whether a majority of the measures are reportable for a particular nursing home. That is, if at least 2 of the 3 short stay measures are reportable for a nursing home, then all 3 short stay measures will be included; otherwise, none will be included. If at least 3 of the long stay measures are reportable, then all 5 of the long stay measures will be included; otherwise, none will be. Furthermore, if a majority of the measures are reportable for a nursing home but some are missing (not reportable), then the missing values will be imputed based on the average of the demonstration nursing homes in the State. This approach is considered to be better than imputing the missing measures based on the nursing home's reportable measures because nursing home performance is not highly correlated across the outcome measures (i.e., good performance on some measures does not necessarily indicate good performance on others.).

Scoring rules for the MDS-based measures are similar to those used for the staffing performance measure. We will use a continuous scoring system that is based on relative performance within a state. For each measure, points will be awarded to nursing homes based on their percentile (or rank) in terms of their performance on the measure during the demonstration year in their state.

2.4. Outcomes from State Health Inspections

All nursing homes that participate in the Medicare or Medicaid programs must undergo a standard survey at least once every fifteen months. Surveys are unannounced and are conducted by a team of health care professionals. State survey teams spend several days in the nursing home to assess whether the nursing home is in compliance with federal requirements. State certification surveys provide a comprehensive assessment of the nursing home, including assessment of nursing home administration, environment, kitchen/food services, and resident rights and quality of life. Information from State surveys will be used in two ways:

- As a qualifying condition for determining eligibility for receiving a performance payment
- As a performance measure in determining a nursing home's performance score

2.4.1. Survey Findings as a Qualifying Condition for Performance Payment Eligibility

Nursing homes will be ineligible for a performance payment if they received one or more citations for substandard quality of care or received one or more citations for actual harm or higher in certain regulatory groups such as quality of life, quality of care, resident rights, resident behavior and nursing home practices and life safety. Given that the State survey is the federal government's assessment of the nursing home's ability to meet even minimal requirements, this specification is intended to

address concerns that nursing homes that otherwise have good performance measures would receive a performance payment even though surveyors may have identified serious quality-of-care issues.

2.4.2. Survey Performance Score

Scoring rules will be based on a slightly modified version of the CMS Special Focus Facility (SFF) Algorithm. CMS developed the SFF algorithm for identifying nursing homes with a history of serious problems that are candidates for its SFF program.

- **Health inspections:** Nursing home performance on State health inspections will be based on the number, scope, and severity of deficiencies identified during the annual inspection survey that corresponds to the demonstration year as well as substantiated findings from complaint investigations that took place during the demonstration year. Values are assigned to individual health citations according to their scope and severity – higher values are assigned for more serious, widespread deficiencies, lower values for less serious, isolated deficiencies (see Table 4). If the citation generates a finding of substandard quality of care, higher values are assigned.
- **Number of revisits required to confirm correction of deficiencies at scope and severity level F or greater:** No values are assigned for the first revisit; values are assigned only for the second, third, and fourth revisits (Table 5). If a nursing home fails to correct major deficiencies by the time of the first revisit and a second revisit takes place, then the value associated with deficiencies is increased by 50. If a third revisit takes place, then the value is increased by another 75. If a fourth revisit is necessary, the value increases by another 100. CMS' experience is that providers that fail to demonstrate restored compliance with safety and quality of care requirements during the first revisit have lower quality of care than other nursing homes. More revisits are associated with more serious quality problems.
- **Complaint surveys and revisits:** Complaint survey and revisits will be assigned to a time period based on the demonstration year in which the complaint survey occurred (i.e., complaint surveys and revisits that occurred within the first year of the demonstration will be used in calculating the year 1 survey performance score regardless of when the nursing home's health inspection takes place. There are some deficiencies that appear on both standard and complaint surveys. To avoid potential double-counting, deficiencies that appear on complaint surveys that are conducted within 15 days of a standard survey (either prior to or after the standard survey) are only counted once. If the scope or severity differs on the two surveys, the highest scope-severity combination will be used

We will calculate a total survey score for nursing homes based on the sum of the values for their deficiencies and revisits. Note that higher values correspond to more deficiencies and revisits and thus lower scores, while lower values correspond to higher scores.

Table 4: Survey Performance Score: Values for Different Types of Deficiencies

Severity	Scope		
	Isolated	Pattern	Widespread
Immediate jeopardy to resident health or safety	J 50 (75)	K 100 (125)	L 150 (175)
Actual harm that is not immediate jeopardy	G 20	H 35 (40)	I 45 (50)
No actual harm with potential for more than minimal harm that is not immediate jeopardy	D 4	E 8	F 16 (20)
No actual harm with potential for minimal harm	A 0	B 0	C 0

Note: Figures in parentheses indicate values for deficiencies that are for substandard quality of care.

Shaded cells denote deficiency scope/severity levels that constitute substandard quality of care if the requirement which is not met is one that falls under the following federal regulations: 42 CFR 483.13 resident behavior and nursing home practices; 42 CFR 483.15 quality of life; 42 CFR 483.25 quality of care.

Source: Centers for Medicare & Medicaid Services

Table 5: Survey Performance Score: Values for Different Number of Revisits

Revisit Number	Noncompliance Values
First	0
Second	50
Third	75 additional
Fourth	100 additional

2.4.3. Scoring Rules

The survey performance measure will count for 20 percent (20 points) of a nursing home’s performance score. Note that, as with the other performance measures, nursing homes’ performance will be measured relative to other nursing homes in their states.

Similar to the other performance measures, scoring will be based on nursing homes’ relative performance within their state, using a continuous scoring system that awards points across the entire distribution. Points will be awarded to nursing homes based on their percentile (or rank) in terms of their performance on the measure during the demonstration year in their state.

- The nursing home with the lowest value (i.e., best performance on the survey domain) in each state will receive 20 points.
- The nursing home with the highest value (i.e., worst performance on the survey domain) in each state will receive 0 points.

2.5. Developmental Measures

There are several other measures that are conceptually appealing as performance measures for the NHVBP demonstration, but that we do not recommend including in the demonstration during its first year because of a need for further development. CMS also plans to collect data on two developmental measures from all applicant nursing homes: staff influenza immunization rates and nursing home use of resident care experience surveys. We will evaluate these measures for possible future inclusion in the determination of the performance score. If included, these data would be collected on an annual basis from participating nursing homes and used as performance measures in years 2 and 3.

Additionally, we will consider a measure based on the percentage of short-stay residents who are discharged to the community. This is appealing as a quality measure for short-stay residents, many of whom are discharged prior to their 14-day assessment and who thus have missing data for the MDS-based short-stay measures described above (Kramer et al., 2008).

3. Performance Payments

Using the performance measures and scoring rules described in Section 2, each nursing home will have a performance score between zero and 100. The rules for linking performance scores to performance payment amounts and determining the size of the performance payment pool are described in this section.

3.1. Linking Performance Scores to Performance Payments

Performance payments will be determined based on overall performance across all the measures rather than the performance on individual measures. This specification reflects the intent of the demonstration to reward homes that provide overall high-quality care rather than rewarding homes for high performance on individual measures or categories of measures. The use of overall performance scores to determine performance payments minimizes the probability that a nursing home that has extremely low performance on one measure category will qualify for a performance payment.

The demonstration is intended both to reward high performing homes and to encourage improvement for homes that may not have good quality initially. As a result, the performance payment will be determined based on the level of performance or improvement in performance over time, with performance linked to performance payment based on the following:

- Nursing homes with an overall performance that is in the 80th percentile or above in terms of performance level would qualify for a performance payment.
- Nursing homes in the top 20 percent in terms of improvement would qualify for a performance payment in recognition of their improved performance, as long as their performance level was at least as high as the 40th percentile among all nursing homes in the State in the performance

year.¹ (This is to ensure that homes do not receive performance payments for improvement if their overall level of performance is low.)

- Nursing homes in the top 10 percent in either performance level or improvement will receive a larger performance payment that is 20 percent higher (adjusted for differences in resident days) than those in the next 10 percent.
- Nursing homes that qualify for a performance payment based on both performance level and improvement would receive payment for either performance or improvement but not both. If a nursing home was in the top decile based on one criterion and in the second decile based on the other, then the nursing home would receive the higher of the two performance payments for which it qualified.
- Payments will be weighted based on the number of resident days for residents who are Medicare beneficiaries, including beneficiaries whose nursing home stay is not covered by Medicare. This includes Medicare beneficiaries who are enrolled in Medicare Advantage. The reason is that, in general, the costs of improving performance system are related to nursing home size. For example, it costs a large nursing home more to increase staffing levels than it does small homes, since the staffing level measures are based on hours per resident day.
- The performance payment pool will be distributed among top performers and improvers so that the performance payment per resident day will be the same for nursing homes that qualify for an incentive payment based on performance level and those that qualify based on improvement.² For example, if the nursing homes that qualified for an incentive payment based on performance level tended to be larger than those that qualified based on improvement, then the total size of the performance pool for those with high performance levels would be higher than the pool for improvers even though the payment per resident day would be the same for both groups.
- Improvement over time will be measured based on the change in overall performance score relative to the baseline.
- In order to qualify for a performance payment, a nursing home must meet one of the following conditions. Either: (a) The nursing home's risk adjusted hospitalization rate in the demonstration year does not exceed its base year risk adjusted rate plus 20 percent; or, (b) the nursing home's risk adjusted hospitalization rate in the demonstration year does not exceed the median rate for the comparison group for that year in the State. This is to assure that nursing homes that receive payments contribute to reduced hospitalization rates (and thus savings).

¹ This is similar to the design used in the CMS Home Health Pay-for-Performance Demonstration. In this demonstration, agencies in the top 20 percent in terms of improvement on each measure qualify for a performance payment for the measure as long as their absolute score on the measure is at or above the 30th percentile.

² While not likely, it is possible that the demonstration will be associated with decreases in provider performance. Note that, in no case, would a nursing home that had a decreased level of performance relative to the preceding year be eligible for an performance payment based on improvement.

3.2. Determining the Size of the Performance Payment Pools

CMS will randomly assign applicant nursing homes to the demonstration and comparison groups for each State. Performance payment pools for each demonstration state will be calculated by comparing the rate of change in selected risk-adjusted Medicare expenditures for beneficiaries in demonstration nursing homes relative to the comparison group.

To avoid paying for small differences in the growth of Medicare expenditures between the experimental and comparison groups that are likely due to chance, the demonstration uses a threshold of 2.3 percent of the estimate of Medicare costs in the absence of the demonstration (i.e., target expenditures). Performance payments will be made only for savings generated above this threshold. The selection of the 2.3 percent threshold was guided by analysis of the variability of costs over time for nursing homes, using a file for which Medicare Part A claims were linked to MDS assessments. There was considerable variation in costs over time, and these analyses supported setting a 2.3 percent minimum threshold.

The method is similar to that used in the CMS Physician Group Practice and Home Health Pay-for-Performance demonstrations. If the demonstration does not yield a payment pool in a state, then no performance payments will be made to any nursing home in the state regardless of the nursing home's performance. If the demonstration does yield a payment pool, then payments will be made to nursing homes in that State. No nursing home will face payment reductions as a result of its quality performance

In this section, we describe the methods to be used to estimate the payment pools. This section supersedes the methods described in the 2006 Design Report. These calculations will be done for each year of the demonstration and will be made separately for each demonstration State. These are the basic steps that are used to determine the payment pool:

- Prior to the demonstration, specify the demonstration and comparison group nursing homes.
- Identify eligible Medicare beneficiaries residing at demonstration and comparison group homes during the demonstration year.
- For demonstration and comparison group residents, define the short stay and long stay episodes that occurred during the demonstration year.
- Sum the Medicare Part A and selected B expenditures for each episode for each resident. Apply risk adjustment models to Medicare expenditures.
- For demonstration and comparison group residents, determine the number of short stay episodes and the number of long stay resident days during the demonstration year.
- For short stay episodes, determine Medicare Part A and B expenditures per episode. For long stay episodes, determine Medicare Part A and B expenditures per resident day.
- Calculate the difference between actual and estimated Medicare expenditures for the demonstration group.
- Determine the size of the performance payment pool.

3.2.1. Specify Demonstration and Comparison Group Nursing Homes

We will use a randomized design to assign nursing homes that apply to be in the demonstration to demonstration and comparison groups for each State. The comparison group will include the same number of nursing homes as the demonstration (i.e., approximately 50 in each of four demonstration states).

3.2.2. Identify Eligible Medicare Beneficiaries

Medicare beneficiaries residing at demonstration and comparison group nursing homes can be identified using MDS assessments. The assessments collect information on the beneficiary's Medicare number and include nursing home admission and discharge dates. The Medicare number can be used to identify and pull the relevant Medicare claims for measuring Medicare expenditures. The nursing home admission and discharge dates are needed to define the nursing home episodes as described below.

Beneficiaries who are enrolled in Medicare managed care for any of the period that they were in a nursing home are excluded from the calculation of actual and estimated expenditures. This is necessary because of incomplete claims data for managed care enrollees.

3.2.3. Define Short- and Long-Stay Episodes

A nursing home episode is defined as a series of contiguous stays in the nursing home, hospital and community. An episode begins with admission to the nursing home and ends with a community stay of at least 30 days. An episode is categorized as short-stay if a resident spends less than 90 days of the episode in a nursing home. An episode with 90 or more nursing home days is a long-stay episode.

For episodes that span across the beginning or the end of the demonstration year, the 90 days preceding and following the demonstration year are examined so that the episode can be properly categorized. For the purpose of calculating Medicare expenditures and resident days, we will consider only the portion of the stay that is included in the demonstration year, apportioning Medicare payments and length of stay to reflect the truncation of a stay that spans the time periods.

3.2.4. Sum the Medicare Part A and B Expenditures and Apply Risk Adjustment

Medicare Part A and B expenditures will be summed for each episode. This calculation will use total Medicare allowed charges for Inpatient, Skilled Nursing Home (SNF), Outpatient, Hospice, and Physician/Supplier Part B claims. Durable Medical Equipment and Home Health Agency claims would not be used. This is because neither of these benefits are covered for beneficiaries in Part B stays (i.e., the long-term population).

In calculating the expenditures, we will include claims with a service date that is within the period that the beneficiary resided in the nursing home and the three days following discharge (based on the starting date of the claim). Note that, if a hospitalization begins within 3 days of nursing home discharge, then costs for the entire hospital stay will be included in the savings calculation (subject to the censoring rules above).

While the use of random assignment to assign homes to the demonstration or comparison groups reduces the need for risk adjustment, residents in the two groups may nonetheless differ with respect

to characteristics related to Medicare costs. Due to the differences in Medicare expenditure patterns for short and long stayers, we will apply different risk adjustment models to these two types of residents. These models are under development and will be described in a coming report.

3.2.5. Determine the Number of Short-Stay Episodes and Long-Stay Resident Days

The number of short stay episodes for the residents of nursing homes in the demonstration and comparison groups will be summed. The number of long stay resident days for each group will be the sum of the nursing home days (plus three days of community discharge if applicable) across all long stay episodes in each group. .

3.2.6. Determine Expenditures per Episode and Expenditures per Resident Day

Medicare expenditures per short stay episode and per long stay day will be calculated for the demonstration and comparison groups. For each group, risk adjusted expenditures for the types of services described above will be summed across all the beneficiaries who resided at the nursing homes in that group during the demonstration year. Total short stay expenditures will be divided by the number of episodes, and total long stay expenditures will be divided by the number of resident days for the demonstration and comparison groups, respectively.

3.2.7. Calculate the Difference between Actual and Estimated Expenditures

The difference between actual and estimated expenditures for the demonstration group will be calculated by comparing the rate of change³ in expenditures per episode (short stayers) and per resident day (long stayers) for beneficiaries in demonstration homes to the rate of change in expenditures per episode and per resident day for beneficiaries in comparison group homes. The calculation is made separately for each demonstration state. Two basic steps are used for this calculation.

- **Calculate “target” Medicare expenditures:** The target Medicare expenditures are what we would expect expenditures for beneficiaries in demonstration homes to be in the absence of the intervention. These are calculated using base year expenditures for the demonstration group and the rate of change in expenditures for the comparison group since the base year. For example, the target Medicare expenditures for long stay residents for a demonstration year “t” would be calculated as:

$$\text{Expenditures/day}_{\text{Expected}} = (\text{Demonstration group exp's/day}_{\text{Baseline}}) * (\Delta \text{Comparison group exp's/day}_t)$$

where the change in comparison group expenditures per day is calculated as (comparison group expenditures/day in year t minus comparison group expenditures/day in base year) divided by (comparison group expenditures/day in base year).

- **Calculate the difference between actual and target expenditures:** For long stayers, this is calculated as the difference between actual and target Medicare expenditures per day for the

³ The rate of change since the base year, which is defined as the 12-month period immediately preceding the first year of the demonstration.

demonstration group multiplied times the total number of resident days for the comparison group in year t.

$$\text{Difference} = \# \text{ of comparison resident days} * (\text{demo exp's/day}_{\text{Actual}} - \text{demo exp's/day}_{\text{Target}})$$

For short stayers, the calculations above would use expenditures per episode rather than expenditures per day and the number of comparison group episodes rather than the number of comparison group days.

The short-stay difference will be multiplied by the number of short-stay episodes in the comparison group. The long-stay difference will be multiplied by the number of long-stay days in the comparison group. This will yield the total dollar difference for short-stayers and long-stayers, respectively. These amounts will be added to yield the total dollar difference between actual and estimated expenditures.

3.2.8. Determine Size of Performance Payment Pools

The payment pool will be calculated each year of the demonstration. A separate payment pool will be calculated for each State. Participating nursing homes will only receive a performance payment for a given demonstration year if a payment pool exists for their State in that year. Similar to the CMS Physician Group Practice Demonstration, a shared savings approach will be used to determine the payment pool. For the NHVBP demonstration, the following rules will be used:

Threshold: There is a great deal of variation from year to year in the Medicare expenditures associated with nursing home residents. Much of the difference between the actual and target expenditures is due to normal variation. To increase the probability that performance payments reflect actual savings to Medicare rather than normal variation, a 2.3 percent threshold will be applied for each State. The threshold will be 2.3 percent of target Medicare expenditures for that State. The actual expenditures must exceed the target expenditures by the threshold amount in order for a payment pool to exist in a demonstration year. The payment pool will include the amount of savings generated above this threshold.

Note that losses to the State pool could occur if the target expenditures exceeded the actual expenditures by more than the 2.3 percent threshold. In the unlikely event that this occurs for a State in a given demonstration year, the State's payment pool in subsequent demonstration years will be adjusted to account for any accrued Medicare losses from previous years of the demonstration. Nursing homes will not be required to pay into the pool under any circumstances.

- **Federal share of savings:** Calculated amounts above the 2.3 percent threshold will be divided, with 80 percent going to the State's demonstration participants and 20 percent retained by Medicare as program savings.
- **Cap:** The actual size of a State's payment pool will not be larger than 5 percent of target Medicare Part A and B expenditures. CMS will retain the excess above this 5 percent cap.

An example of how these rules are used to determine the payment pool is shown in Table 6. **Note that the numbers in this table are illustrative and are not NHVBP estimates.**

Table 6: Example: Determination of State Payment Pool

Category	Amount
Target Medicare expenditures	\$10,000,000
Actual Medicare expenditures under the demonstration	\$9,000,000
Difference between actual and target Medicare expenditures	\$1,000,000
Threshold†	\$230,000
Medicare savings	\$770,000
Amount retained by CMS due to 20% share ††	\$154,000
Amount available for performance payment pool†††	\$616,000
Payment pool cap ††††	\$500,000
Amount retained by CMS due to cap†††††	\$116,000
Total performance payment pool	\$500,000
†: Equal to 2.3% of target Medicare expenditures. ††: Equal to 20% of the Medicare savings †††: Equal to 80% of the Medicare savings ††††: Equal to 5% of target Medicare expenditures. †††††: Equal to the lesser of the amount available for performance payments and the payment pool cap. Source: Abt Associates, 2008	

3.3. Example of Performance Award

3.3.1. Construction of the Payment Simulation file

To provide an example of the potential payment amounts that nursing homes could receive for the first year of the demonstration, CMS constructed a “stay” file for a 10 percent national sample of nursing homes in 2004. First, we identified all nursing home stays in the sample using the MDS. Then we linked all Part A inpatient hospital and SNF claims to each stay. We included all hospitalizations that occurred within 3 days of discharge from the nursing home. Part B data were not available to link to the file. Finally, we summed the Medicare Part A expenditures for each nursing home for the year 2004.

3.3.2. Payment Simulation Approach

For each simulation we randomly selected 100 nursing homes from the stay file. We assigned 50 nursing homes from this sample to a simulated “demonstration group”. The demonstration participants are expected to achieve reductions in hospitalizations. To simulate this effect, we gave nursing homes with a hospitalization rate at or below the median for each 100 home sample a higher probability of being in the demonstration group. Nursing homes with a hospitalization rate at or below the median rate for the 100 home sample were assigned a 60 percent chance of being in the simulation group. Thus the homes selected to be in the demonstration group had a greater chance of having lower hospitalization rates.

We conducted 100 simulations. For each simulation, we calculated the difference in Medicare expenditures between the demonstration group nursing homes and the 100 nursing home sample.

Then we applied the shared savings rules to determine the amount that would be in the payment pool for each simulation.

Note that across all of the simulations, the demonstration group hospitalization rate was an average of 6.6 percent lower than the hospitalizations rate for the 100 nursing home sample. As there was no empirical evidence of the impact of this demonstration on hospitalization rates, the amount of reduction that we could expect was unknown. The CMS Evercare demonstration achieved almost a 50 percent reduction in hospitalizations (Kane, Keckhafer, and Robst, 2002); however, we do not expect the NHVBP demonstration to achieve a similar impact. To inform us on this issue, we ranked the nursing homes in the stay file according to their hospitalization rates. Then we divided the file into deciles according to nursing home rank, and determined the average hospitalization rate for each decile of nursing homes. We determined that if homes in the second to tenth deciles improved their hospitalization rates by one decile (e.g., those in the 10th decile improved their rate to that of the ninth decile, etc.), then overall hospitalization rates would be reduced by 14 percent. This seemed to be achievable over the course of the demonstration. Thus, a 6.6 percent reduction in hospitalization rates for the first year of the demonstration seemed reasonable.

3.3.3. Results of Payment Simulations

Using the above approach, the difference in Medicare expenditures between the demonstration group and the 100 nursing home group was greater than the 2.3 percent threshold for 60 percent of the simulations, and was less than the threshold for 40 percent of the simulations. In other words, the simulations produced a payment pool 60 percent of the time. The average payment amount for an average nursing home in the simulations (i.e., average daily census of 90 residents) that qualified for a performance payment was \$115,300.

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Appendix A: Specifications for Long-Stay Measures

Measure Description	Measure Specifications	Covariates/Risk Adjustment
<p>Residents whose need for help with daily activities has increased</p>	<p>Numerator: Residents with worsening (increasing MDS item score) in Late-Loss ADL self performance at target relative to prior assessment. Residents meet the definition of Late-Loss ADL worsening when at least two of the following are true:</p> <ol style="list-style-type: none"> 1. Bed mobility – [Level at target assessment (G1aA[t]) – [Level at previous assessment (G1aA[t-1])]] > 0, or 2. Transfer - [Level at target assessment (G1bA[t]) – [Level at previous assessment (G1bA[t-1])]] > 0, or 3. Eating - [Level at target assessment (G1hA[t]) – [Level at previous assessment (G1hA[t-1])]] > 0, or 4. Toileting - [Level at target assessment (G1iA[t]) – [Level at previous assessment (G1iA[t-1])]] > 0, <p>OR at least one of the following is true:</p> <ol style="list-style-type: none"> 1. Bed mobility – [Level at target assessment (G1aA[t]) – [Level at previous assessment (G1aA[t-1])]] > 1, or 2. Transfer - [Level at target assessment (G1bA[t]) – [Level at previous assessment (G1bA[t-1])]] > 1, or 3. Eating - [Level at target assessment (G1hA[t]) – [Level at previous assessment (G1hA[t-1])]] > 1, or 4. Toileting - [Level at target assessment (G1iA[t]) – [Level at previous assessment (G1iA[t-1])]] > 1. <p>Denominator: All residents with a valid target and a valid prior assessment.</p> <p>Exclusions: Residents meeting any of the following conditions:</p> <ol style="list-style-type: none"> 1. None of the four Late-Loss ADLs (G1aA, G1bA, G1hA, and G1iA) can show decline because each of the four have a value of 4 (total dependence) or a value of 8 (activity did not occur) on the prior assessment [t-1]. 2. The QM did not trigger (resident not included in the numerator) AND there is missing data on any one of the four Late-Loss ADLs (G1aA, G1bA, G1hA, or G1iA) on the target assessment [t] or prior assessment [t-1]. 3. The resident is comatose (B1 = 1) or comatose status is unknown (B1 = missing) on the target assessment. 4. The resident has end-stage disease (J5c = checked) or end-stage disease status unknown (J5c = missing) on the target assessment. 5. The resident is receiving hospice care (P1ao = checked) or hospice status is unknown (P1ao = missing) on the target assessment or the most recent full assessment. The P1ao value from the last full assessment is only considered if the target assessment is a quarterly assessment and the state quarterly assessment does not include P1ao. 	

Measure Description	Measure Specifications	Covariates/Risk Adjustment
Residents whose ability to move in and around their room got worse	<p>Numerator: Residents whose value for locomotion self performance is greater at target relative to prior assessment (G1eA[t]>G1eA[t- 1]).</p> <p>Denominator: All residents with a valid target assessment and a valid prior assessment.</p> <p>Exclusions: Residents satisfying any of the following conditions:</p> <ol style="list-style-type: none"> 1. The G1eA value is missing on the target assessment [t]. 2. The G1eA value is missing on the prior assessment [t-1] and the G1eA value shows some dependence on the target assessment (G1eA[t]>0). 3. The G1 eA value on the prior assessment is 4 (total dependence) or 8 (activity did not occur). 4. The resident is comatose (B1 = 1) or comatose status is unknown (B1 = missing) on the target assessment. 5. The resident has end-stage disease (J5c = checked) or end-stage disease status is unknown (J5c = missing) on the target assessment. 6. The resident is receiving hospice care (P1ao = checked) or hospice status is unknown(P1ao = missing) on the target assessment or the most recent full assessment. The P1ao value from the last full assessment is only considered if the target assessment is a quarterly assessment and the state quarterly assessment does not include P1ao. 	<p>Covariates:</p> <ol style="list-style-type: none"> 1. Indicator of recent falls on the prior assessment: Covariate = 1 if J4a checked or J4b checked Covariate = 0 if J4a not checked AND J4b not checked 2. Indicator of extensive support or more dependence in eating on the prior assessment: Covariate = 1 if G1hA = 3,4, or 8 Covariate = 0 if G1 hA = 0,1, or 2 3. Indicator of extensive support or more dependence in toileting on the prior assessment: Covariate = 1 if G1iA = 3,4, or 8 Covariate = 0 if G1 iA = 0,1, or 2
High-risk residents with pressure ulcers	<p>Numerator: Residents with pressure sores (Stage 1-4) on target assessment (M2a >0 OR I3a-I3e = ICD-9 707.0*) who are defined as high risk (see denominator definition).</p> <p>Denominator: All residents with a valid target assessment and any one of the following high-risk criteria:</p> <ol style="list-style-type: none"> 1. Impaired in bed mobility or transfer on the target assessment as indicated by G1aA = 3, 4, or 8 OR G1bA = 3, 4, or 8. 2. Comatose on the target assessment as indicated by B1 = 1. 3. Suffer malnutrition on the target assessment as indicated by I3a through I3e = 260, 261, 262, 263.0, 263.1, 263.2, 263.8, or 263.9. <p>Exclusions: Residents satisfying any of the following conditions are excluded:</p> <ol style="list-style-type: none"> 1. The target assessment is an admission (AA8a = 01) assessment. 2. The QM did not trigger (resident is not included in the QM numerator) AND the value of M2a is missing on the target assessment. 	
Residents who have/had a catheter inserted and left in their bladder	<p>Numerator: Residents with indwelling catheters on target assessment (H3d = checked).</p> <p>Denominator: All residents with a valid target assessment.</p> <p>Exclusions: Residents satisfying any of the following conditions:</p> <ol style="list-style-type: none"> 1. The target assessment is an admission (AA8a = 01) assessment. 2. H3d is missing on the target assessment. 	<p>Covariates:</p> <ol style="list-style-type: none"> 1. Indicator of bowel incontinence on the prior assessment: Covariate = 1 if H1a = 4; Covariate = 0 if H1a = 0,1,2, or 3 2. Indicator of pressure sores on the prior assessment: Covariate = 1 if M2a = 3 or 4; Covariate = 0 if M2a = 0, 1 or 2
Residents who were physically restrained	<p>Numerator: Residents who were physically restrained daily (P4c or P4d or P4e = 2) on target assessment.</p> <p>Denominator: All residents with a valid target assessment.</p> <p>Exclusions: Residents satisfying any of the following conditions:</p> <ol style="list-style-type: none"> 1. The target assessment is an admission (AA8a = 01) assessment. 2. The QM did not trigger (resident is not included in the QM numerator) AND the value of P4c or P4d or P4e is missing on the target assessment. 	

Appendix B: Specifications for Short-Stay Measures

Measure Description	Measure Specifications	Exclusions**	Covariates
<p>Percent of short-stay residents with improving level of ADL functioning</p>	<p>Numerator: Residents with ADL-Long Form (ADLLF) lower at 14-day assessment than at 5-day assessment (ADLLF [t]-ADLLF [t-1]<0).</p> <p>ADLLF defined as sum of G1aA, G1bA, G1eA, G1gA, G1hA, G1iA, and G1jA, with 8's recoded to 4's.</p> <p>Denominator: All residents with a valid 14-day assessment (AA8b = 7) AND a valid preceding 5-day assessment (AA8b = 1)</p>	<p>Residents satisfying any of the following conditions:</p> <ol style="list-style-type: none"> 1. Comatose (B1 = 1) or comatose status unknown (B1 = missing) on 14-day assessment 2. End stage disease (J5c=checked) or end stage disease status unknown (J5c = missing) on 14-day assessment 3. Hospice (P1ao = checked) or hospice status unknown (P1ao = missing) on 14-day assessment 4. Non-valid ADLLF scale at 5-day OR 14-day assessment. 5. ADLLF at 5-day assessment equal to 0 (ADLLF [t-1] = 0) 	<p>CPS on the 5-day assessment (see technical specifications)</p>
<p>Percent of short-stay residents who improve status on mid-loss ADL functioning (transfer, locomotion) or remain completely independent in mid-loss ADLs</p>	<p>Numerator:</p> <ol style="list-style-type: none"> 1. Residents with a MLADL change score that is negative (MLADL[t]-MLADL[t-1]<0) OR 2. Residents with a MLADL score of 0 at 5-day AND 14-day assessments (MLADL[t]=0 AND MLADL[t-1]=0). <p>MLADL is defined as the sum of G1b(A), G1e(A) and G1d(A), with 8's recoded to 4's)</p> <p>Denominator: All residents with a valid 14-day assessment (AA8b = 7) AND a valid preceding 5-day assessment (AA8b = 1)</p>	<p>Residents satisfying any of the following conditions:</p> <ol style="list-style-type: none"> 1. Comatose (B1 = 1) or comatose status unknown (B1 = missing) on 14-day assessment 2. End stage disease (J5c=checked) or end stage disease status unknown (J5c = missing) on 14-day assessment 3. Hospice (P1ao = checked) or hospice status unknown (P1ao = missing) on 14-day assessment 4. Residents with non-valid Mid-Loss ADL at the 14-day assessment (MLADL[t]=missing) 5. Residents with non-valid Mid-Loss ADL at the 5-day assessment (MLADL[t-1] = missing) AND MLADL is greater than 0 at the 14-day assessment (MLADL[t]>0) 	<ol style="list-style-type: none"> 1. CPS on the 5-Day assessment 2. RUG Late Loss ADL Scale (R_ADL; see technical specifications) on the 5-day assessment.

Measure Description	Measure Specifications	Exclusions**	Covariates
<p>Percent of short-stay residents who failed to improve their bladder incontinence</p>	<p>Numerator: Residents who satisfy any of the following three conditions:</p> <ol style="list-style-type: none"> On the 5-day assessment, the resident did not have a catheter (H3d[t-1] not checked (value 0)) AND was fully bladder continent (H1b[t-1] = 0). <p>AND</p> <p>On the 14-day assessment, the resident had a catheter (H3d[t] checked (value 1)) OR was less than fully bladder continent (H1b[t] >0).</p> <ol style="list-style-type: none"> On the 5-day assessment (AA8b = 1), the resident did not have a catheter (H3d[t-1] not checked (value 0)) AND was less than fully bladder continent (H1b[t-1] > 0). <p>AND</p> <p>On the 14-day assessment (AA8b = 7), the resident had a new catheter (H3d[t] = checked (value 1)) OR was the same or worse on bladder continence (H1b[t] >= H1b[t-1])</p> <ol style="list-style-type: none"> On the 5-day assessment (AA8b = 1), the resident did have a catheter (H3d[t-1] checked (value 1)). <p>AND</p> <p>On the 14-day assessment (AA8b = 7), the resident still had a catheter (H3d[t] = checked (value 1)) OR had no catheter but was frequently or fully incontinent (H3d[t] not checked (value 0) AND H1b[t] > 2)</p> <p>Denominator: All residents with a valid 14-day assessment (AA8b = 7) AND a valid preceding 5-day assessment (AA8b = 1).</p>	<p>Residents satisfying the following condition:</p> <ol style="list-style-type: none"> There are missing values for H1b or H3d on either the SNF PPS 5-day or 14-day assessment. The resident is comatose (B1 = 1) or comatose status is unknown (B1= missing) on the 14-day assessment. The resident has paraplegia (I1x = 1) or paraplegia status unknown (I1x missing) on the 14-day assessment. The resident has quadriplegia (I1z = 1) or quadriplegia status unknown (I1z missing) on the 14-day assessment. 	