

**MegaQI Covariate  
Analysis and  
Recommendations:  
Identification and  
Evaluation of Existing  
Quality Indicators that  
are Appropriate for Use  
in Long-Term Care  
Settings.**

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# Executive Summary

Over the past two years, the MegaQI Team Steering Committee (SC)<sup>1</sup> selected and validated 45 chronic care (CC) and post-acute care (PAC) quality measures (QMs) (Exhibit 1).<sup>2</sup> Based partly on recommendations from the SC and from the National Quality Forum (NQF), the Centers for Medicare and Medicaid Services (CMS) chose five CC and three PAC QMs for public reporting by posting on CMS' Nursing Home Compare website in November 2002. Two of these QMs (one CC and one PAC) were posted both with and without facility-level adjustment.

Some of the 45 QMs are adjusted for resident-level risk factors, or resident "covariates." Also, adjustment for some QMs includes a facility level measure (the facility admissions profile, or FAP). After selecting QMs for public reporting, CMS instructed the SC to revisit risk adjustment, focusing specifically on resident-level factors. This report presents the results of that process.

The argument for risk adjustment is simple. A well-designed system should make quality measurement fairer by adjusting for risks that facilities cannot control. However, designing a workable system is not simple. In part, this is because it is difficult to measure true, uncontrollable risk. Nonetheless, the SC believes that risk adjustment is necessary and feasible for some QMs. We chose to base risk adjustment on statistical modeling, to allow many covariates to define multiple levels of risk.

We approached this task systematically, in a series of steps that combined analysis, review and decision-making on the proposed covariates by the MegaQI Team's Steering Committee.

*Step 1: Selecting the Initial List of Covariates.* In September 2002, the SC met to select covariates for initial testing. We began with a long list of candidate covariates, applying several criteria to narrow the list. In addition to standards of statistical correlation, we selected covariates 1) that SC clinicians and researchers believed to be good candidate measures of risk, 2) that the SC believed could not be easily "gamed" by nursing facilities to improve their scores, 3) that facilities were unlikely to have "caused" by their previous actions and 4) that could be constructed from the Minimum Data Set (MDS). As shown in Exhibit 2, we selected:

- the 30 "original" covariates already included in specifications for the 45 CC and PAC QMs;
- indices and scales based on the Resource Utilization Group-III (RUG-III) Case Mix system;
- the Nursing Severity Index (NSI);
- two new indices, the Personal Severity Index (PSI) and a Cardio/Pulmonary Impairment Severity Scale; and
- 12 diagnosis indicators.

QMs were computed from data gathered in "target" resident assessments. All covariates were computed from assessments conducted prior to the target assessments

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<sup>1</sup> MegaQI Steering Committee members are from CMS, Abt Associates, Hebrew Rehabilitation Center for Aged and Brown University.

<sup>2</sup> Exhibits cited here and in the main report are attached to the main report. In addition, we have provided a separate Technical Appendix with specifications for the covariates and models, and detailed statistical tests.

Step 2: Reviewing Correlations of Covariates and QMs at the Resident Level. Next, the SC explored the statistical relationship between QMs and covariates. It was agreed that if a measure of correlation between a covariate and a QM was 0.10 or larger, we would retain the covariate for further analysis.<sup>3</sup> Using this standard, and with continued review and discussion of clinical, behavioral and other factors, we dropped the following: 17 of the 30 original covariates; RUG-based scales for Extensive Care, Extensive Services, Rehabilitation and Special Care; the NSI; the Cardio/Pulmonary Impairment Severity Scale; and all diagnosis indicators except acute episode, Alzheimer's disease, other dementia, and hip fracture. The SC combined Alzheimer's and other dementia in one covariate in the final specifications.

Step 3: Testing Covariates in Resident-Level Prediction Model. In Step 3, our objective was to design resident-level models that related specific covariates to the appropriate QMs. With these models, we could show how resident risks related to the prevalence of resident problems. For example, we could predict how much more prevalent bowel incontinence is likely to be among residents with three of four possible risk factors, compared to residents with only two risk factors. To build prediction models, we used MDS data from a sample of all Quarter 2 2002 nursing home residents. We studied how closely each covariate correlated with its associated QM, alone and together with other covariates. After examining several measures of how well different combinations of covariates "fit" the data, we selected final lists of covariates for each QM model. Then, we retested our models using data from five new samples of residents. The models performed well in the retest. The SC approved covariates and models developed in Step 3 for further tests at the facility level in Step 4.

Step 4: Analyzing Facility-Level Risk Adjustment. In Step 4, we used the resident-level prediction models to compute risk adjusted QMs at the facility level and to study the effects of adjustment on QM scores and rankings of nursing facilities. In the adjustment process, each facility's observed and predicted scores are combined with the national mean, to estimate what that facility's QM would be if it faced the national "average" mix of resident risks. We tested the new adjustment models against previous models (based on the FAP, and based on the original resident-level covariates). We were particularly interested to study how effectively adjustment "targets" facilities ranked highest and lowest both in observed QMs and in measures of resident risk, measured by the RUG-III Case Mix Index.

In general, facility-level analyses of adjustment based on the new covariate models showed improvement over the FAP and/or original covariate models, particularly in targeting effectiveness. As expected, we found variation in comparative performance. Some new models achieved solid improvement measured in almost all comparisons with alternatives, most performed well in some comparisons, and a few showed little or no relative improvement.

Recommendations. At the conclusion of this process, the SC recommended resident-level covariates and models, shown in Exhibit 3, that represent a significant departure from the original QM specifications. Our analyses suggest that there may be room for further exploration of the role of nursing facility-level measures in QM adjustment. But we consider the resident-level covariates that we recommend to be valid and accurate for adjusting publicly reported nursing facility QMs

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<sup>3</sup> In fact, the SC retained some covariates that members supported strongly on clinical or behavioral grounds, but that had correlations slightly lower than 0.10.

# Background

Over the past two years, the MegaQI Team Steering Committee (SC), including investigators from Abt Associates and colleagues at Hebrew Rehabilitation Center for Aged (HRCA), Brown University, and the Centers for Medicare and Medicaid Services (CMS), developed specifications for 45 chronic care (CC) and post-acute care (PAC) nursing facility quality measures (QMs). (See Exhibit 1 for a list of all QMs).<sup>4</sup> The National Quality Forum (NQF) reviewed the SC's methodology and recommended a short list of measures for immediate public reporting. With input from a steering committee convened by the NQF and other experts, CMS selected eight of the 45 (five CC and three PAC QMs) for posting on CMS' Nursing Home Compare website in November 2002. Two of these QMs (one CC and one PAC) were posted both with and without facility-level adjustment.

Specifications for most QMs called for adjustment based both on covariates that measure resident-level risk and, for many QMs, facility-level measures (the facility admissions profile, or FAP). Since preliminary risk adjustment analyses had been accelerated to meet public reporting requirements, CMS asked the MegaQI Team to revisit the issues of covariate selection during the fall of 2002, focusing only on resident-level covariates. Over the past two months, we have assessed covariates for QM adjustment in a more comprehensive and systematic fashion than had been possible before. This report recommends resident-level covariates for QM risk adjustment, and it describes the analyses and decision processes that we used to develop these recommendations.

## Why Risk Adjust?

The argument for risk adjusting QMs is simple. The ideal risk adjustment system should calibrate QMs to better measure real differences in quality among nursing facilities. Facility A's unadjusted or "observed" QM shows a higher-than-average prevalence of problems. Facility A also cares for residents at higher-than-average risk of the problem measured by that QM. But Facility A should not be ranked equal in performance to Facility B, which has the same score but treats lower-risk residents. Risk adjustment should correct for differences in resident characteristics over which facilities have little or no control. In this example, Facility A's adjusted score, which shows what the QM would be if Facility A admitted lower risk residents (an "average" resident risk profile) should be lower than Facility B's adjusted score. Adjustment should also move scores of facilities with lower-than-average risk profiles toward the average, producing an adjusted QM higher than the unadjusted QM.

Although the argument for risk adjustment is simple, designing a workable system is not, since uncontrollable risk is difficult both to define and to measure. For example, if a resident is incontinent at admission or at a regular quarterly assessment, her risk of acquiring a pressure sore over the next three to six months may be higher than it is for a continent but otherwise similar resident. But the facility may be able to reduce this risk by treating her incontinence. If so, and if the facility can

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<sup>4</sup> Exhibits are attached at the end of this report. In addition, we have provided a Technical Appendix with specifications for the covariates and models, and detailed statistical tests used to analyze the covariates. Note that QM names in Exhibit 1 are the expanded, consumer-friendly descriptors developed to facilitate public reporting. In the text of this document, we generally use shortened names or code names to describe specific QMs.

mitigate other residents' incontinence as well, adjusting a pressure sore QM using a covariate that measures incontinence might actually “over adjust” the QM. Over adjustment produces a QM score lower than it should be, because incontinence is treated entirely as a measure of risk, not a condition that the facility can change through appropriate care. The risk of developing pressure sores may be buried in other resident characteristics that make incontinence difficult or impossible to treat (for example, deteriorating physical or cognitive function related to the natural progression of a disease).

How much the facility is truly at risk for pressure sores and other problems is almost always debatable. Some might use these ambiguities to argue for minimal or no risk adjustment, on grounds that any adjustment system will tend to give too much leeway to nursing facilities that should address competently the problems of all residents, regardless of risk. The MegaQI Team took the position that risk adjustment is a necessary part of a fair quality measurement system, for some, though not all, QMs.

In risk adjustment, residents are assigned to risk groups. The simplest approach assigns residents to two groups, high and low risk, and reports separate QM scores for each. For example, the QM Behavior Symptoms Affecting Others, developed by the Center for Health Systems Research and Analysis (CHSRA) is defined for a high risk group (all residents with specific, relevant functional and diagnostic evidence of behavior problems) and a low risk group (residents without these indicators). The SC adopted a different method, using statistical estimation techniques to define multiple risk groups, measured by one or more resident-level covariates. We determined a resident's membership in a risk group by the presence or absence of certain risk factors (for example, dependence in toileting) or, for some measures, the level of risk captured in a multiple-value scale (for example, six levels of increasing risk captured by the Cognitive Performance Scale). With this approach, resident risk could be measured in several dimensions (dependence in toileting and a Cognitive Performance Scale score, plus others if appropriate).

## Step One: Selecting the Initial List of Covariates

In September 2002, the SC met to discuss and plan for the covariate analyses. At this meeting, the SC reviewed and selected for subsequent analysis the “original” covariates (those already identified in specifications for the 45 QMs), several new scales and indices, and some proposed new diagnosis measures. Later, we conducted statistical tests to see how closely all proposed covariates correlated with the QMs. Throughout this process, in addition to statistical evidence, we reviewed covariates using clinical and other standards.

- Any proposed covariate had to have “face validity.” In the opinion of experienced SC clinicians and researchers, the covariate had to be plausible, independent of any statistical evidence, as a measure of the risk of a particular QM. The SC paid particular attention to the dangers of over adjustment. We dropped several potential covariates that met our statistical criteria for inclusion but appeared to be questionable as measures of uncontrollable risk.
- The covariate should offer minimal incentive for facilities to “game the system” (for example, by recoding MDS items or by being more selective with admissions).

- We generally rejected covariates that might have been influenced by the facility's own actions. For example, a resident with pressure sores three months ago (a potential covariate) is clearly at higher risk of having pressure sores today. But the facility may have been at least partly responsible for the resident's earlier condition.. Therefore, we considered existence of prior pressure sores to be an inappropriate covariate.
- The proposed covariate could be constructed from one or more Minimum Data Set (MDS) items.

Proposed covariates included:

- the 30 “original” covariates in the specifications for the 45 CC and PAC QMs -- these covariates measure residents' physical, social and cognitive function and clinical condition. Separate lists of covariates had been defined for CC and PAC QMs;
- indices and scales derived from the Resource Utilization Group-III (RUG-III) system, now used to adjust Medicare payments to nursing facilities -- these included the Nursing Case Mix Index (CMI), for both chronic and post acute care; scales created from the RUG CMI model (scales for Extensive Care, Clinically Complex, Cognitive Impairment, Extensive Services, Late Loss ADL, Behavior Problems, Rehabilitation and Special Care); and the Cognitive Performance Scale (CPS);
- the Nursing Severity Index (NSI), both weighted and unweighted;
- an “end of life” measure, the Personal Severity Index (PSI), and two subcomponents: PSIS1 that captures clinical indicators, and PSIS2 that includes functional indicators;
- a Cardio/Pulmonary Impairment Severity Scale;
- twelve diagnosis indicators, from items in Sections I and J of the MDS.

Exhibit 2 lists all the covariates that the SC proposed for testing at the September meeting. Starred items in Exhibit 2 were eventually dropped from the list of recommended covariates. Attachment 1 in the Technical Appendix presents specifications for the all the covariates that we tested.

## Step Two: Reviewing Correlation of Covariates and QMs at the Resident Level

To be useful for adjustment, covariate measures have to correlate with the QMs. Using our previous example, unless the prevalence of a proposed incontinence covariate increases as the prevalence of pressure sores increases, incontinence will be a poor covariate choice for the pressure sore QM. Note that the direction of correlation need not be positive. More residents needing help in bed mobility should be associated with fewer residents showing improvement in walking. Measuring the strength and direction of the correlation between QMs and proposed covariates was the next step in our analysis.

Following the September meeting, SC investigators calculated statistical measures of correlation of all proposed covariates with the 45 QMs. In the following discussion, these correlation measures are referred to collectively as “R-statistics.”<sup>5</sup> Attachments 2 and 3 display these statistics for all covariates and CC and PAC QMs respectively.

The SC used these statistics to refine the list of covariates for succeeding phases of the analyses. In general, we judged each correlation against a common threshold: if the R-statistic was greater than 0.10, we retained the covariate for further testing. However, in some instances in which clinical and other factors seemed compelling, the SC retained covariates with R-statistics lower than 0.10. In other cases where statistical criteria were met, we rejected covariates that we believed failed to meet other criteria for validity.

### Original Covariates

***Covariates for chronic care QMs.*** Most of the original covariates showed correlation with one or more QMs, but not always the QMs to which they had originally been linked. For 1,140 QM/covariate relationships, 161 R-statistics exceeded 0.10, and 89 exceeded 0.15. Of the 30 covariates that had been included in CC QM specifications, only six achieved R-statistics of 0.10 or greater. For several QMs, there were no covariates that made the cut, including QMs with and without resident-level covariates in the current specifications. However, some covariates seemed to be closely associated with several QMs. Only one covariate (age greater than 76) had no apparent association with any QM, though five others had only one (unsteady gait, falls in past 30 days, planned discharge, ALS or MS diagnosis, and unstable function). “Large” R-statistics tended to cluster in association with particular QMs or groups of QMs. This was most obvious for the incontinence QMs, with 13 R-statistics of 0.40 or higher. Directional signs for most of the measures that made the cut seemed appropriate. For example, wandering behavior was positively correlated with the QM Prevalence of Antipsychotic Drug Use (CDRG01).

Other examples included the following:

- The QM ADL Worsening Following Improvement (CADL01) had no covariates in the original specifications, and analyses confirmed no association with any of the candidate covariates.

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<sup>5</sup> At the resident level, QMs are measured as “dichotomous variables” (a resident either has or does not have a problem), and most of the proposed covariates are similarly dichotomous. The SC used the phi statistic as a measure of correlation between two dichotomous variables. As with most measures of correlation, the phi statistic ranges from –1 to +1. The larger the absolute value, the closer the estimated association between a covariate and a problem. Phi’s of +.32 and -.32 show equally strong association, but the positive statistic implies that the covariate and QM move together in the same direction (larger values of the covariate are associated with larger values of the QM), while a negative statistic shows the two moving in opposite directions. For covariates (like the CMI) that could take on many values, we used the coefficient of determination, computed from a logistic regression, as a measure of QM/covariate correlation.



- For the Cognition Worsening QM (CCOG01), none of the four original covariates (bowel incontinence, fall in the past 30 days, weight loss, and age greater than 76) reached the 0.10 threshold.
- The Worsening Bowel Incontinence QM (CCNT02) had three original covariates (short-term memory problem, bladder incontinence, and dependence in dressing), each of which was confirmed in statistical tests, along with another covariate not in the original list (long-term memory problem).

***Covariates for PAC QMs.*** Of the 56 PAC/covariate R-statistics, eleven exceeded 0.10, and seven exceeded 0.15. Four of these did so in association with the QMs they were originally designed to adjust.

Specific examples included:

- The PAC Pressure Sore QM (PPRUX01) had five covariates (sore resolved, needs bed mobility assistance, bowel incontinence, diabetes/peripheral vascular disease and low body mass index); statistical analysis showed correlation with this QM for the first three.
- The Improvement in Walking QM (PWAL0X) had no original covariates, but statistical analysis confirmed correlation with three (no prior residential history, needs bed mobility assistance and bowel incontinence).

### **RUG-III Case Mix Index (CMI)**

The RUG-III Nursing Case Mix Index (CMI) was computed from the 44-category RUG-III Grouper, separately for CC and PAC residents. The CC CMI as a covariate performed well for some QMs. Thirteen of a total 30 QMs that were tested for correlation with the CMI had R-statistics that exceeded 0.10 (nine of the 13 exceeded 0.15). High R-statistics were concentrated in pressure sore and incontinence QMs. For the PAC QMs, the CMI correlated with four of seven QMs at an acceptable level (three of the four R-statistics exceed 0.15). Directional signs all seemed appropriate for both CC and PAC QMs: positive for QMs where higher numbers imply worse performance, and negative for the few cases, such as Improvement in Walking (CWAL0X and PWAL0X), where the positive signs mean improvement.

### **RUG Scales**

We tested seven scales generated by the RUG-III Grouper as intermediate steps in constructing the CMI, for both CC and PAC residents.<sup>6</sup> These scales included:

- Late Loss ADL,
- Behavior Problems,
- Clinically Complex,
- Extensive Care,

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<sup>6</sup> To test these scales, we converted several to dichotomous (two-valued) measures. Specifications for recoding may be found in Attachments 6 and 7.

- Cognitive Impairment,
- Rehabilitation, and
- Special Care.

Late Loss ADL achieved R-statistics at an acceptable level for the most CC QMs (11 out of 38) and PAC QMs (three out of seven). Other scales ranged in the number of acceptable R-statistics from five to eight for CC QMs and from none to two for PAC QMs.

### **Nursing Severity Index (NSI)**

The Nursing Severity Index (NSI) is based on the presence or absence of 30 nursing diagnoses that researchers developed to predict morbidity, mortality and length of stay in acute care residents. For testing as a potential covariate, we measured the NSI diagnoses from items in the MDS, with most relying on the presence or absence of multiple MDS items. For example, the nursing diagnosis “less nutrition than required” is in effect if the MDS shows weight loss, parenteral/IV, feeding tube, or nutrition/hydration to manage skin problems. For each resident, the unweighted NSI is a number between 0 and 30 that represents the sum of all nursing diagnoses coded for that resident. We also tested a version of the NSI in which the components were weighted by the inverse of each component’s frequency in the total resident population. The assumption was that rare components represent relatively high levels of acuity and resource intensity, and should thus have more weight than more frequent, but less serious, components. We analyzed the unweighted and weighted NSIs, for both CC and PAC residents.

Weighting the NSI made a difference, but not an improvement, over the unweighted NSI. The weighted NSI that was applied to CC QMs performed poorly overall. R-statistics equaled or exceeded 0.10 for only three of 38 QMs. R-statistics were acceptable for the incontinence (PCNT0X) and pressure sore (PPRU0X) PAC QMs. Unweighted, the NSI produced 23 R-statistics meeting or exceeding the 0.10 threshold (17 equaled or exceeded 0.15). The unweighted NSI was closely associated with six of the seven PAC QMs, all with R-statistics that exceeded 0.15.

### **Personal Severity Index (PSI)**

The Personal Severity Index (PSI), developed by investigators at Hebrew Rehabilitation Center for Aged and the University of Michigan, is designed to capture functional and clinical conditions characteristic of residents who are near death.<sup>7</sup> (See Attachment 13 in the Technical Appendix) We tested both the full PSI, with 18 components derived from MDS data and age (90 or older), and two subcomponents: PSIS1 (eight clinical components plus age) and PSIS2 (nine functional components plus age). In general, all three versions of the PSI performed about equally well (10 or 11 R-statistics 0.10 or higher for CC QMs, and two to four for PAC QMs).

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<sup>7</sup> PSI development and validation is described in Morris, J.N., R. Jones, S. Morris and B. Fries. Proximity to Death, a Modeling Tool for Use in Nursing Homes. Hebrew Rehabilitation Center for Aged. December 2002. (Attachment 13)

## Other Scales

**Cognitive Performance Scale.** The Cognitive Performance Scale (CPS) is a six-value measure derived from the RUG Grouper. For CC QMs, the CPS achieved about the same frequency of acceptable correlations as the PSI (10 out of 38). The scale was correlated with five of seven PAC QMs.

**Cardio/Pulmonary Impairment Severity Scale.** This scale failed to demonstrate any association with any of the CC or PAC QMs, coming closest (with an R-statistic of  $-0.09$ ) for the PAC Respiratory Problems QM (PRSP0X).

## MDS Diagnosis Indicators

In addition to one original covariate (diagnosis of ALS or MS), we tested 12 new diagnosis indicators from Sections I and J of the MDS. These included:

- acute episode or flare-up,
- Alzheimer's disease,
- dementia other than Alzheimer's,
- arteriosclerotic heart disease (AHSD),
- arthritis,
- cancer,
- congestive heart failure (CHF),
- depression,
- emphysema/COPD,
- hip fracture,
- osteoporosis, and
- renal failure.

Of the 12, only acute episode or flare-up (with two R-statistics of 0.10 or higher), Alzheimer's disease (three) and dementia other than Alzheimer's (four) showed any association with any of the chronic care QMs. Alzheimer's and other dementia achieved accepted R-statistics in relation to three PAC QMs, as did hip fracture and arthritis, both in relation to the inadequate pain management PAC QM. In the final specifications, we combined Alzheimer's disease and dementia other than Alzheimer's into one covariate.

## Selecting Covariates for Further Testing

At this and every stage of the analysis/decision process, the SC reviewed the clinical and behavioral justification for certain covariates, along with the growing body of evidence on statistical relationships. Before Step Three, we eliminated 17 of the original 30 covariates, RUG-based scales for Extensive Care, Extensive Services, Rehabilitation and Special Care, the NSI, the Cardio/Pulmonary Impairment Severity Scale, and all diagnosis indicators except acute episode or flare-up and Alzheimer's disease and other dementia. In general, decisions to drop the original covariates were based on statistical evidence and concerns about over adjustment. We dropped the Cardio/Pulmonary Impairment Severity Scale because it failed every statistical test. Both versions of the NSI were dropped because, though the unweighted version performed well statistically, the SC came to see the NSI as including too many of the components that were seen to threaten over

adjustment in the original covariates. Discarded RUG scales were those that the SC believed to be excessively gameable, because their definitions depended heavily on levels of service. Finally, all diagnostic indicators that were dropped fell short of the 0.10 correlation threshold.

## Step Three: Testing Covariates in Resident-Level Prediction Models

Although the SC recommended no covariates or only one covariate for some QMs, for others there were several candidates. We took the position that a valid method for adjusting QMs could include several separate measures of risk. However, we needed to understand how each proposed covariate performed in concert with other covariates. Covariates may be correlated with each other as well as with QMs. For example, the QM Worsening Bowel Incontinence (CCNT02) had one-to-one correlation with two covariates: the Late Loss ADL scale ( $R = 0.15$ ) and dependence in dressing ( $R = 0.12$ ). But Late Loss ADL and dependence in dressing themselves showed a high degree of correlation with each other ( $R = 0.69$ ). So it was reasonable to suspect that these two covariates may not be independent measures of the risk of worsening bowel incontinence. In some cases, it may be appropriate to drop a covariate that may be duplicating the role of another covariate. Attachments 4 and 5 show measures of correlation between the proposed covariates.

To further the decision process on certain QMs with multiple proposed covariates, the SC examined the effects of all recommended covariates together. This process happened in two stages. First, we used a "test sample" of residents to build statistical models for each QM and its associated covariates. Second, we explored the capacity of these models to function as expected with entirely different "retest samples" of residents.

**Constructing Prediction Models.** The SC conducted initial analyses on 20 percent of the test sample residents. We used a multivariate statistical technique that related each resident's score on the problem captured by a QM (scored 1 if the problem was present, 0 if not present) to all the recommended covariates for that QM.<sup>8</sup> We assessed the contribution of each covariate to the whole group's correlation with a QM by adding covariates to the model one by one, usually beginning with the one that had shown the highest R-statistic, until all were included. Then we reversed the process, beginning with the covariate that had the lowest R-statistic. We used statistics from this process to determine whether or not covariates continued to demonstrate an association with the QM even after other covariates were entered, and to determine which combinations of covariates most accurately predicted the frequency of resident problems. Measures of how well the model "fit" actual resident data included a multiple-measure version of the R-statistic, and measures that captured how frequently the combined covariates predicted a resident's status correctly. These included "concordance," an overall measure of the percent of residents with and without the problem that the model predicted correctly, and "sensitivity," the percent of residents with the problem that were predicted to have the problem.

Taking these measures into account, the SC made recommendations for covariates to be included in the final resident-level models, constructed on data from the entire test sample.

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<sup>8</sup> For these analyses, the SC used logistic regression to conduct all multivariate analyses.

**Testing the prediction models.** Next, we used the “retest sample” to see if the test models built in Step Three would perform equally well for an entirely different set of residents. To do this, we drew five 20 percent random subsamples of residents from the retest sample. Then, for each QM and each 20 percent sample, we used the test models to predict resident problems. We then studied the correlation of predicted problems with actual problems, using R-statistics, concordance and sensitivity measures. In general, the models performed equally well for the test sample and the retest subsamples. Measures of correlation and fit were not substantially different – that is, the retests did not improve on results from the test models, but they also did not show poorer performance. Test models, and the retest results, are reported in Attachment 8.

**Preparing for the facility level analyses.** The SC reviewed results of the retest, and revisited issues of clinical validity for several of the proposed covariates. At the conclusion of this process, the SC confirmed the selection of covariates for further testing at the facility level.

## Step Four: Analyzing Facility-Level Risk Adjustment

Although the basis for a valid risk adjustment system is correlation between covariates and QMs at the resident level, QMs are risk adjusted at the facility level. In other words, risk adjustment is performed for all residents with a specific condition or set of conditions across the whole facility, rather than on a resident-by-resident basis. In the next stage of the analyses, we used our models to risk adjust facility QMs. We then compared distributions of QMs with and without adjustment, to assess what impact adjustment had on facility scores and rankings.

### Computing Adjusted QMs

For QMs with recommended covariates, we computed adjusted scores for all 16,615 U.S. nursing facilities in Q2 2002, applying the quality measure calculation method currently in use for the 10 publicly reported QMs. There are three components of an *adjusted facility QM score*.

1. The *observed facility QM score* is simply the ratio of a facility’s residents who have the condition or problem represented by the QM over all facility residents at risk for the problem.
2. The *predicted facility QM score* is the score that would be predicted for the facility, given the mix of residents residing in the facility for the time period under analysis. We predicted each facility’s score by combining the appropriate covariates and profiles of resident risks characteristics, using models developed in Step Three (above).
3. The *national average QM score* completes the formula.

Each facility’s adjusted score combines the observed score, the predicted score and the national average score. For the publicly reported QMs, no adjusted scores are computed for facilities with at-risk resident populations smaller than a set threshold (30 residents for CC QMs, and 20 for PAC QMs). This is because QM scores based on small numbers of residents tend to be highly unstable, making them difficult to interpret. (An increase from one to two residents with a QM problem, out of a pool of five residents at risk for the problem, will double the QM score from 20 to 40 percent). The SC adhered to this exclusion rule for adjustment based on the new covariate models.

## Assessing the Effects of Adjustment: Comparing the New Models to Earlier Models

We assessed the effects of adjustment on facilities in several ways. Wherever possible, we compared performance of the new models to alternative models. These alternatives were based on the facility admissions profile (FAP), on the original resident level covariates, or on FAP/original covariate combinations. First, we assessed the overall impact of adjustment, measured through correlation (of observed and adjusted QMs) and through analysis of how facility ranking on QM scores changed after adjustment. Then we studied more closely the extent to which different adjustment methods targeted facilities that admit residents with more or less risk.

***Correlating observed and adjusted QMs.*** If an observed QM correlates less closely with QMs adjusted with the new covariates than QMs adjusted by other methods, then the new covariate model “works” in the sense that the new model changes facilities' QM scores more than the other models. We correlated the observed QMs with QMs adjusted by the new covariates. Where appropriate, we did the same for FAP-adjusted and original covariate-adjusted QMs. Results are presented in Attachment 9. We made several observations based on these analyses.

- Measures of correlation between observed QMs and QMs adjusted by the new covariates ranged from 0.986 (very close correlation, little impact of adjustment on the QMs) to 0.713 (less close correlation, more impact).
- For half of the 40 QMs that had alternative adjustment models, the new covariate models had more impact (lower correlation with observed QMs) than at least one of the alternatives. For 14 QMs, one of the alternatives was the original covariate model. The new covariate models showed greater impact (lower R) than the original covariate model for 10 of these QMs. Only for Worsening Behavioral Symptoms (CBEH04), Worsening Bowel Incontinence (CCNT02), Worsening Bladder Incontinence (CCNT03) and Worsening Pressure Sores (CPRU04) did the original covariate models appear to have greater impact than the new models.
- In general, models based on the FAP showed lower correlation than the new covariate models. For 18 QMs, the FAP model was the only alternative. Of these 18, the new models showed lower correlation than the FAP for only six.
- We proposed new covariate models for two QMs that had no previous adjustments: ADL Improvement (CADL03) and Little or No Activity (CSOC02). However, measures of correlation with observed QMs were high for both (0.961 and 0.984 respectively), suggesting minimal impact.

***Exploring the effects of adjustment on facility ranking.*** Correlation provides a good measure of average impact, but it does not show the effects adjustment might have on facility rankings by QM score. We began our exploration of ranking by documenting overall changes, in terms of movements among facilities grouped into the highest and lowest 10 percent of QM scores.

To study the effects of adjustment on facility ranking, we computed several measures, including

- the percent of facilities ranked in the highest and lowest 10 percent of each QM distribution that moved toward the “middle” of the distribution after adjustment (from the highest 10

percent to any lower rank above the mid-point of the distribution, and from the lowest 10 percent to any higher rank below the mid-point) — for this measure, the larger the percent of facilities moved from the highest and lowest groups toward the middle groups, the more “effective” the adjustment method;

- the percent of facilities that did not move at all — here, the smaller the percent of non-movers, the more effective the adjustment method;
- the average difference in percentage points between the observed and the adjusted QM scores — the larger the average difference between observed and adjusted QMs, the more effective the adjustment method.

In general, as Attachment 9 shows, statistics on changes in rank confirmed evidence from the correlation analyses. For the 10 QMs for which correlation analysis showed the new models to be more effective, there was more movement out of the top and bottom 10 percent of QM scores and fewer non-mover facilities for the new than for the original covariate models. For the QM Prevalence of Indwelling Catheter (CCAT02), scores for 41 percent of facilities were unchanged by adjustment under the new model (Line 3, Column 3), compared to 47 percent under the original covariate model (Line 3, Column 2). Adjusted with the new model, 3.79 percent of facilities in the top 10 percent and 1.26 percent in the bottom 10 percent (Lines 1 and 2, Column 3) moved toward the middle (compared to 2.86 percent and 0.99 percent respectively for the original covariate model, shown in Lines 1 and 2, Column 2). The average percentage point change due to adjustment was 0.0191 for the new model and 0.0162 for the original (Line 1, Columns 2 and 3).

In contrast, for the QM Worsening Behavioral Symptoms (CBEH04), adjustment using the new covariates left 68.8 percent of facilities unchanged in ranking, compared to 64.9 percent of facilities under the original covariate model. With the new model, movement from the top 10 percent (1.25 percent) and bottom 10 percent (0.60 percent) was less than movement with the original covariate model (1.50 and 0.82 percent respectively).

Taken together, the correlation and rank analyses do not show many clear patterns. However, we found some interesting tendencies.

- There are three prevalence QMs for pressure sores (CPRU01 - CPRU03), and three for incontinence (CCNT01, CCNT05 and CCNT06). For each, the new models outperformed the FAP models and, when they were present, the original covariate models. Exactly the opposite was true for the incidence measures Worsening Pressure Sores (CPRU04), Worsening Bowel Incontinence (CCNT02), and Worsening Bladder Incontinence (CCNT03), for which the new models proved to be less effective than their alternatives.
- For all PAC QMs, the FAP models generated more movement than the new models. But for three PAC QMs, Failure to Improve During Early PAC Period (PADL0X), Failure to Prevent or Improve Pressure Sores (PPRU0X), and Failure to Prevent or Improve Respiratory Problems (PRSP0X), the new covariate models were more effective than the original covariate models.

***Exploring the effects of adjustment on facilities admitting high and low-risk residents.*** To this point, we can only say that one adjustment model had a greater impact than another either on the whole distribution of QM scores or on facilities with extremely high or low scores. We do not know how effectively any adjustment performed in targeting QMs of facilities that care for very high or low risk residents.

To study targeting effectiveness, we created facility-level indicators of risk from the RUG-III CMI scores of residents at admission. We classified facilities as “High QM/High CMI” if they were in the top 10 percent of the QM distribution and the top 10 percent of the CMI distribution. “Low QM/Low CMI” defined groups of facilities in the bottom 10 percent of both distributions. Then we computed two targeting ratios: High QM/High CMI facilities, as a percent of all facilities that moved from the top 10 percent of a QM distribution, and equivalent ratios for Low QM /Low CMI facilities moving from the bottom 10 percent of a QM distribution. If the new models targeted for risk more effectively than the alternatives, we should expect to see larger targeting ratios for the new models.

Overall, as Attachment 10 shows, the new covariate models did a better job of targeting than the original covariate models in 18 of 28 possible comparisons (comparing movement from the top and bottom 10 percent in each of 14 QMs). An example will show how we reached these conclusions. For Worsening Behavioral Symptoms (CBEH04), we first calculated the percent of all 16,615 facilities that moved from the top and bottom 10 percent for this QM. Column 5 shows that 0.816 percent (136 facilities) moved from the bottom 10 percent to the middle of the distribution when adjusted using the original covariate model, while 0.602 percent (100 facilities) moved when adjusted by the new model (Column 6). Some of these “movers” were in the lowest CMI risk group. Using the original covariate model, 0.123 percent of all facilities (20 facilities) that moved were low in both QM and risk (Column 2). For the new model, the percentage was 0.122 (19 facilities), shown in Column 4. The percent of “movers” from the low QM group that were also low risk, shown in Column 7, was about 15 percent (0.123/0.816) for the original covariate model. The corresponding figure for the new model was about 20.2 percent (0.122/0.602), shown in Column 9.

For seven QMs, the new models were superior at both extremes of the distribution. For four more, the new model outperformed the original model at one or the other extreme, but not both. For three, the original covariate model targeted facilities better than the new model.

The new covariate models also performed quite well in comparison to FAP-adjusted models, shown in Columns 8 and 11. Out of 56 possible comparisons (comparing movement from the top and bottom groups in each of 28 QMs), the new models were more effective than FAP-adjusted models in 35 comparisons.

#### **Adjustment and QM Change at the Facility Level – Seven "Case Studies"**

To provide concrete illustrations of how adjustment affects QM scores, we tabulated 40 facility-level measures for each of seven QMs. For this purpose, we selected samples of 20 facilities from the High QM/High CMI group, and 20 from the Low QM/Low CMI group for the following QMs (starred QMs are publicly reported):

- Prevalence of Infections (CINF0X)\*
- Pressure Sore Prevalence (high and low risk) (CPRU01)\*
- Inadequate Pain Management (CPAI0X)\*



Inadequate Pain Management (PPAI0X)\*  
Improvement in Walking (PWAL0X)\*  
Prevalence of Feeding Tubes (CNUT01)  
Worsening Bladder Incontinence (CCNT03)

Attachment 11 shows how the new covariate models adjusted each facility's observed QM, compared to the FAP-adjusted and original covariate models. In most cases, adjustment reduced the scores of the High CMI facilities and increased scores of the Low CMI facilities. For example, adjusted by the new covariate model, High CMI Facility 12's QM for CINF0X dropped from 30.26 percent to 25.79 percent. For Low CMI Facility 17, their CINF0X QM increased when adjusted by the new model from 4.00 percent to 4.65 percent. We did not find entirely consistent patterns of increase or decrease across all facilities. This was the expected result. Since the CMI is an inclusive measure of resident case mix, we would not expect to see adjustment models achieve uniformly high targeting efficiency across diverse facilities.

### **Assessing the Effects of Adjustment: Comparing the New Models Across QMs**

We compared the new covariate models across QMs, to give an additional perspective on relative performance. This also provided context for assessing QMs that had few (or no) alternative adjustment models for comparison. Attachment 12 ranks all QMs in ascending order on four measures of movement following adjustment. In this table, Column 1 shows the percent of all facilities that moved from the lowest 10 percent of observed QM scores. Column 2 shows the percent moving from the highest 10 percent. Columns 3 and 4 report "targeting ratios." Column 3 shows the lowest-CMI facilities that moved, as a percent of all movers from the lowest 10 percent of QM scores. Column 4 shows the highest-CMI movers, as a percent of all movers from the highest 10 percent of QM scores. QMs in each column are ranked above and below the median value for each measure. We considered new covariate models above the median to be "relatively effective," compared to models for QMs below the median.

Here, as in the earlier comparisons among alternative adjusters, we were particularly interested in targeting capability, shown in Columns 3 and 4. The range for models targeting low risk facilities runs from zero for Antipsychotic Use, High and Low Risk (CDRG01) -- meaning that this model moved none of the lowest risk facilities toward the middle of the distribution -- to 53.4 percent (over half of facilities that moved from the lowest scores for Worsening Pressure Sores, CRPU04, were from the lowest risk group). At the other extreme, the Walking Improvement (PWAL0X) model did not move any high-risk facilities out of the highest group of QM scores, while about 35 percent of CPRU04's high-QM movers were high-risk facilities.

Some QMs performed consistently above the median on all four measures, while others changed their relative positions. The former group included CINF0X, CCNT01, CCNT02, CCNT06, CPRU01, CNUT01, PPRU0X and PCNT0X. Others were above the median in both measures of targeting effectiveness, but below on one or more measures that captured total movement: these include CADL03, CCAT02, CMOB1, CCNT03 and CPRU04. From these results, it is apparent that incontinence and pressure sore QM models tended to be relatively effective at targeting facilities based on risk.

## Summary of New Covariates Performance at the Facility Level

We can summarize with a few generalizations about performance of the new adjustment models.

- Taken as a group, the new models tended to do a better job of targeting adjustment appropriately. That is, the new models moved facilities ranked highest both on QM scores and resident risk toward the center of the distribution, and did the same for facilities ranked lowest on QM and risk. This was particularly true in comparisons of new to original covariate models, but it was also true in many comparisons with FAP adjustment models.
- Generalizations about the performance of new models for QM “families” are difficult to support. But the new covariate models for CC and PAC incontinence and pressure sore QMs tended to perform well, compared to FAP and to original covariate alternatives, and compared to new covariate models for other QMs.
- As expected, the performance of some QM models did not conform neatly to any of these generalizations. These included the two QMs for which we have only new covariate models, ADL Improvement (CADL03) and Little or No Activity (CSOC02). For these, we can only cite their performance relative to other new covariate models. CADL03’s model performed above the median in targeting effectiveness for both high and low risk facilities. CSOC02 only performed above the median in the percent of facilities moved from the lowest QM group.

For six QMs (CCOM01, CDRG01, CDRG02, CPRU02, CFAL01, PPAI0X and PWAL0X), the new models were less effective in targeting than the alternatives in every comparison, though some showed effectiveness in other ways. Only PWAL0X failed to perform well in comparisons with the alternative (FAP-adjustment) in total and targeted movement effectiveness, and in comparison with other new covariate-adjusted QMs.

## Conclusions and Recommendations

This report describes a process through which the SC analyzed potential covariates for adjusting nursing facility CC and PAC QMs. We recommend resident-level covariates and models, shown in Exhibit 3 that represent a significant departure from the original QM specifications.

- None of the recommended models includes a facility admissions profile (FAP) measure.
- Some QMs with models based on original covariates have entirely new covariates, or no recommended covariates at all.
- Some QMs formerly adjusted only with FAP measures now have models based on resident-level covariates.
- Some QMs, for which no adjustment model was recommended, now have new covariate models.

The SC began with an inclusive list of potential resident-level covariates. We tested the correlation of these covariates, singly and jointly, with the 45 QMs. We reviewed each covariate against standards of clinical validity in the context of particular QM models. We tried to follow a “conservative” strategy designed to minimize the chances of over adjustment.

In general, facility-level analyses of adjustment based on the new covariate models showed improvement over the FAP and/or original covariate models. We did not, however, use results from the facility-level analyses to revise our recommendations on new covariate models. As expected, we found variation in comparative performance. Some new models achieved solid improvement measured in almost all comparisons with alternatives, most performed well in some comparisons, and a few showed little or no relative improvement. These results suggest that further exploration of the role of facility-level measures may produce more effective adjustment models. But we consider the resident-level covariates that we recommend to be valid and accurate for adjusting publicly reported nursing facility QMs.

**Exhibit 1 – Table of QMs**  
**\* QMs selected for public reporting**

<b>Chronic Care Quality Measures</b>	<b>Code Name</b>
* Percent of residents who had an unexpected loss of function in some basic daily activities	CADL01
Percent of residents with worsening function in some basic daily activities	CADL02
Percent of residents who have improved in their ability to function	CADL03
Percent of residents who have declined in their ability to locomote	CMOB01
Percent of residents who walk as well or better than the previous assessment	CWAL0X
Percent of residents whose cognitive ability has worsened	CCOG01
Percent of residents whose ability to communicate has worsened	CCOM01
Percent of residents with symptoms of delirium	CDEL0X
Percent of residents with inappropriate behavior (high & low risk)	CBEH01
Percent of residents with inappropriate behavior (high risk)	CBEH02
Percent of residents with inappropriate behavior (low risk)	CBEH03
Percent of residents whose behavior has worsened	CBEH04
Percent of residents who have become more depressed or anxious	CMOD03
Percent of residents engaging in little or no activity	CSOC02
Percent of residents with a new indwelling catheter	CCAT01
Percent of residents with indwelling catheters	CCAT02
Percent of residents who are bladder or bowel incontinent (high & low risk)	CCNT01
Percent of residents who are bladder or bowel incontinent (high risk)	CCNT05
Percent of residents who are bladder or bowel incontinent (low risk)	CCNT06
Percent of residents with worsening bowel continence	CCNT02
Percent of residents with worsening bladder continence	CCNT03
Percent of residents with a urinary tract infection	CCNT04
Percent of residents who have fallen	CFAL01
* Percent of residents with infections	CINF0X
Percent of residents with a feeding tube	CNUT01
Percent of residents with a low BMI	CBMI0X
Percent of residents who have unexplained weight loss	CWGT01
* Percent of residents with pain	CPAI0X
Percent of residents with worsening pain	CPAN01
* Percent of residents with pressure sores (high&low risk)	CPRU01
Percent of residents with pressure sores (high risk)	CPRU02
Percent of residents with pressure sores (low risk)	CPRU03
Percent of residents with worsening pressure sores	CPRU04
Percent of residents with burns, skin tears or cuts	CBUR0X
* Percent of residents in physical restraints	CRES01
Percent of residents on antipsychotics without a diagnosis of psychosis (high & low risk)	CDRG01
Percent of residents on antipsychotics without a diagnosis of psychosis (high risk)	CDRG02
Percent of residents on antipsychotics without a diagnosis of psychosis (low risk)	CDRG03

<b>Post Acute Quality Measures</b>	<b>Code Name</b>
* Percent of short-stay residents with delirium	PDEL0X
Percent of short-stay residents who have not improved since admission	PADL0X
Percent of short-stay residents whose ability to control their bowel or bladder has not improved since admission	PCNT0X
* Percent of short-stay residents with pain	PPAI0X
Percent of short-stay residents whose pressure sores have not gotten better	PPRU0X
Percent of short-stay residents who have developed a respiratory infection or have not gotten better	PRSP0X
* Percent of short-stay residents who walk as well or better on day 14 as on day 5 of their stay	PWAL0X

## Exhibit 2 – Table of Covariates<sup>9</sup>

<b>CHRONIC CARE</b>	
<b>COVARIATE NAME</b>	<b>CODE NAME</b>
Age > 76*	CCOG1_D
ALS/MS diagnosis	CNUT1_B
Any wandering	CFAL1_B
Bed mobility problem*	CWGT1_B
Bladder Incontinence*	CCNT2_C
Bowel incontinence*	CCOG1_A
Fall in last 30 days*	CCOG1_B
Fall in last 180 days*	CMOB1_A
Independence in daily decision making*	CPAIX_A
Locomotion Problem	CPRU4_D
Long term memory problem	CWGT1_A
Moderate/impaired decision making problem	CBEH4_B
Modes of expression: speech*	CBEH4_A
More dependence in dressing*	CCNT3_B
More dependence in toileting	CMOB1_C
Motor agitation	CBEH4_C
Not totally dependent in transferring	CMOD3_A
Pain Present*	CMOD3_B
Physically abusive behavior*	CWGT1_C
Planned discharge: 30-90 days*	CMOD3_C
Pressure sores (stage 3 or 4)	CCAT1_B
Requires much assistance for eating	CCOM1_A
Resident not bedfast*	CFAL1_A
Severe decision making problem*	CCNT3_C
Short term memory problem	CCOM1_B
Swallowing problem	CNUT1_A
Transferring problem*	CPRU4_A
Unstable condition*	CPRU4_B
Unsteady gait/cognitive impairment	CFAL1_C
Weight loss (5%, past 30 days; 10%, past 180 days)*	CCNT3_D
<b>Nursing Severity Index (NSI)</b>	
Weighted NSI*	NSIDX
Unweighted NSI*	NSIUNWT
<b>Personal Severity Index (PSI)</b>	
Full PSI	MF1
PSI: Subset 1 – Diagnoses	MFIS1
PSI: Subset 2 – Non-Diagnoses	MFIS2

<sup>9</sup> Starred items were dropped from final QM specifications, either because they failed the SC's statistical threshold or because literature and informed judgment of SC members determined that they failed on non-statistical grounds (over adjustment, clinical relevance, potential for gaming, etc.)

CHRONIC CARE	
COVARIATE NAME	CODE NAME
<b>Resource Utilization Group (RUG)</b>	
RUG Nursing CMI	R_CMIC
RUG Late Loss ADL	R_ADL
RUG Behavior Problems	R_BEH
RUG Clinically Complex	R_CLN
RUG Extensive Care*	R_EXT
RUG Cognitive Impairment	R_IMP
RUG Rehabilitation*	R_REHC
RUG Special Care*	R_SPC
<b>Other Scales</b>	
Cardiopulmonary Severity Scale*	CARDIO
Cognitive Performance Scale (CPS)	CPS
<b>MDS Diagnosis Indicators</b>	
Acute Episode or Flare-up	J5B
Combination Alzheimer's Disease / Other Dementia	I1QU
Arteriosclerotic Heart Disease (AHSD)*	I1D
Arthritis*	I1L
Cancer*	I1PP
Congestive Heart Failure (CHF)*	I1F
Depression*	I1EE
Emphysema/COPD*	I1II
Hip Fracture in last 180 days*	J4C
Osteoporosis*	I1O
Renal Failure*	I1QQ

POST-ACUTE CARE	
COVARIATE NAME	CODE NAME
Bowel incontinence*	PPRUX_C
Diabetes or peripheral vascular disease*	PPRUX_D
Indicator of asthma on prior assessment*	PRSPX_A
Indicator of emphysema/COPD on prior assessment*	PRSPX_B
Low body mass index*	PPRUX_E
Needs bed mobility assistance*	PPRUX_B
No prior residential history*	PADLX_A
Sore resolved*	PPRUX_A
<b>Nursing Severity Index (NSI)</b>	
Weighted NSI*	NSIDX
Unweighted NSI*	NSIUNWT
<b>Personal Severity Index (PSI)</b>	
Full PSI	MFI
PSI: Subset 1 – Diagnoses	MFIS1
PSI: Subset 2 – Non-Diagnoses	MFIS2

<b>POST-ACUTE CARE</b>	
<b>COVARIATE NAME</b>	<b>CODE NAME</b>
<b>Resource Utilization Group (RUG)</b>	
RUG Nursing CMI	R_CMIP
RUG Late Loss ADL	R_ADL
RUG Behavior Problems*	R_BEH
RUG Clinically Complex	R_CLN
RUG Extensive Care*	R_EXT
RUG Cognitive Impairment*	R_IMP
RUG Rehabilitation*	R_REHC
RUG Special Care*	R_SPC
<b>Other Scales</b>	
Cardiopulmonary Severity Scale*	CARDIO
Cognitive Performance Scale (CPS)	CPS
Bowel incontinence*	PPRUX_C
Diabetes or peripheral vascular disease*	PPRUX_D
Indicator of asthma on prior assessment*	PRSPX_A
Indicator of emphysema/COPD on prior assessment*	PRSPX_B
Low body mass index*	PPRUX_E
Needs bed mobility assistance*	PPRUX_B
No prior residential history*	PADLX_A
Sore resolved*	PPRUX_A
<b>Nursing Severity Index (NSI)</b>	
Weighted NSI*	NSIDX
Unweighted NSI*	NSIUNWT
<b>Personal Severity Index (PSI)</b>	
Full PSI	MFI
PSI: Subset 1 – Diagnoses	MFIS1
PSI: Subset 2 – Non-Diagnoses	MFIS2
<b>Resource Utilization Group (RUG)</b>	
RUG Nursing CMI	R_CMIP
RUG Late Loss ADL	R_ADL
RUG Behavior Problems*	R_BEH
RUG Clinically Complex	R_CLN
RUG Extensive Care*	R_EXT
RUG Cognitive Impairment*	R_IMP
RUG Rehabilitation*	R_REHC
RUG Special Care*	R_SPC
<b>Other Scales</b>	
Cardiopulmonary Severity Scale*	CARDIO
Cognitive Performance Scale (CPS)	CPS
<b>MDS Diagnosis Indicators</b>	
Acute Episode or Flare-up*	J5B
Combination Alzheimer's Disease / Other Dementia	I1QU
Arteriosclerotic Heart Disease (AHSD)*	I1D
Arthritis*	I1L
Cancer*	I1PP



POST-ACUTE CARE	
COVARIATE NAME	CODE NAME
Congestive Heart Failure (CHF)*	I1F
Depression*	I1EE
Emphysema/COPD*	I1II
Hip Fracture in last 180 days	J4C
Osteoporosis*	I1O
Renal Failure*	I1QQ

**Exhibit 3 – Table of Finalized QMs and Covariates**  
**\* QMs selected for public reporting**

<b>Chronic Care Quality Measures</b>	<b>Accepted Covariates</b>
* Percent of residents who had an unexpected loss of function in some basic daily activities	NO COVARIATES
Percent of residents with worsening function in some basic daily activities	NO COVARIATES
Percent of residents who have improved in their ability to function	RUG Nursing CMI RUG Clinically Complex
Percent of residents who have declined in their ability to locomote	PSI: Subset 1 – Diagnoses More dependence in toileting Requires much assistance for eating
Percent of residents who walk as well or better than the previous assessment	Full PSI
Percent of residents whose cognitive ability has worsened	NO COVARIATES
Percent of residents whose ability to communicate has worsened	Short term memory problem Long term memory problem Cognitive Performance Scale
Percent of residents with symptoms of delirium	NO COVARIATES
Percent of residents with inappropriate behavior (high & low risk)	RUG Cognitive Impairment Cognitive Performance Scale Long term memory problem
Percent of residents with inappropriate behavior (high risk)	Long term memory problem Moderate/impaired decision making problem Any wandering
Percent of residents with inappropriate behavior (low risk)	Moderate/impaired decision making problem Cognitive Performance Scale
Percent of residents whose behavior has worsened	Moderate/impaired decision making problem Cognitive Performance Scale
Percent of residents who have become more depressed or anxious	NO COVARIATES
Percent of residents engaging in little or no activity	RUG Nursing CMI RUG Late Loss ADL
Percent of residents with a new indwelling catheter	NO COVARIATES
Percent of residents with indwelling catheters	Pressure sores (stage 3 or 4) RUG Nursing CMI RUG Clinically Complex ALS/MS diagnosis
Percent of residents who are bladder or bowel incontinent (high & low risk)	PSI: Subset 1 – Diagnoses PSI: Subset 2 – Non-Diagnoses RUG Late Loss ADL
Percent of residents who are bladder or bowel incontinent (high risk)	PSI: Subset 1 – Diagnoses PSI: Subset 2 – Non-Diagnoses RUG Late Loss ADL
Percent of residents who are bladder or bowel incontinent (low risk)	PSI: Subset 1 – Diagnoses PSI: Subset 2 – Non-Diagnoses RUG Late Loss ADL

<b>Chronic Care Quality Measures</b>	<b>Accepted Covariates</b>
Percent of residents with worsening bowel continence	RUG Nursing CMI PSI: Subset 1 – Diagnoses PSI: Subset 2 – Non-Diagnoses RUG Late Loss ADL
Percent of residents with worsening bladder continence	PSI: Subset 1 – Diagnoses PSI: Subset 2 – Non-Diagnoses Cognitive Performance Scale RUG Nursing CMI
Percent of residents with a urinary tract infection	NO COVARIATES
Percent of residents who have fallen	Locomotion Problem Not totally dependent in transferring Unsteady gait/cognitive impairment Any wandering RUG Late Loss ADL
* Percent of residents with infections	RUG Nursing CMI RUG Clinically Complex
Percent of residents with a feeding tube	RUG Clinically Complex Swallowing problem RUG Nursing CMI
Percent of residents with a low BMI	PSI: Subset 1 – Diagnoses
Percent of residents who have unexplained weight loss	PSI: Subset 1 – Diagnoses
* Percent of residents with pain	Cognitive Performance Scale Long term memory problem
Percent of residents with worsening pain	NO COVARIATES
* Percent of residents with pressure sores (high&low risk)	RUG Nursing CMI RUG Clinically Complex PSI: Subset 1 – Diagnoses PSI: Subset 2 – Non-Diagnoses RUG Late Loss ADL
Percent of residents with pressure sores (high risk)	RUG Nursing CMI RUG Clinically Complex PSI: Subset 1 – Diagnoses
Percent of residents with pressure sores (low risk)	RUG Nursing CMI
Percent of residents with worsening pressure sores	RUG Nursing CMI RUG Late Loss ADL
Percent of residents with burns, skin tears or cuts	NO COVARIATES
* Percent of residents in physical restraints	NO COVARIATES
Percent of residents on antipsychotics without a diagnosis of psychosis (high & low risk)	Motor agitation Moderate/impaired decision making problem RUG Behavior Problems RUG Cognitive Impairment Long term memory problem Cognitive Performance Scale Combination Alzheimer's Disease / Other Dementia
Percent of residents on antipsychotics without a diagnosis of psychosis (high risk)	RUG Behavior Problems RUG Cognitive Impairment

<b>Chronic Care Quality Measures</b>	<b>Accepted Covariates</b>
	Combination Alzheimer's Disease / Other Dementia
Percent of residents on antipsychotics without a diagnosis of psychosis (low risk)	RUG Behavior Problems RUG Cognitive Impairment Combination Alzheimer's Disease / Other Dementia Moderate/impaired decision making problem Motor agitation

<b>Post Acute Quality Measures</b>	<b>Code Name</b>
* Percent of short-stay residents with delirium	NO COVARIATES
Percent of short-stay residents who have not improved since admission	Cognitive Performance Scale PSI: Subset 2 – Non-Diagnoses
Percent of short-stay residents whose ability to control their bowel or bladder has not improved since admission	RUG Nursing CMI PSI: Subset 1 – Diagnoses PSI: Subset 2 – Non-Diagnoses RUG Late Loss ADL
* Percent of short-stay residents with pain	Cognitive Performance Scale Hip Fracture in last 180 days Combination Alzheimer's Disease / Other Dementia
Percent of short-stay residents whose pressure sores have not gotten better	RUG Clinically Complex PSI: Subset 1 – Diagnoses PSI: Subset 2 – Non-Diagnoses RUG Nursing CMI RUG Late Loss ADL
Percent of short-stay residents who have developed a respiratory infection or have not gotten better	RUG Clinically Complex
* Percent of short-stay residents who walk as well or better on day 14 as on day 5 of their stay	RUG Late Loss ADL PSI: Subset 2 – Non-Diagnoses RUG Nursing CMI Cognitive Performance Scale

**Attachment #1:  
Covariate Definitions**

**CHRONIC CARE**

<b>COVARIATE NAME</b>	<b>CODE NAME</b>	<b>DEFINITION (WITH MDS ITEM LOCATION WHERE APPLICABLE)</b>
Age > 76	CCOG1_D	Indicator that resident age is greater than 76 on the assessment reference date (A3a) of the prior assessment: Covariate = 1 if age > 76. Covariate = 0 if age <= 76.
ALS/MS diagnosis	CNUT1_B	Indicator of Amyotrophic Lateral Sclerosis or Multiple Sclerosis on the prior assessment or most recent full assessment: Covariate = 1 if I3a through I3e = 335.20 for amyotrophic lateral sclerosis OR if I1w checked (value 1) for multiple sclerosis). Covariate = 0 if covariate not = 1 AND I1w not checked (value 0).
Any wandering	CFAL1_B	Indicator that resident wanders on the prior assessment: Covariate = 1 if E4a(A) = 1, 2, or 3. Covariate = 0 if E4a(A) = 0.
Bed mobility problem	CPRU4_C	Indicator of bed mobility problem on the prior assessment: Covariate = 1 if G1a(A) = 3, 4, or 8. Covariate = 0 if G1a(A) = 0, 1, or 2.
Bladder Incontinence	CCNT2_C	Indicator of bladder incontinence on the prior assessment: Covariate = 1 if H1b = 3 or 4. Covariate = 0 if H1b = 0, 1, or 2.
Bowel incontinence	CCAT1_A	Indicator that resident has bowel incontinence on the prior assessment: Covariate = 1 if H1a = 4. Covariate = 0 if H1a = 0, 1, 2, or 3.
Fall in last 30 days	CCOG1_B	Indicator that resident fell in the past 30 days on the prior assessment. Covariate = 1 if J4a is checked. Covariate = 0 if J4a is not checked.
Fall in last 180 days	CMOB1_A	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.

<b>COVARIATE NAME</b>	<b>CODE NAME</b>	<b>DEFINITION (WITH MDS ITEM LOCATION WHERE APPLICABLE)</b>
Independence in daily decision making	CPAIX_A	Indicator of independence or modified independence in daily decision making on the prior assessment: Covariate = 1 if B4 = 0 or 1. Covariate = 0 if B4 = 2 or 3.
Locomotion Problem	CPRU4_D	Indicator of locomotion problem or activity did not occur on the prior assessment: Covariate = 1 if G1e(A) = 3, 4, or 8. Covariate = 0 if G1e(A) = 0, 1, or 2.
Long term memory problem	CWGT1_A	Indicator of long term memory problem on the prior assessment: Covariate = 1 if B2b = 1. Covariate = 0 if B2b = 0.
Moderate/impaired decision making problem	CBEH4_B	Indicator of moderately or severely impaired cognitive skills for daily decision making on the prior assessment: Covariate = 1 if B4 > 1. Covariate = 0 if B4 = 0 or 1.
Modes of expression: speech	CBEH4_A	Indicator of modes of expression including speech on the prior assessment OR the most recent full assessment: Covariate = 1 if C3a = checked. Covariate = 0 if C3a = not checked.
More dependence in dressing	CCNT2_B	Indicator of dressing problem or dressing did not occur on the prior assessment: Covariate = 1 if G1g(A) = 3, 4, or 8. Covariate = 0 if G1g(A) = 0, 1, or 2.
More dependence in toileting	CMOB1_C	Indicator of extensive support or more dependence in toileting on the prior assessment: Covariate = 1 if G1i(A) = 3, 4, or 8. Covariate = 0 if G1i(A) = 0, 1, or 2.
Motor agitation	CBEH4_C	Indicator of motor agitation on the prior assessment: Covariate = 1 if E1n = 1 or 2. Covariate = 0 if E1n = 0.
Not totally dependent in transferring	CMOD3_A	Indicator of independent through extensive assistance transferring on the prior assessment: Covariate = 1 if G1b(A) = 0, 1, 2, or 3. Covariate = 0 if G1b(A) = 4 or 8.
Pain Present	CMOD3_B	Indicator of pain on the prior assessment: Covariate = 1 if J2a = 1 or 2. Covariate = 0 if J2a = 0.

<b>COVARIATE NAME</b>	<b>CODE NAME</b>	<b>DEFINITION (WITH MDS ITEM LOCATION WHERE APPLICABLE)</b>
Physically abusive behavior	CWGT1_C	Indicator of physically abusive behavior on the prior assessment: Covariate = 1 if E4c(A) = 2 or 3. Covariate = 0 if E4c(A) = 0 or 1.
Planned discharge: 30-90 days	CMOD3_C	Indicator of discharge planned in 3 months on the prior assessment or most recent full assessment: Covariate = 1 if Q1c = 1 or 2. Covariate = 0 if Q1c = 0 or 3.
Pressure ulcers (stage 3 or 4)	CCAT1_B	Indicator of pressure ulcers on the prior assessment: Covariate = 1 if M2a = 3 or 4. Covariate = 0 if M2a = 0.
Requires much assistance for eating	CCOM1_A	Indicator that resident requires extensive assistance or is totally dependent in eating on the prior assessment: Covariate = 1 if G1h(A) = 3, 4, or 8. Covariate = 0 if G1h(A) = 0, 1, or 2.
Resident not bedfast	CFAL1_A	Indicator that resident is not bedfast on the prior assessment: Covariate = 1 if G6a not checked. Covariate = 0 if G6a is checked.
Severe decision making problem	CCNT3_C	Indicator of severe decision making problem on the prior assessment: Covariate = 1 if B4 = 3. Covariate = 0 if B4 = 0, 1, or 2.
Short term memory problem	CCNT2_A	Indicator that resident has a short term memory problem on the prior assessment: Covariate = 1 if B2a = 1. Covariate = 0 if B2a = 0.
Swallowing problem	CNUT1_A	Indicator of swallowing problem on the prior assessment or most recent full assessment: Covariate = 1 if K1b checked (value 1) for swallowing problem. Covariate = 0 if K1b not checked (value 0).
Transferring problem	CPRU4_A	Indicator of transfer problem or transfer did not occur on the prior assessment: Covariate = 1 if G1b(A) = 3, 4, or 8. Covariate = 0 if G1b(A) = 0, 1, or 2.
Unstable condition	CPRU4_B	Indicator of unstable functional status on the prior assessment: Covariate = 1 if J5a = checked (value 1). Covariate = 0 if J5a = not checked (value 0).

COVARIATE NAME	CODE NAME	DEFINITION (WITH MDS ITEM LOCATION WHERE APPLICABLE)
Unsteady gait/cognitive impairment	CFAL1_C	Indicator that resident has an unsteady gait and is cognitively impaired on the prior assessment. Covariate = 1 if J1n checked (value 1) AND CPS $\geq$ 2. (CPS is defined in the Technical Comments for COG01 in the Numerator and Denominator column.) Covariate = 0 if J1n not checked (value 0) OR CPS < 2.
Weight loss (5%, past 30 days; 10%, past 180 days)	CCNT3_D	Indicator of weight loss on the prior assessment: Covariate = 1 if K3a = 1. Covariate = 0 if K3a = 0.
<b>Nursing Severity Index (NSI)</b>		
Weighted NSI	NSIDX	The individual diagnoses comprising the NSI include: <b>Group 1: Overall Health and Perceptions</b> Potential for injury Infection/contagion Prolonged disease Instability Impaired life support systems <b>Group 2: Nutrition and Metabolism</b> Excess fluid volume Fluid volume deficit Bleeding Less nutrition than required Potential skin impairment Alterations in oral mucous membranes Altered body temperature <b>Group 3: Urinary and Fecal Function</b> Urinary incontinence Other altered urinary elimination problem Constipation Diarrhea Bowel incontinence <b>Group 4: Activity and Exercise</b> Activity intolerance Ineffective airway clearance Altered breathing pattern Impaired gas exchange Decreased cardiac output Altered health maintenance Impaired mobility Self-care deficit



COVARIATE NAME	CODE NAME	DEFINITION (WITH MDS ITEM LOCATION WHERE APPLICABLE)
		<b>Group 5: Psychosocial Concerns</b> Disturbed self-concept Depression Grieving Altered family process Social isolation Impaired verbal communication Ineffective individual coping Potential for growth in family coping Spiritual distress
Unweighted NSI	NSIUNWT	The individual diagnoses comprising the NSI include: <b>Group 1: Overall Health and Perceptions</b> Potential for injury Infection/contagion Prolonged disease Instability Impaired life support systems <b>Group 2: Nutrition and Metabolism</b> Excess fluid volume Fluid volume deficit Bleeding Less nutrition than required Potential skin impairment Alterations in oral mucous membranes Altered body temperature <b>Group 3: Urinary and Fecal Function</b> Urinary incontinence Other altered urinary elimination problem Constipation Diarrhea Bowel incontinence <b>Group 4: Activity and Exercise</b> Activity intolerance Ineffective airway clearance Altered breathing pattern Impaired gas exchange Decreased cardiac output Altered health maintenance Impaired mobility Self-care deficit

COVARIATE NAME	CODE NAME	DEFINITION (WITH MDS ITEM LOCATION WHERE APPLICABLE)
		<b>Group 5: Psychosocial Concerns</b> Disturbed self-concept Depression Grieving Altered family process Social isolation Impaired verbal communication Ineffective individual coping Potential for growth in family coping Spiritual distress
<b>Personal Severity Index (PSI)</b>		
Full PSI	PSI	<ul style="list-style-type: none"> <li>▪ Scale Components Include:</li> <li>▪ Age 90 or older</li> <li>▪ Cognitive decision making: severely impaired (B4=3)</li> <li>▪ Delirium: Periods of lethargy (B5E=2)</li> <li>▪ Ability to understand: sometimes/rarely (C6=2,3)</li> <li>▪ Transfer – extensive, total, did not occur (G1Ba=3,4,8)</li> <li>▪ Locomotion – extensive, total, did not occur (G1eA=3,4,8)</li> <li>▪ Eating -- extensive, total, did not occur (G1hA=3,4,8)</li> <li>▪ Personal hygiene – total, did not occur (G1jA=4,8)</li> <li>▪ Sad mood – daily repetitive verbalizations (E1c=2)</li> <li>▪ Sad mood – something terrible about to happen – daily (E1g=2)</li> <li>▪ Acute episode – yes (J5b=1)</li> <li>▪ Unstable – yes (J5a=1)</li> <li>▪ Change in care needs – deteriorated (Q2=2)</li> <li>▪ End stage disease – yes (J5c=1)</li> <li>▪ Bowel – occasional, frequent incontinent (H1b=2,3,4)</li> <li>▪ Weight loss – yes (K3a=1)</li> <li>▪ Pressure ulcer – stages 1 through 4 (M2a=1,2,3,4)</li> <li>▪ Stasis ulcers – yes (M2b=1,2,3,4)</li> </ul>
PSI: Subset 1 – Diagnoses	PSIS1	<ul style="list-style-type: none"> <li>▪ Age 90 or older</li> <li>▪ Acute episode – yes (J5b=1)</li> <li>▪ Unstable – yes (J5a=1)</li> <li>▪ Change in care needs – deteriorated (Q2=2)</li> <li>▪ End stage disease – yes (J5c=1)</li> <li>▪ Bowel – occasional, frequent incontinent (H1b=2,3,4)</li> <li>▪ Weight loss – yes (K3a=1)</li> <li>▪ Pressure ulcer – stages 1 through 4 (M2a=1,2,3,4)</li> <li>▪ Stasis ulcers – yes (M2b=1,2,3,4)</li> </ul>

COVARIATE NAME	CODE NAME	DEFINITION (WITH MDS ITEM LOCATION WHERE APPLICABLE)
PSI: Subset 2 – Non-Diagnoses	PSIS2	<ul style="list-style-type: none"> <li>▪ Age 90 or older</li> <li>▪ Cognitive decision making: severely impaired (B4=3)</li> <li>▪ Delirium: Periods of lethargy (B5E=2)</li> <li>▪ Ability to understand: sometimes/rarely (C6=2,3)</li> <li>▪ Transfer – extensive, total, did not occur (G1Ba=3,4,8)</li> <li>▪ Locomotion – extensive, total, did not occur (G1eA=3,4,8)</li> <li>▪ Eating -- extensive, total, did not occur (G1hA=3,4,8)</li> <li>▪ Personal hygiene – total, did not occur (G1jA=4,8)</li> <li>▪ Sad mood – daily repetitive verbalizations (E1c=2)</li> <li>▪ Sad mood – something terrible about to happen –daily (E1g=2)</li> </ul>
<b>Resource Utilization Group (RUG)</b>		
RUG Nursing CMI	R_CMIC	Case Mix Index based on RUG-III Grouper.
RUG Late Loss ADL	R_ADL	Split into physical functioning groups based on the ADL index and whether the number of nursing rehab activities is 2 or more **
RUG Behavior Problems	R_BEH	Resident must have an ADL index of 10 or less and the presence of delusions, hallucinations, or one of more of the following 4 or more days per week: wandering, verbally abusive behavior, physically abusive behavior, socially inappropriate/disruptive behavior, resisting care.**
RUG Clinically Complex	R_CLN	Resident qualifies for extensive services on the basis of clinical indicators. Qualifications include any of the following: feeding tube with high parenteral/enteral intake; comatose and not awake and ADL dependent; septicemia; second or third degree burns; dehydration; hemiplegia/hemiparesis and an ADL index of 10 or more; internal bleeding; pneumonia; end stage disease; chemotherapy; dialysis; physician order changes on 4 or more days and physicians visits on 1 or more day; physician order changes on 2 or more days and physician visits on 7 days; diabetes and injections on 7 days and physician order changes on 2 or more days; transfusions; oxygen therapy; application of dressing to foot and injection on foot or open lesion on foot. **

COVARIATE NAME	CODE NAME	DEFINITION (WITH MDS ITEM LOCATION WHERE APPLICABLE)
RUG Extensive Care	R_EXT	Resident qualifies for extensive services on the basis of clinical indicators. Qualifications include receipt of parenteral/IV feeding, IV medication, the special care category, the clinically complex category, and the impaired cognition category. ADL index score must be 7 or higher otherwise classify resident into special care. **
RUG Cognitive Impairment	R_IMP	Resident must have an ADL index of 10 or less and a Cognitive Performance Scale of 3 or more, indicating moderate, moderately severe, severe, or very severe impairment). **
RUG Rehabilitation	R_REHC	<p><b>Ultra high rehabilitation</b> (At least 720 minutes of therapy received per week with 5 or more days for one type of therapy and at least 3 days for a second type)</p> <p><b>Very high rehabilitation</b> (At least 500 minutes of therapy received per week with 5 or more days for one type of therapy)</p> <p><b>High rehabilitation</b> (At least 325 minutes of therapy received per week with 5 or more days per week for one type of therapy)</p> <p><b>Medium rehabilitation</b> (At least 150 minutes of therapy received per week with 5 or more days of some type of therapy)</p> <p><b>Low rehabilitation</b> (At least 45 minutes of therapy received per week with 3 or more days of some type of therapy and 2 or more nursing rehabilitation activities at least 6 days per week each.</p>
RUG Special Care	R_SPC	<p>Resident qualifies for extensive services on the basis of clinical indicators. Qualifications include an ADL index of 7 or more plus any of the following: **</p> <ul style="list-style-type: none"> <li>• Two or more ulcers of any type or a stage 3 or 4 pressure ulcer and two or more selected skin care treatments;</li> <li>• Feeding tube with enteral intake and aphasia;</li> <li>• Surgical wounds or open lesions other than ulcers, rashes, or cuts and surgical wound care or application of dressings or ointments;</li> <li>• Respiratory therapy for 7 days;</li> </ul>

COVARIATE NAME	CODE NAME	DEFINITION (WITH MDS ITEM LOCATION WHERE APPLICABLE)
		<ul style="list-style-type: none"> <li>• Cerebral palsy and an ADL score of 10 or more;</li> <li>• Fever, plus any one of vomiting or weight loss or tube feeding with high; parenteral/enteral intake, pneumonia, or dehydration;</li> <li>• Multiple sclerosis and an ADL score of 10 or more;</li> <li>• Quadriplegia and an ADL score of 10 or more; and</li> <li>• Radiation therapy)</li> </ul>
<b>Other Scales</b>		
Cardiopulmonary Severity Scale	CARDIO	<p><b>CARDIO = 0</b> if ASHD (I1d), CHF (I1f), Cardiac Dysrhythmia (I1e), Other Cardio (I1k) and COPD(I1ii) all = 0.</p> <p><b>CARDIO = 1</b> IF ASHD or CHF or Cardiac Dysrhythmia or Other Cardio or COPD = 1 and none of the other characteristics for CARDIO = 2 or 3.</p> <p><b>CARDIO = 2</b> IF ASHD or CHF or Cardiac Dysrhythmia or Other Cardio or COPD = 1 AND any one of the following:</p> <ol style="list-style-type: none"> <li>1. Weight gain or loss (j1a=1) AND Independent in Walk (G1cA=0)</li> <li>2. Oxygen therapy (P1ag=1) AND Independent in Walk (G1cA=0)</li> <li>3. Shortness of breath (J1l=1)</li> <li>4. Inability to lie flat (J1b=1)</li> <li>5. Chest pain (J3c=1)</li> <li>6. Walk in room (G1cA&gt;2)</li> <li>7. Edema (j1g=1)</li> <li>8. COPD (I1ii=1) and either CHF(I1f=1) or ASHD(I1d=1)</li> </ol> <p><b>CARDIO = 3</b> IF ASHD or CHF or Cardiac Dysrhythmia or Other Cardio or COPD = 1 and any one of the following:</p> <ol style="list-style-type: none"> <li>1. Weight gain or loss (j1a=1) and Supervision in Walk (G1cA= 1,2,3,4,8)</li> <li>2. Oxygen therapy (P1g=1) AND Supervision in Walk (G1cA= 1,2,3,4,8)</li> <li>3. Ventilator or respirator (P1l=1)</li> <li>4. Syncope (J1m=1)</li> </ol>

COVARIATE NAME	CODE NAME	DEFINITION (WITH MDS ITEM LOCATION WHERE APPLICABLE)
Cognitive Performance Scale (CPS)	CPS	<p>The CPS was created to generate the RUG Cognitive Impairment Scale. The following represent the CPS code used:</p> <p>0 = intact  1 = borderline intact  2 = mild impairment  3 = moderate impairment  4 = moderately severe impairment  5 = severe impairment  6 = very severe impairment</p>
<b>MDS Diagnosis Indicators</b>		
Acute Episode or Flare-up	J5B	J5b = checked
Combination Alzheimer's Disease / Other Dementia	I1QU	I1q and u = checked
Arteriosclerotic Heart Disease (AHSD)	I1D	I1d = checked
Arthritis	I1L	I1l = checked
Cancer	I1PP	I1pp = checked
Congestive Heart Failure (CHF)	I1F	I1f = checked
Depression	I1EE	I1ee = checked
Emphysema/COPD	I1II	I1ii = checked
Hip Fracture in last 180 days	J4C	J4c = checked
Osteoporosis	I1O	I1o = checked
Renal Failure	I1QQ	I1qq = checked

## POST-ACUTE CARE

COVARIATE NAME	CODE NAME	DEFINITION (WITH MDS ITEM LOCATION WHERE APPLICABLE)
Bowel incontinence	PPRUX_C	Indicator of bowel incontinence at least one/week on the SNF PPS 5-day assessment: Covariate = 1 if H1a 2, 3, or 4. Covariate = 0 if H1a = 0 or 1.
Diabetes or peripheral vascular disease	PPRUX_D	Indicator of diabetes or peripheral vascular disease on the SNF PPS 5-day assessment: Covariate = 1 if I1a checked (value 1) OR I1j checked (value 1). Covariate = 0 if I1a not checked (value 0) AND I1j not checked (value 0).
Indicator of asthma on prior assessment	PRSPX_A	Indicator of asthma on the SNF PPS 5-day assessment: Covariate = 1 if I1hh checked (value 1). Covariate = 0 if I1hh not checked (value 0).
Indicator of emphysema/COPD on prior assessment	PRSPX_B	Indicator of Emphysema/COPD on the SNF PPS 5-day assessment: Covariate = 1 if I1ii checked (value 1). Covariate = 0 if I1ii not checked (value 0).
Low body mass index	PPRUX_E	Indicator of low Body Mass Index (BMI) on the SNF PPS 5-day assessment: Covariate = 1 if BMI $\geq 12$ AND $\leq 19$ . Covariate = 0 if BMI $> 19$ AND $\leq 40$ . Where: $\text{BMI} = \text{weight (Kg)} / \text{height}^2 (\text{m}^2) = ((\text{K2b} * 0.45) / (((\text{K2a} * .0254)^2)))$ (Note: An implausible BMI value $< 12$ or $> 40$ will be treated as a missing value on this covariate.)
Needs bed mobility assistance	PPRUX_B	Indicator of requiring limited or more assistance in bed mobility on the SNF PPS 5-day assessment: Covariate = 1 if G1a(A) = 2, 3, 4, or 8. Covariate = 0 if G1a(A) = 0 or 1.

No prior residential history	PADLX_A	<p>Indicator of NO prior residential history preceding the current SNF stay for the patient:</p> <p>Covariate = 1 if there is NO prior residential history indicated by the following condition being satisfied:</p> <ol style="list-style-type: none"> <li>1) There is a recent admission assessment (AA8a = 01) available for the patient AND AB5a through AB5e are not checked (value 0) AND AB5f is checked (value 1) on that assessment.</li> </ol> <p>Covariate = 0 if there is prior residential history indicated by either of the following conditions being satisfied:</p> <ol style="list-style-type: none"> <li>1) There is a recent admission assessment (AA8a = 01) AND any of the items AB5a through AB5e are checked (value 1) OR AB5f is not checked (value 0) on that assessment.</li> <li>2) There is no recent admission assessment (AA8a = 01).</li> </ol>
Ulcer resolved	PPRUX_A	<p>Indicator of history of resolved pressure ulcer on the SNF PPS 5-day assessment:</p> <p>Covariate = 1 if M3 = 1.</p> <p>Covariate = 0 if M3 = 0.</p>
<b>Nursing Severity Index (NSI)</b>		
Weighted NSI	NSIDX	<p>The individual diagnoses comprising the NSI include:</p> <p><b>Group 1: Overall Health and Perceptions</b></p> <ul style="list-style-type: none"> <li>Potential for injury</li> <li>Infection/contagion</li> <li>Prolonged disease</li> <li>Instability</li> <li>Impaired life support systems</li> </ul> <p><b>Group 2: Nutrition and Metabolism</b></p> <ul style="list-style-type: none"> <li>Excess fluid volume</li> <li>Fluid volume deficit</li> <li>Bleeding</li> <li>Less nutrition than required</li> <li>Potential skin impairment</li> <li>Alterations in oral mucous membranes</li> <li>Altered body temperature</li> </ul>



		<p><b>Group 3: Urinary and Fecal Function</b>  Urinary incontinence  Other altered urinary elimination problem  Constipation  Diarrhea  Bowel incontinence</p> <p><b>Group 4: Activity and Exercise</b>  Activity intolerance  Ineffective airway clearance  Altered breathing pattern  Impaired gas exchange  Decreased cardiac output  Altered health maintenance  Impaired mobility  Self-care deficit</p> <p><b>Group 5: Psychosocial Concerns</b>  Disturbed self-concept  Depression  Grieving  Altered family process  Social isolation  Impaired verbal communication  Ineffective individual coping  Potential for growth in family coping  Spiritual distress</p>
Unweighted NSI	NSIUNWT	<p>The individual diagnoses comprising the NSI include:</p> <p><b>Group 1: Overall Health and Perceptions</b>  Potential for injury  Infection/contagion  Prolonged disease  Instability  Impaired life support systems</p> <p><b>Group 2: Nutrition and Metabolism</b>  Excess fluid volume  Fluid volume deficit  Bleeding  Less nutrition than required  Potential skin impairment  Alterations in oral mucous membranes  Altered body temperature</p>

		<p><b>Group 3: Urinary and Fecal Function</b>  Urinary incontinence  Other altered urinary elimination problem  Constipation  Diarrhea  Bowel incontinence</p> <p><b>Group 4: Activity and Exercise</b>  Activity intolerance  Ineffective airway clearance  Altered breathing pattern  Impaired gas exchange  Decreased cardiac output  Altered health maintenance  Impaired mobility  Self-care deficit</p> <p><b>Group 5: Psychosocial Concerns</b>  Disturbed self-concept  Depression  Grieving  Altered family process  Social isolation  Impaired verbal communication  Ineffective individual coping  Potential for growth in family coping  Spiritual distress</p>
<b>Personal Severity Index (PSI)</b>		
Full PSI	PSI	<ul style="list-style-type: none"> <li>▪ Scale Components Include:</li> <li>▪ Age 90 or older Cognitive decision making: severely impaired (B4=3)</li> <li>▪ Delirium: Periods of lethargy (B5E=2)</li> <li>▪ Ability to understand: sometimes/rarely (C6=2,3)</li> <li>▪ Transfer – extensive, total, did not occur (G1Ba=3,4,8)</li> <li>▪ Locomotion – extensive, total, did not occur (G1eA=3,4,8)</li> <li>▪ Eating -- extensive, total, did not occur (G1hA=3,4,8)</li> <li>▪ Personal hygiene – total, did not occur (G1jA=4,8)</li> <li>▪ Sad mood – daily repetitive verbalizations (E1c=2)</li> <li>▪ Sad mood – something terrible about to happen – daily (E1g=2)</li> <li>▪ Acute episode – yes (J5b=1)</li> <li>▪ Unstable – yes (J5a=1)</li> <li>▪ Change in care needs – deteriorated (Q2=2)</li> <li>▪ End stage disease – yes (J5c=1)</li> <li>▪ Bowel – occasional, frequent incontinent (H1b=2,3,4)</li> <li>▪ Weight loss – yes (K3a=1)</li> <li>▪ Pressure ulcer – stages 1 through 4 (M2a=1,2,3,4)</li> <li>▪ Stasis ulcers – yes (M2b=1,2,3,4)</li> </ul>

PSI: Subset 1 – Diagnoses	PSIS1	<ul style="list-style-type: none"> <li>▪ Age 90 or older</li> <li>▪ Acute episode – yes (J5b=1)</li> <li>▪ Unstable – yes (J5a=1)</li> <li>▪ Change in care needs – deteriorated (Q2=2)</li> <li>▪ End stage disease – yes (J5c=1)</li> <li>▪ Bowel – occasional, frequent incontinent (H1b=2,3,4)</li> <li>▪ Weight loss – yes (K3a=1)</li> <li>▪ Pressure ulcer – stages 1 through 4 (M2a=1,2,3,4)</li> <li>▪ Stasis ulcers – yes (M2b=1,2,3,4)</li> </ul>
PSI: Subset 2 – Non-Diagnoses	PSIS2	<ul style="list-style-type: none"> <li>▪ Age 90 or older</li> <li>▪ Cognitive decision making: severely impaired (B4=3)</li> <li>▪ Delirium: Periods of lethargy (B5E=2)</li> <li>▪ Ability to understand: sometimes/rarely (C6=2,3)</li> <li>▪ Transfer – extensive, total, did not occur (G1Ba=3,4,8)</li> <li>▪ Locomotion – extensive, total, did not occur (G1eA=3,4,8)</li> <li>▪ Eating -- extensive, total, did not occur (G1hA=3,4,8)</li> <li>▪ Personal hygiene – total, did not occur (G1jA=4,8)</li> <li>▪ Sad mood – daily repetitive verbalizations (E1c=2)</li> <li>▪ Sad mood – something terrible about to happen –daily (E1g=2)</li> </ul>
<b>Resource Utilization Group (RUG)</b>		
RUG Nursing CMI	R_CMIP	Case Mix Index based on RUG-III Grouper.
RUG Late Loss ADL	R_ADL	Split into physical functioning groups based on the ADL index and whether the number of nursing rehab activities is 2 or more. **
RUG Behavior Problems	R_BEH	Resident must have an ADL index of 10 or less and the presence of delusions, hallucinations, or one of more of the following 4 or more days per week: wandering, verbally abusive behavior, physically abusive behavior, socially inappropriate/disruptive behavior, resisting care. **
RUG Clinically Complex	R_CLN	Resident qualifies for extensive services on the basis of clinical indicators. Qualifications include any of the following: feeding tube with high parenteral/enteral intake; comatose and not awake and ADL dependent; septicemia; second or third degree burns; dehydration; hemiplegia/hemiparesis and an ADL index of 10 or more; internal bleeding; pneumonia; end stage disease; chemotherapy; dialysis; physician order changes on 4 or more days and physicians visits on 1 or more day; physician order changes on 2 or more days and physician visits on 7 days; diabetes and injections on 7 days and physician order changes on 2 or more days; transfusions; oxygen

		therapy; application of dressing to foot and injection on foot or open lesion on foot. **
RUG Extensive Care	R_EXT	Resident qualifies for extensive services on the basis of clinical indicators. Qualifications include receipt of parenteral/IV feeding, IV medication, the special care category, the clinically complex category, and the impaired cognition category. ADL index score must be 7 or higher otherwise classify resident into special care. **
RUG Cognitive Impairment	R_IMP	Resident must have an ADL index of 10 or less and a Cognitive Performance Scale of 3 or more, indicating moderate, moderately severe, severe, or very severe impairment). **
RUG Rehabilitation	R_REHC	<p><b>Ultra high rehabilitation</b> (At least 720 minutes of therapy received per week with 5 or more days for one type of therapy and at least 3 days for a second type)</p> <p><b>Very high rehabilitation</b> (At least 500 minutes of therapy received per week with 5 or more days for one type of therapy)</p> <p><b>High rehabilitation</b> (At least 325 minutes of therapy received per week with 5 or more days per week for one type of therapy)</p> <p><b>Medium rehabilitation</b> (At least 150 minutes of therapy received per week with 5 or more days of some type of therapy)</p> <p><b>Low rehabilitation</b> (At least 45 minutes of therapy received per week with 3 or more days of some type of therapy and 2 or more nursing rehabilitation activities at least 6 days per week each.</p>
RUG Special Care	R_SPC	<p>Resident qualifies for extensive services on the basis of clinical indicators. Qualifications include an ADL index of 7 or more plus any of the following: **</p> <ul style="list-style-type: none"> <li>• Two or more ulcers of any type or a stage 3 or 4 pressure ulcer and two or more selected skin care treatments;</li> <li>• Feeding tube with enteral intake and aphasia;</li> </ul>

		<ul style="list-style-type: none"> <li>• Surgical wounds or open lesions other than ulcers, rashes, or cuts and surgical wound care or application of dressings or ointments;</li> <li>• Respiratory therapy for 7 days;</li> <li>• Cerebral palsy and an ADL score of 10 or more;</li> <li>• Fever, plus any one of vomiting or weight loss or tube feeding with high; parenteral/enteral intake, pneumonia, or dehydration;</li> <li>• Multiple sclerosis and an ADL score of 10 or more;</li> <li>• Quadriplegia and an ADL score of 10 or more; and</li> <li>• Radiation therapy)</li> </ul>
<b>Other Scales</b>		
Cardiopulmonary Severity Scale	CARDIO	<p><b>CARDIO = 0</b> IF ASHD (I1d), CHF (I1f), Cardiac Dysrhythmia (I1e), Other Cardio (I1k) and COPD(I1ii) all = 0.</p> <p><b>CARDIO = 1</b> IF ASHD or CHF OR Cardiac Dysrhythmia or Other Cardio or COPD = 1 and none of the other characteristics for CARDIO = 2 or 3.</p> <p><b>CARDIO = 2</b> IF ASHD or CHF or Cardiac Dysrhythmia or Other Cardio or COPD = 1 and any one of the following:</p> <ol style="list-style-type: none"> <li>9. Weight gain or loss (j1a=1) and Independent in Walking (G1cA=0)</li> <li>10. Oxygen therapy (P1ag=1) and Independent in Walking (G1cA=0)</li> <li>11. Shortness of breath (J1l=1)</li> <li>12. Inability to lie flat (J1b=1)</li> <li>13. Chest pain (J3c=1)</li> <li>14. Walking in room (G1cA&gt;2)</li> <li>15. Edema (j1g=1)</li> <li>16. COPD (I1ii=1) and EITHER CHF (I1f=1) OR ASHD(I1d=1)</li> </ol> <p><b>CARDIO = 3</b> IF ASHD or CHF or Cardiac Dysrhythmia or Other Cardio or COPD = 1 and any one of the following:</p> <ol style="list-style-type: none"> <li>5. Weight gain or loss (j1a=1) and Supervision in Walking (G1cA= 1,2,3,4,8)</li> <li>6. Oxygen therapy (P1g=1) and Supervision in Walking (G1cA= 1,2,3,4,8)</li> <li>7. Ventilator or respirator (P1l=1)</li> <li>8. Syncope (J1m=1)</li> </ol>

Cognitive Performance Scale (CPS)	CPS	The CPS was created based on the RUG Cognitive Impairment Scale. The following represent the CPS code used: 0 = intact 1 = borderline intact 2 = mild impairment 3 = moderate impairment 4 = moderately severe impairment 5 = severe impairment 6 = very severe impairment
<b>MDS Diagnosis Indicators</b>		
Acute Episode or Flare-up	J5B	J5b = checked
Combination Alzheimer's Disease / Other Dementia	I1QU	I1q and u = checked
Arteriosclerotic Heart Disease (ASHD)	I1D	I1d = checked
Arthritis	I1L	I1l = checked
Cancer	I1PP	I1pp = checked
Congestive Heart Failure (CHF)	I1F	I1f = checked
Depression	I1EE	I1ee = checked
Emphysema/COPD	I1II	I1ii = checked
Hip Fracture in last 180 days	J4C	J4c = checked
Osteoporosis	I1O	I1o = checked
Renal Failure	I1QQ	I1qq = checked

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\*\* The ADL index is based on the amount of support required for the following ADL activities: bed mobility, transferring, toilet use, and eating. It ranges from 4 (fully independent) to 8 (totally dependent, needs two-person assistance where applicable)

## Attachment #2

## Covariate/QM Correlation Measures: Phi Coefficients (Chronic Care)

Chronic Care Prevalence	CADL01-I	CINFOX*- I	CPAIOX*- I	CPRU01*- I	CRES01-II
MODES OF EXPRESSION:SPEECH	0.01	0.00	0.05	-0.05	-0.08
MODERATE/IMPAIRED DECISION MAKING PROB	0.04	0.00	-0.14	0.03	0.19
SEVERE DECISION MAKING PROB	0.02	0.00	-0.09	0.06	0.21
INDEPENDENCE IN DAILY DECISION MAKING	-0.05	0.00	<b>0.14</b>	-0.03	-0.19
MOTOR AGITATION (PAST 5-7 DAYS)	0.02	0.00	-0.02	-0.02	0.11
SHORT TERM MEMORY PROBLEM	0.04	0.00	<b>-0.13</b>	0.01	0.14
LONG TERM MEMORY PROBLEM	0.05	-0.01	<b>-0.14</b>	0.02	0.18
PHYSICALLY ABUSIVE BEHAVIOR	0.01	0.00	-0.02	0.00	0.06
ANY WANDERING	0.05	-0.02	-0.05	-0.05	0.06
PRESSURE ULCERS (STAGE 3 O4 4)	0.00	0.08	0.05	0.38	0.00
BLADDER INCONTINENCE	0.03	0.00	-0.09	0.03	0.20
BOWEL INCONTINENCE	-0.01	0.03	-0.07	<b>0.14</b>	0.22
FALL IN PAST 30 DAYS	0.06	0.03	0.01	0.00	0.03
FALL IN PAST 180 DAYS	0.07	0.03	0.01	-0.02	0.05
WEIGHT LOSS (5%,PAST 30 D;10% PAST 180 D)	0.02	0.05	0.03	0.08	0.02
LOCOMOTION PROBLEM	-0.05	0.04	0.00	<b>0.13</b>	0.10
BED MOBILITY PROBLEM	-0.10	0.03	-0.01	<b>0.11</b>	0.07
UNSTEADY GAIT/COG IMP	0.06	0.01	-0.03	-0.05	0.05
RESIDENT NOT BEDFAST	0.01	-0.06	-0.04	-0.13	0.02
MORE DEPENDENCE IN TOILETING	-0.02	0.07	-0.03	<b>0.15</b>	0.20
REQUIRES MUCH ASSISTANCE FOR EATING	-0.04	0.04	-0.06	0.13	0.21
MORE DEPENDENCE IN DRESSING	-0.02	0.05	-0.02	0.11	0.16
TRANSFERRING PROBLEM	-0.10	0.04	-0.01	<b>0.13</b>	0.11
NOT TOTALLY DEPENDENT IN TRANSFERRING	0.08	-0.05	0.00	<b>-0.17</b>	-0.14
PAIN PRESENT	0.00	0.06	0.38	0.06	-0.06
PLANNED DISCHARGE: 30 - 90 DAYS	0.04	0.04	0.03	0.04	-0.02
SWALLOWING PROBLEM	-0.01	0.04	-0.02	0.05	0.04
ALS/MS DIAGNOSIS	-0.01	0.02	0.01	0.04	0.01
UNSTABLE FUNCTIONAL STATUS	0.03	0.06	0.03	0.05	0.06
AGE GREATER THAN 76	0.06	0.01	-0.03	-0.01	0.01
<b>RUG INDICES AND SCALES</b>					
CC NURSING CMI	0.01	<b>0.17</b>	0.05	<b>0.21</b>	0.09
CC LATE LOSS ADL	-0.06	0.08	-0.01	<b>0.17</b>	<b>0.19</b>
CC BEHAVIOR PROBLEMS	0.03	-0.04	-0.03	-0.06	-0.06
CC CLINICALLY COMPLEX	0.01	<b>0.13</b>	0.07	<b>0.13</b>	0.00
CC EXTENSIVE CARE	0.01	<b>0.12</b>	0.03	<b>0.11</b>	0.01
CC COGNITIVE IMPAIRMENT	0.07	-0.05	-0.07	<b>-0.10</b>	-0.07
CC REHAB	0.02	0.05	0.02	0.03	0.00
CC SPECIAL CARE	0.00	<b>0.12</b>	0.06	<b>0.26</b>	0.03
<b>NURSING SEVERITY INDICES</b>					
WEIGHTED NSI	0.03	<b>0.11</b>	0.06	<b>0.10</b>	0.03
UNWEIGHTED NSI	0.09	<b>0.25</b>	0.08	<b>0.30</b>	<b>0.20</b>
<b>PERSONAL SEVERITY INDEX</b>					
FULL PSI	0.05	0.08	-0.02	<b>0.14</b>	<b>0.18</b>
PSI: SUBSET 1	0.06	0.08	0.01	<b>0.15</b>	<b>0.10</b>
PSI: SUBSET 2	0.00	0.06	-0.04	<b>0.15</b>	<b>0.21</b>
<b>OTHER SCALES</b>					
COGNITIVE PERFORMANCE SCALE (CPS)	0.04	0.00	<b>-0.14</b>	0.01	<b>0.15</b>
CARDIO/PULMONARY IMPAIRMENT SCALE	0.02	0.05	0.04	0.01	-0.04
<b>MDS DIAGNOSIS INDICATORS</b>					
ACUTE EPISODE OR FLAIR-UP	0.02	<b>0.10</b>	0.06	0.07	0.07
ALZHEIMER'S DISEASE	0.04	-0.02	-0.07	-0.01	<b>0.10</b>
ARTERIOSCLEROTIC HEART DISEASE (AHSD)	0.01	0.01	0.01	0.01	-0.01
ARTHRITIS	0.01	0.01	0.09	0.00	-0.03
CANCER	0.01	0.02	0.03	0.01	0.00
CONGESTIVE HEART FAILURE (CHF)	0.01	0.04	0.04	0.02	-0.01
DEMENTIA OTHER THAN ALZHEIMER'S	0.02	-0.01	-0.08	0.00	0.07
DEPRESSION	0.00	0.02	0.06	-0.01	-0.01
EMPHYSEMA/COPD	0.01	0.04	0.04	0.00	-0.04
HIP FRACTURE	0.00	0.02	0.02	0.04	0.04
OSTEOPOROSIS	0.01	0.01	0.05	-0.01	-0.01
RENAL FAILURE	0.01	0.04	0.02	0.04	-0.02

Chronic Care Prevalence	CBEH01* II	CBEH02* III	CBEH03* III	CBMIOX* II	CBUROX* II
MODES OF EXPRESSION:SPEECH	0.04	0.06	-0.01	-0.02	0.01
MODERATE/IMPAIRED DECISION MAKING PROB	<b>0.20</b>	<b>0.13</b>	<b>0.13</b>	0.05	0.06
SEVERE DECISION MAKING PROB	0.09	0.05	0.03	0.06	0.05
INDEPENDENCE IN DAILY DECISION MAKING	-0.20	-0.13	-0.13	-0.05	-0.06
MOTOR AGITATION (PAST 5-7 DAYS)	0.24	<b>0.23</b>	0.11	0.02	0.03
SHORT TERM MEMORY PROBLEM	<b>0.14</b>	0.02	0.00	0.05	0.05
LONG TERM MEMORY PROBLEM	<b>0.17</b>	<b>0.10</b>	0.04	0.04	0.05
PHYSICALLY ABUSIVE BEHAVIOR	0.22	0.23	0.09	0.01	0.03
ANY WANDERING	<b>0.19</b>	<b>0.18</b>	0.06	0.00	0.02
PRESSURE ULCERS (STAGE 3 OR 4)	-0.02	-0.02	0.00	0.03	0.02
BLADDER INCONTINENCE	0.10	0.06	0.04	0.05	0.06
BOWEL INCONTINENCE	0.05	0.01	0.03	0.07	0.06
FALL IN PAST 30 DAYS	0.04	0.04	0.01	0.02	0.05
FALL IN PAST 180 DAYS	0.06	0.06	0.01	0.02	0.05
WEIGHT LOSS(5%, PAST 30 D: 10%, PAST 180 D)	0.01	0.01	0.00	0.11	0.03
LOCOMOTION PROBLEM	-0.02	-0.04	0.01	0.06	0.04
BED MOBILITY PROBLEM	0.01	-0.01	0.03	0.01	0.03
UNSTEADY GAIT/COG IMP	0.07	0.03	0.03	0.01	0.03
RESIDENT NOT BEDFAST	0.03	0.03	0.00	-0.03	-0.01
MORE DEPENDENCE IN TOILETING	0.06	0.03	0.03	0.06	0.08
REQUIRES MUCH ASSISTANCE FOR EATING	0.03	-0.01	0.01	0.09	0.06
MORE DEPENDENCE IN DRESSING	0.05	0.03	0.02	0.05	0.06
TRANSFERRING PROBLEM	0.03	0.01	0.03	0.03	0.04
NOT TOTALLY DEPENDENT IN TRANSFERRING	0.00	0.03	-0.03	-0.05	-0.04
PAIN PRESENT	-0.02	0.01	0.00	0.01	0.01
PLANNED DISCHARGE: 30 - 90 DAYS	-0.03	-0.02	-0.03	0.01	0.01
SWALLOWING PROBLEM	-0.03	-0.04	0.00	0.00	0.01
ALS/MS DIAGNOSIS	-0.01	-0.01	0.01	0.00	-0.02
UNSTABLE FUNCTIONAL STATUS	0.11	0.09	0.05	0.03	0.04
AGE GREATER THAN 76	-0.04	-0.05	-0.10	0.06	0.07
<b>RUG INDICES AND SCALES</b>					
CC NURSING CMI	0.01	0.03	0.00	0.05	0.06
CC LATE LOSS ADL	0.02	-0.01	0.02	0.07	0.08
CC BEHAVIOR PROBLEMS	<b>0.22</b>	<b>0.21</b>	<b>0.22</b>	-0.02	-0.02
CC CLINICALLY COMPLEX	-0.05	-0.05	-0.01	0.01	0.03
CC EXTENSIVE CARE	-0.04	-0.04	-0.02	0.03	0.02
CC COGNITIVE IMPAIRMENT	<b>0.11</b>	0.08	0.06	-0.04	-0.03
CC REHAB	-0.04	-0.03	-0.03	0.01	0.01
CC SPECIAL CARE	-0.04	-0.04	0.00	0.04	0.02
<b>NURSING SEVERITY INDICES</b>					
WEIGHTED NSI	0.05	0.05	0.03	0.04	0.05
UNWEIGHTED NSI	<b>0.11</b>	0.08	0.05	<b>0.10</b>	<b>0.17</b>
<b>PERSONAL SEVERITY INDEX</b>					
FULL PSI	0.09	0.06	0.02	0.08	0.08
PSI: SUBSET 1	0.07	0.05	0.01	<b>0.10</b>	0.09
PSI: SUBSET 2	0.07	0.04	0.01	0.09	0.08
<b>OTHER SCALES</b>					
COGNITIVE PERFORMANCE SCALE (CPS)	<b>0.15</b>	0.03	0.06	0.05	0.05
CARDIO/PULMONARY IMPAIRMENT SCALE	-0.03	-0.02	-0.03	0.01	0.03
<b>MDS DIAGNOSIS INDICATORS</b>					
ACUTE EPISODE OR FLAIR-UP	-0.01	-0.01	-0.01	0.02	0.03
ALZHEIMER'S DISEASE	0.08	0.05	0.01	0.01	0.03
ARTERIOSCLEROTIC HEART DISEASE (AHSD)	0.00	0.00	-0.01	0.00	0.01
ARTHRITIS	-0.01	0.00	-0.02	-0.02	0.02
CANCER	-0.02	-0.01	-0.02	0.00	0.01
CONGESTIVE HEART FAILURE (CHF)	-0.03	-0.02	-0.02	-0.02	0.03
DEMENTIA OTHER THAN ALZHEIMER'S	0.09	0.05	0.05	0.02	0.03
DEPRESSION	0.03	0.03	0.04	-0.02	0.01
EMPHYSEMA/COPD	0.00	0.01	0.01	0.04	0.02
HIP FRACTURE	-0.01	-0.01	-0.02	0.05	0.02
OSTEOPOROSIS	-0.02	-0.02	-0.03	0.07	0.03
RENAL FAILURE	-0.02	-0.01	-0.01	-0.02	0.01



Chronic Care Prevalence	CCAT02-I	CCNT01*-I	CCNT04-I	CCNT05*-I	CCNT06*-I
MODES OF EXPRESSION:SPEECH	-0.04	-0.17	0.01	-0.10	-0.04
MODERATE/IMPAIRED DECISION MAKING PROB	-0.02	0.38	0.01	0.05	0.28
SEVERE DECISION MAKING PROB	0.01	0.36	0.00	0.01	0.06
INDEPENDENCE IN DAILY DECISION MAKING	0.02	-0.38	-0.01	-0.05	-0.28
MOTOR AGITATION (PAST 5-7 DAYS)	-0.03	0.07	0.00	-0.06	0.04
SHORT TERM MEMORY PROBLEM	-0.04	0.32	0.01	0.06	0.24
LONG TERM MEMORY PROBLEM	-0.03	0.36	0.00	0.06	0.24
PHYSICALLY ABUSIVE BEHAVIOR	-0.01	0.08	0.00	0.02	0.06
ANY WANDERING	-0.05	0.05	-0.01	-0.17	0.05
PRESSURE ULCERS (STAGE 3 OR 4)	0.20	0.05	0.05	0.03	0.04
BLADDER INCONTINENCE	-0.17	0.85	0.00	0.68	0.83
BOWEL INCONTINENCE	0.10	0.58	0.03	0.42	0.49
FALL IN PAST 30 DAYS	-0.02	-0.01	0.03	-0.07	0.03
FALL IN PAST 180 DAYS	-0.04	0.00	0.03	-0.08	0.06
WEIGHT LOSS(5%, PAST 30 D;10%, PAST 180 D	0.04	0.05	0.03	0.02	0.05
LOCOMOTION PROBLEM	0.10	0.37	0.03	0.24	0.28
BED MOBILITY PROBLEM	0.10	0.35	0.02	0.18	0.27
UNSTEADY GAIT/COG IMP	-0.06	0.03	0.01	-0.10	0.08
RESIDENT NOT BEDFAST	-0.16	-0.10	-0.04	-0.05	-0.06
MORE DEPENDENCE IN TOILETING	0.13	0.64	0.07	0.49	0.57
REQUIRES MUCH ASSISTANCE FOR EATING	0.09	0.41	0.03	0.27	0.25
MORE DEPENDENCE IN DRESSING	0.09	0.50	0.05	0.36	0.43
TRANSFERRING PROBLEM	0.11	0.41	0.03	0.25	0.35
NOT TOTALLY DEPENDENT IN TRANSFERRING	-0.17	-0.40	-0.04	-0.24	-0.27
PAIN PRESENT	0.06	-0.11	0.05	-0.04	-0.06
PLANNED DISCHARGE: 30 - 90 DAYS	0.02	-0.05	0.02	-0.02	-0.03
SWALLOWING PROBLEM	0.05	0.13	0.02	0.06	0.10
ALS/MS DIAGNOSIS	0.13	0.04	0.03	0.01	0.04
UNSTABLE FUNCTIONAL STATUS	0.03	0.08	0.04	-0.02	0.08
AGE GREATER THAN 76	-0.06	0.09	0.01	0.01	0.09
RUG INDICES AND SCALES					
CC NURSING CMI	0.19	0.32	0.10	0.17	0.27
CC LATE LOSS ADL	0.15	0.54	0.08	0.37	0.45
CC BEHAVIOR PROBLEMS	-0.06	-0.06	-0.03	-0.24	-0.07
CC CLINICALLY COMPLEX	0.12	0.08	0.06	0.07	0.07
CC EXTENSIVE CARE	0.12	0.04	0.06	0.02	0.04
CC COGNITIVE IMPAIRMENT	-0.03	-0.16	-0.04	-0.38	-0.09
CC REHAB	0.02	0.02	0.03	-0.01	0.00
CC SPECIAL CARE	0.21	0.10	0.06	0.06	0.08
NURSING SEVERITY INDICES					
WEIGHTED NSI	0.09	0.15	0.06	0.07	0.14
UNWEIGHTED NSI	0.27	0.49	0.18	0.35	0.43
PERSONAL SEVERITY INDEX					
FULL PSI	0.08	0.58	0.07	0.25	0.52
PSI: SUBSET 1	0.00	0.35	0.05	0.12	0.36
PSI: SUBSET 2	0.11	0.56	0.06	0.29	0.45
OTHER SCALES					
COGNITIVE PERFORMANCE SCALE (CPS)	-0.03	0.34	0.01	0.06	0.26
CARDIO/PULMONARY IMPAIRMENT SCALE	0.01	-0.03	0.02	0.01	0.01
MDS DIAGNOSIS INDICATORS					
ACUTE EPISODE OR FLAIR-UP	0.07	0.00	0.06	0.00	0.01
ALZHEIMER'S DISEASE	-0.05	0.15	-0.01	0.00	0.07
ARTERIOSCLEROTIC HEART DISEASE (AHSD)	0.00	0.01	0.01	0.01	0.02
ARTHRITIS	-0.02	-0.01	0.02	0.00	0.01
CANCER	0.02	0.00	0.01	0.00	0.00
CONGESTIVE HEART FAILURE	0.02	-0.02	0.02	0.01	0.01
DEMENTIA OTHER THAN ALZHEIMER'S	-0.04	0.14	0.00	0.01	0.12
DEPRESSION	0.01	0.02	0.03	-0.01	0.05
EMPHYSEMA/COPD	0.01	-0.07	0.00	-0.01	-0.04
HIP FRACTURE	0.00	0.00	0.02	-0.01	0.01
OSTEOPOROSIS	-0.03	0.01	0.01	0.00	0.02
RENAL FAILURE	0.05	-0.02	0.02	0.00	-0.01

Chronic Care Prevalence	CDRG01* II	CDRG02* III	CDRG03* III	CFAL01- II	CNUT01* II
MODES OF EXPRESSION: SPEECH	0.07	0.05	0.07	0.06	-0.33
MODERATE/IMPAIRED DECISION MAKING PROB	<b>0.17</b>	0.08	<b>0.13</b>	0.01	0.14
SEVERE DECISION MAKING PROB	0.04	0.02	0.00	-0.05	0.25
INDEPENDENCE IN DAILY DECISION MAKING	-0.17	-0.08	-0.13	-0.01	-0.14
MOTOR AGITATION (PAST 5-7 DAYS)	<b>0.19</b>	<b>0.12</b>	<b>0.14</b>	0.04	-0.01
SHORT TERM MEMORY PROBLEM	<b>0.14</b>	0.03	0.10	0.03	0.09
LONG TERM MEMORY PROBLEM	<b>0.15</b>	0.08	<b>0.11</b>	0.01	0.14
PHYSICALLY ABUSIVE BEHAVIOR	0.09	0.04	0.04	0.01	0.00
ANY WANDERING	<b>0.19</b>	<b>0.13</b>	<b>0.16</b>	<b>0.08</b>	-0.07
PRESSURE ULCERS STAGE 3 OR 4)	-0.02	0.00	-0.02	-0.03	0.10
BLADDER INCONTINENCE	0.03	0.00	0.00	-0.04	0.13
BOWEL INCONTINENCE	-0.01	-0.01	-0.03	-0.09	0.28
FALL IN PAST 30 DAYS	0.06	0.05	0.05		-0.06
FALL IN PAST 180 DAYS	0.08	0.06	0.06	0.15	-0.10
WEIGHT LOSS(5%,PAST 30 D;10%,PAST 180 D)	0.00	0.00	0.00	0.01	0.02
LOCOMOTION PROBLEM	-0.07	-0.06	-0.07	<b>-0.12</b>	0.20
BED MOBILITY PROBLEM	-0.04	-0.05	-0.05	<b>-0.11</b>	0.18
UNSTEADY GAIT/COG IMP	0.09	0.04	0.07	<b>0.10</b>	-0.09
RESIDENT NOT BEDFAST	0.04	0.03	0.04	<b>-0.05</b>	-0.23
MORE DEPENDENCE IN TOILETING	-0.01	-0.01	-0.04	-0.07	0.19
REQUIRES MUCH ASSISTANCE FOR EATING	-0.02	-0.01	-0.04	-0.08	0.41
MORE DEPENDENCE IN DRESSING	-0.01	-0.02	-0.04	-0.07	0.16
TRANSFERRING PROBLEM	-0.04	-0.04	-0.05	-0.12	0.17
NOT TOTALLY DEPENDENT IN TRANSFERRING	0.06	0.06	0.07	<b>0.12</b>	-0.30
PAIN PRESENT	-0.03	-0.01	-0.03	0.01	-0.05
PLANNED DISCHARGE: 30-90 DAYS	-0.02	0.00	-0.02	0.04	0.00
SWALLOWING PROBLEM	-0.04	-0.03	-0.04	-0.03	<b>0.30</b>
ALS/MS DIAGNOSIS	-0.03	-0.02	-0.03	-0.02	<b>0.04</b>
UNSTABLE FUNCTIONAL STATUS	0.09	0.08	0.07	0.03	0.01
AGE GREATER THAN 76	-0.04	-0.07	-0.05	0.04	-0.08
<b>RUG INDICES AND SCALES</b>					
CC NURSING CMI	0.05	0.01	0.05	0.04	<b>0.28</b>
CC LATE LOSS ADL	-0.05	-0.07	0.09	<b>-0.10</b>	<b>0.24</b>
CC BEHAVIOR PROBLEMS	<b>0.16</b>	0.09	<b>0.14</b>	0.05	-0.08
CC CLINICALLY COMPLEX	-0.06	-0.01	-0.05	-0.02	<b>0.34</b>
CC EXTENSIVE CARE	-0.03	-0.01	-0.03	0.00	<b>0.16</b>
CC COGNITIVE IMPAIRMENT	<b>0.16</b>	0.08	<b>0.15</b>	0.09	<b>-0.12</b>
CC REHAB	-0.01	0.01	-0.01	0.02	0.01
CC SPECIAL CARE	-0.06	-0.03	-0.06	-0.04	<b>0.26</b>
<b>NURSING SEVERITY INDICES</b>					
WEIGHTED NSI	0.02	0.01	0.01	0.01	<b>0.09</b>
UNWEIGHTED NSI	0.06	0.05	0.03	0.00	<b>0.32</b>
<b>PERSONAL SEVERITY INDEX</b>					
FULL PSI	0.02	0.01	-0.01	-0.02	<b>0.16</b>
PSI: SUBSET 1	0.03	0.01	0.00	0.02	0.05
PSI: SUBSET 2	0.00	-0.01	-0.03	-0.07	<b>0.23</b>
<b>OTHER SCALES</b>					
COGNITIVE PERFORMANCE SCALE (CPS)	<b>0.14</b>	0.03	<b>0.10</b>	0.02	<b>0.11</b>
CARDIO/PULMONARY IMPAIRMENT SCALE	-0.04	-0.03	-0.03	0.02	-0.02
<b>MDS DIAGNOSIS INDICATORS</b>					
ACUTE EPISODE OR FLAIR-UP	-0.01	0.01	-0.01	0.02	0.03
ALZHEIMER'S DISEASE	<b>0.12</b>	0.08	0.09	0.02	-0.01
ARTERIOSCLEROTIC HEART DISEASE (AHSD)	-0.01	-0.01	-0.01	0.01	-0.01
ARTHRITIS	-0.02	-0.04	-0.02	0.01	-0.07
CANCER	-0.01	0.00	-0.01	0.01	0.00
CONGESTIVE HEART FAILURE (CHF)	-0.05	-0.04	-0.04	0.01	-0.02
DEMENTIA OTHER THAN ALZHEIMER'S	<b>0.13</b>	0.06	<b>0.12</b>	0.02	0.01
DEPRESSION	0.08	0.05	0.08	0.02	-0.05
EMPHYSEMA/COPD	-0.01	-0.01	0.00	0.01	-0.01
HIP FRACTURE	0.00	0.01	0.00	0.02	-0.02
OSTEOPOROSIS	-0.03	-0.03	-0.03	0.01	-0.04
RENAL FAILURE	-0.02	-0.01	-0.02	0.00	0.01

Chronic Care Prevalence	CPRU02* (N/A)	CPRU03* (N/A)	CSOC02- II	CWGT01 *-III
MODES OF EXPRESSION: SPEECH	-0.02	0.00	-0.13	0.01
MODERATE/IMPAIRED DECISION MAKING PROB	-0.02	-0.02	0.11	0.02
SEVERE DECISION MAKING PROB	0.00	-0.01	<b>0.17</b>	0.00
INDEPENDENCE IN DAILY DECISION MAKING	0.02	0.02	-0.11	-0.02
MOTOR AGITATION (PAST 5-7 DAYS)	-0.03	-0.01	0.03	0.01
SHORT TERM MEMORY PROBLEM	-0.03	-0.03	0.08	0.02
LONG TERM MEMORY PROBLEM	-0.02	-0.03	0.10	<b>0.01</b>
PHYSICALLY ABUSIVE BEHAVIOR	-0.01	0.00	0.03	<b>0.01</b>
ANY WANDERING	-0.04	-0.03	-0.02	0.00
PRESSURE ULCERS (STAGE 3 OR 4)	0.38	0.31	0.05	0.04
BLADDER INCONTINENCE	<b>-0.11</b>	0.02	0.08	0.02
PRIOR BOWEL INCONTINENCE	0.05	0.03	<b>0.15</b>	0.03
FALL IN PAST 30 DAYS	0.00	0.03	-0.01	0.05
FALL IN PAST 180 DAYS	-0.02	0.02	-0.03	0.04
WEIGHT LOSS(5%, PAST 30 D;10% PAST 180 D)	0.07	0.04	0.04	0.21
LOCOMOTION PROBLEM	0.05	0.07	<b>0.12</b>	0.04
BED MOBILITY PROBLEM	0.04	0.07	0.11	<b>0.02</b>
UNSTEADY GAIT/COG IMP	-0.06	0.00	-0.02	0.01
RESIDENT NOT BEDFAST	-0.11	-0.03	<b>-0.17</b>	-0.02
MORE DEPENDENCE IN TOILETING	0.00	0.05	0.11	0.05
REQUIRES MUCH ASST FOR EATING	0.05	0.02	<b>0.19</b>	0.03
MORE DEPENDENCE IN DRESSING	0.00	0.04	0.09	0.04
TRANSFERRING PROBLEM	0.01	0.07	0.10	0.03
NOT TOTALLY DEPENDENT IN TRANSFERRING	<b>-0.09</b>	-0.05	-0.16	-0.03
PAIN PRESENT	0.07	0.05	-0.01	0.04
PLANNED DISCHARGE: 30-90 DAYS	0.05	0.05	-0.01	0.04
SWALLOWING PROBLEM	0.02	0.01	0.07	0.01
ALS/MS DIAGNOSIS	0.03	0.00	0.00	-0.01
UNSTABLE FUNCTIONAL STATUS	0.04	0.02	0.04	0.05
AGE GREATER THAN 76	-0.03	0.00	0.01	0.02
<b>RUG INDICES AND SCALES</b>				
CC NURSING CMI	<b>0.18</b>	<b>0.11</b>	<b>0.10</b>	0.09
CC LATE LOSS ADL	0.02	0.07	<b>0.12</b>	0.05
CC BEHAVIOR PROBLEMS	-0.01	-0.02	-0.01	-0.01
CC CLINICALLY COMPLEX	<b>0.10</b>	0.09	0.06	0.06
CC EXTENSIVE CARE	<b>0.10</b>	0.06	0.04	0.06
CC COGNITIVE IMPAIRMENT	-0.02	-0.04	-0.05	-0.03
CC REHAB	0.03	0.04	-0.01	0.03
CC SPECIAL CARE	<b>0.25</b>	<b>0.14</b>	0.06	0.05
<b>NURSING SEVERITY INDEX</b>				
WEIGHTED NSI	<b>0.09</b>	0.05	0.07	0.07
UNWEIGHTED NSI	<b>0.22</b>	<b>0.22</b>	<b>0.20</b>	<b>0.17</b>
<b>PERSONAL SEVERITY INDEX</b>				
FULL PSI	0.02	0.08	<b>0.11</b>	0.08
PSI: SUBSET 1	<b>0.12</b>	0.09	0.07	<b>0.11</b>
PSI: SUBSET 2	0.02	0.04	<b>0.14</b>	0.06
<b>OTHER SCALES</b>				
COGNITIVE PERFORMANCE SCALE (CPS)	-0.03	-0.03	0.08	0.01
CARDIO/PULMONARY IMPAIRMENT SCALE	0.02	0.02	-0.01	0.03
<b>MDS DIAGNOSIS INDICATORS</b>				
ACUTE EPISODE OR FLAIR-UP	0.07	0.04	0.01	0.06
ALZHEIMER'S DISEASE	-0.02	-0.02	0.04	0.00
ARTERIOSCLEROTIC HEART DISEASE (AHSD)	0.00	0.01	0.00	0.01
ARTHRITIS	-0.01	0.00	-0.01	0.01
CANCER	0.01	0.01	0.00	0.02
CONGESTIVE HEART FAILURE (CHF)	0.02	0.02	0.00	0.03
DEMENTIA OTHER THAN ALZHEIMER'S	-0.01	-0.02	0.03	0.00
DEPRESSION	-0.03	0.00	-0.01	0.01
EMPHYSEMA/COPD	0.01	0.01	0.00	0.02
HIP FRACTURE	0.04	0.05	0.00	0.04
OSTEOPOROSIS	-0.02	0.00	-0.01	0.00
RENAL FAILURE	0.04	0.03	0.00	0.03

Chronic Care Incidence	CADL02	CADL03	CBEH04*	CCAT01	CCOG01*
MODES OF EXPRESSION: SPEECH	0.00	0.01	0.04	0.00	-0.01
MODERATE/IMPAIRED DECISION MAKING PROB	-0.01	-0.07	0.08	0.00	-0.09
SEVERE DECISION MAKING PROB	0.00	-0.04	0.00	0.00	-0.02
INDEPENDENCE IN DAILY DECISION MAKING	0.01	0.07	-0.08	0.00	0.08
MOTOR AGITATION (PAST 5-7 DAYS)	-0.01	-0.02	0.07	-0.01	0.00
SHORT TERM MEMORY PROBLEM	-0.01	-0.07	0.07	0.00	-0.04
LONG TERM MEMORY PROBLEM	-0.01	-0.08	0.07	0.00	-0.01
PHYSICALLY ABUSIVE BEHAVIOR	0.00	-0.02	0.00	0.00	0.01
ANY WANDERING	0.00	-0.04	0.04	-0.01	0.00
PRESSURE ULCERS (STAGE 3 OR 4)	0.00	0.03	-0.01	0.04	0.01
BLADDER INCONTINENCE	-0.01	-0.06	0.01	0.02	0.03
BOWEL INCONTINENCE	-0.02	-0.02	-0.02	0.02	0.04
FALL IN PAST 30 DAYS	0.01	0.11	0.05	0.02	0.04
FALL IN PAST 180 DAYS	0.03	0.06	0.06	0.01	0.03
WEIGHT LOSS(5%, PAST 30 D;10% PAST 180 D)	0.00	0.06	0.01	0.02	0.03
LOCOMOTION PROBLEM	-0.03	0.08	-0.04	0.02	0.04
BED MOBILITY PROBLEM	-0.03	0.05	-0.02	0.01	0.02
UNSTEADY GAIT/COG IMP	0.00	-0.01	0.05	0.00	-0.03
RESIDENT NOT BEDFAST	0.01	-0.02	0.02	-0.02	-0.01
MORE DEPENDENCE IN TOILETING	-0.04	0.07	0.00	0.03	0.04
REQUIRES MUCH ASSISTANCE FOR EATING	-0.04	0.04	-0.02	0.02	0.07
MORE DEPENDENCE IN DRESSING	-0.03	0.06	0.00	0.02	0.03
TRANSFERRING PROBLEM	-0.05	0.05	-0.02	0.02	0.02
NOT TOTALLY DEPENDENT IN TRANSFERRING	0.05	-0.03	0.04	-0.03	-0.02
PAIN PRESENT	0.01	0.08	-0.01	0.02	0.00
PLANNED DISCHARGE: 30-90 DAYS	0.02	0.12	-0.01	0.05	0.05
SWALLOWING PROBLEM	0.00	0.01	-0.02	0.02	0.01
ALS/MS DIAGNOSIS	-0.01	-0.02	-0.01	0.01	-0.01
UNSTABLE FUNCTIONAL STATUS	-0.01	0.05	0.05	0.02	0.02
AGE GREATER THAN 76	0.02	-0.02	0.00	0.00	0.04
RUG INDICES AND SCALES					
CC NURSING CMI	0.01	0.21	0.00	0.06	0.05
CC LATE LOSS ADL	-0.03	0.09	-0.02	0.04	0.04
CC BEHAVIOR PROBLEMS	-0.01	-0.07	0.05	-0.02	-0.02
CC CLINICALLY COMPLEX	0.01	0.13	-0.02	0.05	0.03
CC EXTENSIVE CARE	0.00	0.15	0.00	0.04	0.03
CC COGNITIVE IMPAIRMENT	0.01	-0.09	0.07	-0.03	0.09
CC REHAB	0.01	0.13	0.00	0.03	0.03
CC SPECIAL CARE	0.00	0.11	-0.02	0.05	0.02
NURSING SEVERITY INDICES					
WEIGHTED NSI	0.01	0.09	0.02	0.03	
UNWEIGHTED NSI	0.02	0.14	0.05	0.15	0.07
PERSONAL SEVERITY INDEX					
FULL PSI	-0.02	0.08	0.02	0.04	0.04
PSI: SUBSET 1	-0.01	0.09	0.03	0.04	0.05
PSI: SUBSET 2	-0.04	0.07	0.00	0.03	0.04
OTHER SCALES					
COGNITIVE PERFORMANCE SCALE (CPS)	-0.01	-0.07	0.07	0.00	-0.07
CARDIO/PULMONARY IMPAIRMENT SCALE	0.02	0.02	0.00	0.02	0.01
MDS DIAGNOSIS INDICATORS					
ACUTE EPISODE OR FLAIR-UP	0.00	0.13	0.01	0.04	0.05
ALZHEIMER'S DISEASE	0.00	-0.04	0.04	-0.01	0.02
ARTERIOSCLEROTIC HEART DISEASE (AHSD)	0.01	0.00	0.00	0.01	0.00
ARTHRITIS	0.00	0.01	0.00	0.00	0.00
CANCER	0.01	0.01	0.00	0.01	0.01
CONGESTIVE HEART FAILURE (CHF)	0.01	0.02	0.00	0.03	0.01
DEMENTIA OTHER THAN ALZHEIMER'S	0.00	-0.05	0.05	0.00	0.00
DEPRESSION	0.00	0.00	0.01	0.00	0.00
EMPHYSEMA/COPD	0.01	0.03	0.00	0.01	0.00
HIP FRACTURE	0.02	0.09	0.01	0.01	0.01
OSTEOPOROSIS	0.01	0.00	-0.01	0.00	0.00
RENAL FAILURE	0.01	0.03	0.00	0.02	0.01

Chronic Care Incidence	CCOM01* II	CCNT02- II	CCNT03*- I	CDELOX*- II	CMOB01*- I
MODES OF EXPRESSION: SPEECH	-0.02	-0.01	-0.01	0.06	0.00
MODERATE/IMPAIRED DECISION MAKING PROB	<b>0.09</b>	<b>0.12</b>	0.09	0.02	0.06
SEVERE DECISION MAKING PROB	0.07	0.09	<b>0.07</b>	-0.09	0.07
INDEPENDENCE IN DAILY DECISION MAKING	-0.10	-0.12	<b>-0.09</b>	-0.03	-0.07
MOTOR AGITATION (PAST 5-7 DAYS)	0.03	0.05	0.03	0.05	0.02
SHORT TERM MEMORY PROBLEM	<b>0.10</b>	<b>0.11</b>	<b>0.09</b>	0.05	0.06
LONG TERM MEMORY PROBLEM	<b>0.10</b>	<b>0.11</b>	0.09	0.01	0.07
PHYSICALLY ABUSIVE BEHAVIOR	0.02	0.04	0.02	0.00	0.02
ANY WANDERING	0.05	0.06	0.05	0.04	0.02
PRESSURE ULCERS (STAGE 3 OR 4)	0.01	0.03	0.01	0.00	0.02
BLADDER INCONTINENCE	0.07	<b>0.15</b>	-0.03	-0.03	0.09
BOWEL INCONTINENCE	0.06		0.05	-0.07	0.07
FALL IN PAST 30 DAYS	0.04	0.06	0.07	0.07	0.05
FALL IN PAST 180 DAYS	0.04	0.07	0.07	0.07	<b>0.06</b>
WEIGHT LOSS(5%, PAST 30 D; \10%, PAST 180 D)	0.02	0.05	<b>0.04</b>	0.03	0.03
LOCOMOTION PROBLEM	0.03	0.09	0.06	-0.05	0.00
BED MOBILITY PROBLEM	0.03	0.08	0.04	-0.04	0.04
UNSTEADY GAIT/COG IMP	0.03	0.06	0.05	0.07	0.05
RESIDENT NOT BEDFAST	0.00	-0.03	-0.01	0.01	-0.02
MORE DEPENDENCE IN TOILETING	0.06	0.17	0.09	-0.03	<b>0.10</b>
REQUIRES MUCH ASSISTANCE FOR EATING	<b>0.07</b>	0.11	0.07	-0.06	<b>0.08</b>
MORE DEPENDENCE IN DRESSING	0.04	<b>0.12</b>	<b>0.07</b>	-0.04	0.07
TRANSFERRING PROBLEM	0.03	0.09	0.04	-0.04	0.03
NOT TOTALLY DEPENDENT IN TRANSFERRING	-0.03	-0.08	-0.04	0.06	-0.04
PAIN PRESENT	-0.03	-0.01	0.00	0.04	0.01
PLANNED DISCHARGE: 30 - 90 DAYS	0.01	0.02	0.03	0.03	0.05
SWALLOWING PROBLEM	0.01	0.03	0.03	-0.02	0.01
ALS/MS DIAGNOSIS	-0.01	0.00	-0.02	-0.01	0.00
UNSTABLE FUNCTIONAL STATUS	0.03	0.06	0.05	0.07	0.04
AGE GREATER THAN 76	0.05	0.06	0.06	0.03	0.07
<b>RUG INDICES AND SCALES</b>					
CC NURSING CMI	0.04	<b>0.12</b>	<b>0.10</b>	0.02	0.09
CC LATE LOSS ADL	0.05	<b>0.15</b>	0.09	-0.03	0.09
CC BEHAVIOR PROBLEMS	0.01	0.00	0.01	0.04	-0.01
CC CLINICALLY COMPLEX	0.00	0.04	0.04	0.02	0.04
CC EXTENSIVE CARE	0.02	0.05	0.06	0.03	0.03
CC COGNITIVE IMPAIRMENT	0.02	0.01	0.02	0.05	-0.01
CC REHAB	0.01	0.03	0.04	0.03	0.02
CC SPECIAL CARE	0.00	0.04	0.03	0.00	0.03
<b>NURSING SEVERITY INDICES</b>					
WEIGHTED NSI	0.02	0.06	0.05	0.06	0.06
UNWEIGHTED NSI	0.09	<b>0.19</b>	<b>0.14</b>	0.09	<b>0.17</b>
<b>PERSONAL SEVERITY INDEX</b>					
FULL PSI	0.07	<b>0.18</b>	<b>0.11</b>	0.01	<b>0.11</b>
PSI: SUBSET 1	0.06	<b>0.14</b>	0.08	0.05	<b>0.11</b>
PSI: SUBSET 2	0.07	<b>0.16</b>	<b>0.11</b>	-0.03	0.09
<b>OTHER SCALES</b>					
COGNITIVE PERFORMANCE SCALE (CPS)	<b>0.10</b>	<b>0.11</b>	0.09	0.05	0.06
CARDIO/PULMONARY IMPAIRMENT SCALE	0.00	0.01	0.01	0.03	0.03
<b>MDS DIAGNOSIS INDICATORS</b>					
ACUTE EPISODE OR FLAIR-UP	0.03	0.03	0.04	0.01	0.03
ALZHEIMER'S DISEASE	0.06	0.06	0.05	0.00	0.04
ARTERIOSCLEROTIC HEART DISEASE (AHSD)	0.00	0.01	0.01	0.01	0.01
ARTHRITIS	0.00	-0.01	0.00	0.02	0.02
CANCER	0.00	-0.01	0.01	0.01	0.01
CONGESTIVE HEART FAILURE (CHF)	-0.01	0.01	0.01	0.02	0.02
DEMENTIA OTHER THAN ALZHEIMER'S	0.05	0.06	0.05	0.02	0.03
DEPRESSION	-0.01	0.01	0.00	0.02	0.01
EMPHYSEMA/COPD	-0.02	-0.01	-0.01	0.02	0.00
HIP FRACTURE	0.01	0.02	0.03	0.01	0.01
OSTEOPOROSIS	0.00	0.01	0.01	0.01	0.01
RENAL FAILURE	-0.01	-0.02	0.01	0.01	0.01

Chronic Care Incidence	CMOD03 *-II	CPAN01* II	CPRU04* III	CWALOX *-I
MODES OF EXPRESSION: SPEECH	0.05	0.04	-0.03	0.00
MODERATE/IMPAIRED DECISION MAKING PROB	-0.01	-0.06	0.02	-0.04
SEVERE DECISION MAKING PROB	-0.04	-0.06	0.03	-0.04
INDEPENDENCE IN DAILY DECISION MAKING	0.00	0.06	-0.02	0.05
MOTOR AGITATION (PAST 5-7 DAYS)	-0.02	-0.01	-0.01	-0.01
SHORT TERM MEMORY PROBLEM	0.00	-0.05	0.01	-0.04
LONG TERM MEMORY PROBLEM	-0.01	-0.06	0.02	-0.04
PHYSICALLY ABUSIVE BEHAVIOR	0.00	-0.01	0.00	-0.02
ANY WANDERING	0.02	-0.01	-0.03	-0.02
PRESSURE ULCERS (STAGE 3 OR 4)	0.00	0.01	0.03	-0.01
BLADDER INCONTINENCE	-0.03	-0.05	0.04	-0.08
BOWEL INCONTINENCE	-0.05	-0.06	0.08	-0.05
FALL IN PAST 30 DAYS	0.04	0.01	0.01	-0.06
FALL IN PAST 180 DAYS	0.04	0.02	0.00	-0.07
WEIGHT LOSS(5%, PAST 30 D;10%, PAST 180 D)	0.01	0.01	0.04	-0.03
LOCOMOTION PROBLEM	-0.03	-0.03	0.07	-0.01
BED MOBILITY PROBLEM	-0.02	-0.03	0.06	-0.02
UNSTEADY GAIT/COG IMP	0.03	0.00	-0.02	-0.07
RESIDENT NOT BEDFAST	0.01	0.00	-0.06	0.00
MORE DEPENDENCE IN TOILETING	-0.02	-0.03	0.10	-0.08
REQUIRES MUCH ASSISTANCE FOR EATING	-0.04	-0.05	0.07	-0.05
MORE DEPENDENCE IN DRESSING	-0.02	-0.03	0.07	-0.05
TRANSFERRING PROBLEM	-0.03	-0.03	0.07	-0.02
NOT TOTALLY DEPENDENT IN TRANSFERRING	0.04	0.03	-0.09	0.00
PAIN PRESENT	0.05	-0.07	0.03	-0.02
PLANNED DISCHARGE: 30-90 DAYS	0.04	0.04	0.05	-0.05
SWALLOWING PROBLEM	-0.02	-0.01	0.03	-0.01
ALS/MS DIAGNOSIS	0.00	0.00	0.02	0.00
UNSTABLE FUNCTIONAL STATUS	0.04	0.01	0.03	-0.04
AGE GREATER THAN 76	0.02	0.01	0.01	-0.06
RUG INDICES AND SCALES				
CC NURSING CMI	0.02	0.02	0.11	0.08
CC LATE LOSS ADL	-0.02	-0.02	0.11	-0.06
CC BEHAVIOR PROBLEMS	0.01	-0.01	-0.04	0.01
CC CLINICALLY COMPLEX	0.02	0.04	0.07	-0.04
CC EXTENSIVE CARE	0.02	0.03	0.07	-0.03
CC COGNITIVE IMPAIRMENT	0.02	-0.02	-0.06	0.01
CC REHAB	0.02	0.03	0.03	-0.03
CC SPECIAL CARE	0.00	0.02	0.08	-0.03
NURSING SEVERITY INDICES				
WEIGHTED NSI	0.03	0.03	0.05	0.05
UNWEIGHTED NSI	0.05	0.03	0.17	0.14
PERSONAL SEVERITY INDEX				
FULL PSI	0.01	-0.02	0.09	-0.10
PSI: SUBSET 1	0.03	0.00	0.07	-0.08
PSI: SUBSET 2	-0.02	-0.04	0.09	-0.07
OTHER SCALES				
COGNITIVE PERFORMANCE SCALE (CPS)	0.00	-0.06	0.01	-0.04
CARDIO/PULMONARY IMPAIRMENT SCALE	0.03	0.03	0.02	-0.03
OTHER SCALES				
ACUTE EPISODE OR FLAIR-UP	0.04	0.03	-0.01	0.06
ALZHEIMER'S DISEASE	0.00	-0.03	0.00	0.00
ARTERIOSCLEROTIC HEART DISEASE (AHSD)	0.01	0.01	0.01	0.01
ARTHRITIS	0.02	0.03	0.00	0.01
CANCER	0.01	0.02	0.01	0.02
CONGESTIVE HEART FAILURE (CHF)	0.02	0.03	0.02	0.03
DEMENTIA OTHER THAN ALZHEIMER'S	0.00	0.00	0.00	0.00
DEPRESSION	0.03	0.02	-0.01	0.01
EMPHYSEMA/COPD	0.00	0.02	0.00	0.02
HIP FRACTURE	0.01	0.00	0.03	0.04
OSTEOPOROSIS	0.01	0.01	0.00	0.00
RENAL FAILURE	0.01	0.02	0.03	0.03

## Attachment #3

## Covariate/QM Correlation Measures: Phi Coefficients (Post Acute Care)

COVARIATE DESCRIPTIONS	PADLOX*	PCNTOX*	PDELOX*	PPAIOX*	PPRUOX*	PRSPOX*	PWALOX*
NO PRIOR RESIDENTIAL HISTORY	-0.11	-0.17	-0.03	0.04	-0.04	0.04	0.09
ULCER RESOLVED	0.06	0.08	0.00	0.00	0.11	-0.01	-0.06
NEEDS BED MOBILITY ASSISTANCE	0.03	0.28	0.04	0.06	0.17	-0.01	-0.15
BOWEL INCONTINENCE	0.20	0.51	0.06	-0.13	0.20	-0.02	-0.21
DIABETES/PERIPHERAL VASCULAR DISEASE	0.03	0.02	0.00	0.00	0.07	-0.01	-0.04
LOW BMI	0.03	0.05	0.01	-0.03	0.08	-0.01	-0.03
ASTHMA	-0.02	-0.03	0.00	0.02	-0.02	-0.02	0.02
EMPHYSEMA/COPD	-0.01	-0.03	0.00	-0.01	0.00	-0.09	0.01
RUG INDICES AND SCALES							
PAC NURSING CMI	0.12	0.32	0.05	0.01	0.21	0.05	0.18
PAC LATE LOSS ADL	0.09	0.39	0.06	0.03	0.21	-0.01	-0.17
PAC BEHAVIOR PROBLEMS	0.03	-0.02	0.03	-0.04	-0.05	0.01	0.03
PAC CLINICALLY COMPLEX	0.02	0.06	0.03	0.02	0.11	0.15	-0.04
PAC EXTENSIVE CARE	0.01	0.13	0.03	0.04	0.11	-0.07	-0.05
PAC COGNITIVE IMPAIRMENT	0.05	-0.02	0.03	-0.09	-0.09	0.01	0.02
PAC REHAB	0.06	-0.06	-0.02	0.01	-0.04	0.03	0.03
PAC SPECIAL CARE	0.01	-0.01	0.00	0.15	0.29	0.00	-0.01
NURSING SEVERITY INDICES							
WEIGHTED NSI	0.07	0.19	0.07	0.01	0.12	0.09	0.07
UNWEIGHTED NSI	0.16	0.43	0.19	0.04	0.31	0.29	0.18
PERSONAL SEVERITY INDEX							
FULL PSI	0.04	0.25	0.05	0.00	0.16	-0.03	-0.10
PSI: SUBSET 1	0.05	0.23	0.05	-0.02	0.20	-0.04	-0.07
PSI: SUBSET 2	0.12	0.40	0.07	-0.01	0.21	-0.02	-0.16
OTHER SCALES							
COGNITIVE PERFORMANCE SCALE (CPS)	0.17	0.37	0.11	-0.18	-0.08	-0.02	0.15
CARDIO/PULMONARY IMPAIRMENT SCALE	0.00	0.01	0.01	-0.05	0.02	-0.09	-0.01
MDS DIAGNOSIS INDICATORS							
ACUTE EPISODE OR FLARE-UP	-0.03	0.00	0.01	0.03	0.01	-0.04	-0.02
ALZHEIMER'S DISEASE	0.08	0.14	0.03	-0.08	0.01	0.00	-0.05
ARTERIOSCLEROTIC HEART DISEASE (AHSD)	0.00	0.01	0.01	-0.01	0.01	-0.02	0.00
ARTHRITIS	-0.02	-0.01	0.00	0.10	-0.02	0.00	0.01
CANCER	0.00	-0.01	0.01	0.03	0.02	-0.01	0.01
CONGESTIVE HEART FAILURE (CHF)	0.02	0.03	0.01	-0.05	0.04	-0.08	-0.02
DEMENTIA OTHER THAN ALZHEIMER'S	0.10	0.21	0.04	-0.13	0.03	-0.01	-0.07
DEPRESSION	0.04	0.05	0.01	0.02	-0.01	-0.02	-0.03
EMPHYSEMA/COPD	-0.01	-0.03	0.00	-0.01	0.00	-0.09	-0.01
HIP FRACTURE	-0.01	0.03	0.01	0.12	0.05	0.04	-0.01
OSTEOPOROSIS	-0.01	0.00	0.00	0.08	-0.01	0.00	0.00
RENAL FAILURE	0.02	0.01	0.00	-0.02	0.06	-0.02	-0.03

**Attachment #4**

**Correlation Among Covariates: Chronic Care QM Models**

**CINFOX MODEL**

	CC NURSING CMI	CC CLINICALLY COMPLEX
COVARIATE CORRELATIONS		
CC NURSING CMI	1.00	0.64
CC CLINICALLY COMPLEX		1.00



### CPAIOX MODEL

	INDEPENDENCE IN DAILY DECISION MAKING	COGNITIVE PERFORMANCE SCALE (CPS)	LONG TERM MEMORY PROBLEM	SHORT TERM MEMORY PROBLEM	SEVERE DECISION MAKING PROB	CC COGNITIVE IMPAIRMENT
<b>COVARIATE CORRELATIONS</b>						
<b>INDEPENDENCE IN DAILY DECISION MAKING</b>	1.00	-0.77	-0.65	-0.60	-0.40	-0.35
<b>COGNITIVE PERFORMANCE SCALE (CPS)</b>		1.00	0.68	0.71	0.76	0.16
<b>LONG TERM MEMORY PROBLEM</b>			1.00	0.60	0.42	0.22
<b>SHORT TERM MEMORY PROBLEM</b>				1.00	0.29	0.25
<b>SEVERE DECISION MAKING PROB</b>					1.00	-0.05
<b>CC COGNITIVE IMPAIRMENT</b>						1.00

**CPRU01 MODEL**

	<b>CC NURSING CMI</b>	<b>CC LATE LOSS ADL</b>	<b>MORE DEPENDENCE IN TOILETING</b>	<b>PSI: SUBSET 1</b>	<b>PSI: SUBSET 2</b>	<b>BOWEL INCONTINENCE</b>	<b>FULL PSI</b>	<b>LOCOMOTION PROBLEM</b>	<b>TRANSFERRING PROBLEM</b>	<b>CC CLINICALLY COMPLEX</b>	<b>BED MOBILITY PROBLEM</b>
<b>COVARIATE CORRELATIONS</b>											
<b>CC NURSING CMI</b>	1.00	0.59	0.45	0.37	0.40	0.30	0.48	0.30	0.30	0.64	0.46
<b>CC LATE LOSS ADL</b>		1.00	0.81	0.40	0.78	0.06	0.78	0.64	0.77	0.43	0.80
<b>MORE DEPENDENCE IN TOILETING</b>			1.00	0.37	0.66	0.54	0.68	0.52	0.67	0.31	0.63
<b>PSI: SUBSET 1</b>				1.00	0.39	0.24	0.68	0.18	0.17	0.22	0.29
<b>PSI: SUBSET 2</b>					1.00	0.65	0.93	0.68	0.65	0.31	0.69
<b>BOWEL INCONTINENCE</b>						1.00	0.62	0.41	0.42	0.24	0.51
<b>FULL PSI</b>							1.00	0.64	0.62	0.35	0.67
<b>LOCOMOTION PROBLEM</b>								1.00	0.58	0.26	0.57
<b>TRANSFERRING PROBLEM</b>									1.00	0.29	0.68
<b>CC CLINICALLY COMPLEX</b>										1.00	0.39
<b>BED MOBILITY PROBLEM</b>											1.00

### CMOB01 MODEL

	MORE DEPENDENCE IN TOILETING	REQUIRES MUCH ASSISTANCE FOR EATING	FULL PSI	PSI : SUBSET 1
COVARIATE CORRELATIONS				
MORE DEPENDENCE IN TOILETING	1.00	0.44	0.68	0.37
REQUIRES MUCH ASSISTANCE FOR EATING		1.00	0.71	0.21
FULL PSI			1.00	0.68
PSI : SUBSET 1				1.00

### CCOM01 MODEL

	SHORT TERM MEMORY PROBLEM	LONG TERM MEMORY PROBLEM	COGNITIVE PERFORMANCE SCALE (CPS)	MODERATE / IMPAIRED DECISION MAKING PROB
<b>COVARIATE CORRELATIONS</b>				
<b>SHORT TERM MEMORY PROBLEM</b>	1.00	0.60	0.71	0.60
<b>LONG TERM MEMORY PROBLEM</b>		1.00	0.68	0.65
<b>COGNITIVE PERFORMANCE SCALE (CPS)</b>			1.00	0.77
<b>MODERATE/IMPAIRED DECISION MAKING PROB</b>				1.00

**CSOC02 MODEL**

	REQUIRES MUCH ASST FOR EATING	SEVERE DECISION MAKING PROB	RESIDENT NOT BEDFAST	PRIOR BOWEL INCONTINENCE	PSI: SUBSET 2	LOCOMOTION PROBLEM	CC LATE LOSS ADL	FULL PSI	CC NURSING CMI
<b>COVARIATE CORRELATIONS</b>									
<b>REQUIRES MUCH ASST FOR EATING</b>	1.00	0.53	-0.18	0.53	0.77	0.43	0.60	0.71	0.34
<b>SEVERE DECISION MAKING PROB</b>		1.00	-0.11	0.45	0.69	0.26	0.40	0.61	0.16
<b>RESIDENT NOT BEDFAST</b>			1.00	-0.18	-0.20	-0.18	-0.20	-0.20	-0.21
<b>PRIOR BOWEL INCONTINENCE</b>				1.00	0.65	0.41	0.58	0.62	0.30
<b>PSI: SUBSET 2</b>					1.00	0.68	0.78	0.93	0.40
<b>LOCOMOTION PROBLEM</b>						1.00	0.64	0.64	0.30
<b>CC LATE LOSS ADL</b>							1.00	0.78	0.59
<b>FULL PSI</b>								1.00	0.48
<b>CC NURSING CMI</b>									1.00

## CPRU02 MODEL

	CC NURSING CMI	PSI: SUBSET 1	BLADDER INCONTINENCE	CC CLINICALLY COMPLEX	NOT TOTALLY DEPENDENT IN TRANSFERRING
COVARIATE CORRELATIONS					
CC NURSING CMI	1.00	0.37	0.22	0.64	0.30
PSI: SUBSET 1		1.00	0.41		0.17
BLADDER INCONTINENCE			1.00	0.14	0.34
CC CLINICALLY COMPLEX				1.00	0.29
NOT TOTALLY DEPENDENT IN TRANSFERRING					1.00

## CNUTO1 MODEL

COVARIATE CORRELATIONS	CC CLINICALLY COMPLEX	SWALLOWING PROBLEM	CC NURSING CMI	CC LATE LOSS ADL	PSI: SUBSET 2	FULL PSI
CC CLINICALLY COMPLEX	1.00	0.31	0.64	0.43	0.31	0.35
SWALLOWING PROBLEM		1.00	0.27	0.31	0.34	0.32
CC NURSING CMI			1.00	0.59	0.40	0.48
CC LATE LOSS ADL				1.00	0.78	0.78
PSI: SUBSET 2					1.00	0.93
FULL PSI						1.00

### CFAL01 MODEL

	LOCOMOTION PROBLEM	NOT TOTALLY DEPENDENT IN TRANSFERRING	BED MOBILITY PROBLEM	UNSTEADY GAIT/COG IMP	CC LATE LOSS ADL	ANY WANDERING
<b>COVARIATE CORRELATIONS</b>						
<b>LOCOMOTION PROBLEM</b>	1.00	-0.47	0.57	-0.19	0.64	-0.24
<b>NOT TOTALLY DEPENDENT IN TRANSFERRING</b>		1.00	-0.60	0.24	-0.60	0.14
<b>BED MOBILITY PROBLEM</b>			1.00	-0.12	0.80	-0.13
<b>UNSTEADY GAIT/COG IMP</b>				1.00	0.05	0.13
<b>CC LATE LOSS ADL</b>					1.00	-0.10
<b>ANY WANDERING</b>						1.00



**CDRG03 MODEL**

	ANY WANDERING	CC COGNITIVE IMPAIRMENT	MOTOR AGITATION (PAST 5-7 DAYS)	CC BEHAVIOR PROBLEMS	MODERATE / IMPAIRED DECISION MAKING PROB	COMBINATION OF ALZHEIMER'S / OTHER DEMENTIA	LONG TERM MEMORY PROBLEM	SHORT TERM MEMORY PROBLEM	COGNITIVE PERFORMANCE SCALE (CPS)
<b>COVARIATE CORRELATIONS</b>									
<b>ANY WANDERING</b>	1.00	0.30	0.32	0.41	0.22	0.21	0.22	0.18	0.18
<b>CC COGNITIVE IMPAIRMENT</b>		1.00	0.02	0.48	0.35	0.19	0.22	0.25	0.16
<b>MOTOR AGITATION (PAST 5-7 DAYS)</b>			1.00	0.20	0.22	0.16	0.20	0.16	0.21
<b>CC BEHAVIOR PROBLEMS</b>				1.00	0.13	0.11	0.11	0.09	0.06
<b>MODERATE/IMPAIRED DECISION MAKING PROB</b>					1.00	0.42	0.65	0.60	0.77
<b>COMBINATION OF ALZHEIMER'S / OTHER DEMENTIA</b>						1.00	0.42	0.43	0.44
<b>LONG TERM MEMORY PROBLEM</b>							1.00	0.60	0.68
<b>SHORT TERM MEMORY PROBLEM</b>								1.00	0.71
<b>COGNITIVE PERFORMANCE SCALE (CPS)</b>									1.00

### CDRG02 MODEL

	ANY WANDERING	MOTOR AGITATION (PAST 5-7 DAYS)	CC BEHAVIOR PROBLEMS	CC COGNITIVE IMPAIRMENT	COMBINATION OF ALZHEIMER'S / OTHER DEMENTIA
<b>COVARIATE CORRELATIONS</b>					
<b>ANY WANDERING</b>	1.00	0.32	0.41	0.30	0.21
<b>MOTOR AGITATION (PAST 5-7 DAYS)</b>		1.00	0.20	0.13	0.16
<b>CC BEHAVIOR PROBLEMS</b>			1.00	0.48	0.11
<b>CC COGNITIVE IMPAIRMENT</b>				1.00	0.19
<b>COMBINATION OF ALZHEIMER'S / OTHER DEMENTIA</b>					1.00

# CDRG01 MODEL

COVARIATE CORRELATIONS	MOTOR AGITATION (PAST 5-7 DAYS)	ANY WANDERING	MODERATE / IMPAIRED DECISION MAKING PROB	CC BEHAVIOR PROBLEMS	CC COGNITIVE IMPAIRMENT	LONG TERM MEMORY PROBLEM	SHORT TERM MEMORY PROBLEM	COGNITIVE PERFORMANCE SCALE (CPS)	COMBINATION OF ALZHEIMER'S / OTHER DEMENTIA
MOTOR AGITATION (PAST 5-7 DAYS)	1.00	0.32	0.22	0.20	0.13	0.20	0.16	0.21	0.16
ANY WANDERING		1.00	0.22	0.41	0.30	0.22	0.18	0.18	0.21
MODERATE/IMPAIRED DECISION MAKING PROB			1.00	0.13	0.35	0.65	0.60	0.77	0.42
CC BEHAVIOR PROBLEMS				1.00	0.48	0.11	0.09	0.06	0.11
CC COGNITIVE IMPAIRMENT					1.00	0.22	0.25	0.16	0.19
LONG TERM MEMORY PROBLEM						1.00	0.60	0.68	0.42
SHORT TERM MEMORY PROBLEM							1.00	0.71	0.43
COGNITIVE PERFORMANCE SCALE (CPS)								1.00	0.44
COMBINATION OF ALZHEIMER'S / OTHER DEMENTIA									1.00

### CCNT03 MODEL

	FULL PSI	PSI: SUBSET 2	CC NURSING CMI	MODERATE / IMPAIRED DECISION MAKING PROB	SHORT TERM MEMORY PROBLEM	PSI: SUBSET 1	COGNITIVE PERFORMANCE SCALE (CPS)	MORE DEPENDENCE IN DRESSING
<b>COVARIATE CORRELATIONS</b>								
<b>FULL PSI</b>	1.00	0.93	0.48	0.45	0.35	0.68	0.66	0.59
<b>PSI: SUBSET 2</b>		1.00	0.40	0.45	0.34	0.39	0.70	0.59
<b>CC NURSING CMI</b>			1.00	0.14	0.08	0.37	0.20	0.34
<b>MODERATE/IMPAIRED DECISION MAKING PROB</b>				1.00	0.60	0.24	0.77	0.25
<b>SHORT TERM MEMORY PROBLEM</b>					1.00	0.22	0.71	0.18
<b>PSI: SUBSET 1</b>						1.00	0.25	0.27
<b>COGNITIVE PERFORMANCE SCALE (CPS)</b>							1.00	0.34
<b>MORE DEPENDENCE IN DRESSING</b>								1.00

CCNT02 MODEL

	FULL PSI	PSI: SUBSET 2	BLADDER INCONTINENCE	CC LATE LOSS ADL	PSI: SUBSET 1	MODERATE / IMPAIRED DECISION MAKING PROB	MORE DEPENDENCE IN DRESSING	CC NURSING CMI	SHORT TERM MEMORY PROBLEM	LONG TERM MEMORY PROBLEM	COGNITIVE PERFORMANCE SCALE (CPS)	COMBINATION OF ALZHEIMER'S / OTHER DEMENTIA
<b>COVARIATE CORRELATIONS</b>												
<b>FULL PSI</b>	1.00	0.93	0.59	0.78	0.68	0.45	0.59	0.48	0.35	0.43	0.66	0.24
<b>PSI: SUBSET 2</b>		1.00	0.53	0.78	0.39	0.45	0.59	0.40	0.34	0.44	0.70	0.24
<b>BLADDER INCONTINENCE</b>			1.00	0.56	0.41	0.38	0.46	0.22	0.32	0.35	0.46	0.22
<b>CC LATE LOSS ADL</b>				1.00	0.40	0.31	0.69	0.59	0.24	0.28	0.46	0.11
<b>PSI: SUBSET 1</b>					1.00	0.08	0.27	0.37	0.22	0.20	0.25	0.14
<b>MODERATE/IMPAIRED DECISION MAKING PROB</b>						1.00	0.25	0.14	0.60	0.65	0.77	0.42
<b>MORE DEPENDENCE IN DRESSING</b>							1.00	0.34	0.18	0.22		0.10
<b>CC NURSING CMI</b>								1.00	0.08	0.11	0.20	-0.03
<b>SHORT TERM MEMORY PROBLEM</b>									1.00	0.60	0.71	0.43
<b>LONG TERM MEMORY PROBLEM</b>										1.00		
<b>COGNITIVE PERFORMANCE SCALE (CPS)</b>											1.00	0.44
<b>COMBINATION OF ALZHEIMER'S / OTHER DEMENTIA</b>												1.00

### CADLO3 MODEL

	CC NURSING CMI	CC CLINICALLY COMPLEX	ACUTE EPISODE OR FLARE-UP
COVARIATE CORRELATIONS			
CC NURSING CMI	1.00	0.64	0.24
CC CLINICALLY COMPLEX		1.00	0.17
ACUTE EPISODE OR FLARE-UP			1.00

CCNT06 MODEL

	FULL PSI	PSI: SUBSET 2	CC LATE LOSS ADL	MORE DEPENDENCE IN DRESSING	PSI: SUBSET 1	TRANSFERRING PROBLEM	MODERATE/ IMPAIRED DECISION MAKING PROB	LOCOMOTION PROBLEM	BED MOBILITY PROBLEM	CC NURSING CMI	COGNITIVE PERFORMANCE SCALE (CPS)	SHORT TERM MEMORY PROBLEM	LONG TERM MEMORY PROBLEM	COMBINATION OF ALZHEIMER'S / OTHER DEMENTIA
COVARIATE CORRELATIONS														
FULL PSI	1.00	0.93	0.78	0.59	0.68	0.62	0.45	0.64	0.67	0.48	0.66	0.35	0.43	0.24
PSI: SUBSET 2		1.00	0.78	0.59	0.39	0.65	0.45	0.68	0.69	0.40	0.70	0.34	0.44	0.24
CC LATE LOSS ADL			1.00	0.69	0.40	0.77	0.32	0.64	0.80	0.59	0.46	0.24	0.28	0.11
MORE DEPENDENCE IN DRESSING				1.00	0.27	0.58	0.25	0.50	0.55	0.34	0.34	0.18	0.22	0.10
PSI: SUBSET 1					1.00	0.17	0.45	0.18	0.29	0.37	0.66	0.22	0.20	0.14
TRANSFERRING PROBLEM						1.00	0.19	0.58	0.68	0.30	0.28	0.12	0.16	0.04
MODERATE/IMPAIRED DECISION MAKING PROB							1.00	0.16	0.24	0.14	0.77	0.60	0.65	0.42
LOCOMOTION PROBLEM								1.00	0.57	0.30	0.28	0.10	0.14	0.02
BED MOBILITY PROBLEM									1.00	0.46	0.38	0.17	0.21	0.07
CC NURSING CMI										1.00	0.20	0.08	0.11	-0.03
COGNITIVE PERFORMANCE SCALE (CPS)											1.00	0.71	0.68	0.44
SHORT TERM MEMORY PROBLEM												1.00	0.60	0.43
LONG TERM MEMORY PROBLEM													1.00	0.42
COMBINATION OF ALZHEIMER'S / OTHER DEMENTIA														1.00

## CCNT05 MODEL

COVARIATE CORRELATIONS	CC LATE LOSS ADL	MORE DEPENDENCE IN DRESSING	PSI: SUBSET 2	TRANSFERRIN G PROBLEM	FULL PSI	LOCOMOTION PROBLEM	BED MOBILITY PROBLEM	CC NURSING CMI	PSI: SUBSET 1
CC LATE LOSS ADL	1.00	0.69	0.78	0.77	0.78	0.64	0.80	0.59	0.40
MORE DEPENDENCE IN DRESSING		1.00	0.59	0.58	0.59	0.50	0.55	0.34	0.27
PSI: SUBSET 2			1.00	0.65	0.93	0.68	0.69	0.40	0.39
TRANSFERRING PROBLEM				1.00	0.62	0.58	0.68	0.30	0.17
FULL PSI					1.00	0.64	0.67	0.48	0.68
LOCOMOTION PROBLEM						1.00	0.57	0.30	0.18
BED MOBILITY PROBLEM							1.00	0.46	0.29
CC NURSING CMI								1.00	0.37
PSI: SUBSET 1									1.00



**CCNT01 MODEL**

	FULL PSI	PSI: SUBSET 2	CC LATE LOSS ADL	MORE DEPENDENCE IN DRESSING	TRANSFERRING PROBLEM	MODERATE / IMPAIRED DECISION MAKING PROB	LONG TERM MEMORY PROBLEM	LOCOMOTION PROBLEM	BED MOBILITY PROBLEM	PSI: SUBSET 1	COGNITIVE PERFORMANCE SCALE (CPS)	SHORT TERM MEMORY PROBLEM	CC NURSING CMI	MODES OF EXPRESSION:SPEECH	COMBINATION OF ALZHEIMER'S / OTHER DEMENTIA
<b>COVARIATE CORRELATIONS</b>															
<b>FULL PSI</b>	1.00	0.93	0.78	0.59	0.62	0.45	0.43	0.64	0.67	0.68	0.66	0.35	0.48	-0.30	0.24
<b>PSI: SUBSET 2</b>		1.00	0.78	0.59	0.65	0.45	0.44	0.68	0.69	0.39	0.70	0.34	0.40	-0.35	0.24
<b>CC LATE LOSS ADL</b>			1.00	0.69	0.77	0.32	0.28	0.64	0.80	0.40	0.46	0.24	0.59	-0.25	0.11
<b>MORE DEPENDENCE IN DRESSING</b>				1.00	0.58	0.25	0.22	0.50	0.55	0.27	0.34	0.18	0.34	-0.16	0.10
<b>TRANSFERRING PROBLEM</b>					1.00	0.19	0.16	0.58	0.68	0.17	0.28	0.12	0.30	-0.17	0.04
<b>MODERATE/IMPAIRED DECISION MAKING PROB</b>						1.00	0.65	0.16	0.24	0.24	0.77	0.60	0.14	-0.16	0.42
<b>LONG TERM MEMORY PROBLEM</b>							1.00	0.14	0.21	0.20	0.68	0.60	0.11	-0.17	0.42
<b>LOCOMOTION PROBLEM</b>								1.00	0.57	0.18	0.28	0.10	0.30	-0.18	0.02
<b>BED MOBILITY PROBLEM</b>									1.00	0.29	0.38	0.17	0.46	-0.24	0.07
<b>PSI: SUBSET 1</b>										1.00	0.25	0.22	0.37	-0.02	0.14
<b>COGNITIVE PERFORMANCE SCALE (CPS)</b>											1.00	0.71	0.20	-0.35	0.44
<b>SHORT TERM MEMORY PROBLEM</b>												1.00	0.08	-0.10	0.43
<b>CC NURSING CMI</b>													1.00	-0.17	-0.03
<b>MODES OF EXPRESSION:SPEECH</b>														1.00	-0.02
<b>COMBINATION OF ALZHEIMER'S / OTHER DEMENTIA</b>															1.00

## CCAT02 MODEL

	PRESSURE ULCERS (STAGE 3 OR 4)	CC NURSING CMI	ALS/MS DIAGNOSIS	CC CLINICALLY COMPLEX
COVARIATE CORRELATIONS				
PRESSURE ULCERS (STAGE 3 OR 4)	1.00	0.22	0.04	0.15
CC NURSING CMI		1.00	0.12	0.64
ALS/MS DIAGNOSIS			1.00	0.02
CC CLINICALLY COMPLEX				1.00

## CBEH02 MODEL

COVARIATE CORRELATIONS	MOTOR AGITATION (PAST 5-7 DAYS)	ANY WANDERING	MODERATE / IMPAIRED DECISION MAKING PROB	LONG TERM MEMORY PROBLEM	SHORT TERM MEMORY PROBLEM
MOTOR AGITATION (PAST 5-7 DAYS)	1.00	0.32	0.22	0.20	0.16
ANY WANDERING		1.00	0.22	0.22	0.18
MODERATE/IMPAIRED DECISION MAKING PROB			1.00	0.65	0.60
LONG TERM MEMORY PROBLEM				1.00	0.60
SHORT TERM MEMORY PROBLEM					1.00

**CBEH01 MODEL**

COVARIATE CORRELATIONS	MODERATE / IMPAIRED DECISION MAKING PROB	ANY WANDERING	LONG TERM MEMORY PROBLEM	COGNITIVE PERFORMANCE SCALE (CPS)	SHORT TERM MEMORY PROBLEM	CC COGNITIVE IMPAIRMENT
MODERATE/IMPAIRED DECISION MAKING PROB	1.00	0.22	0.65	0.77	0.60	0.35
ANY WANDERING		1.00	0.22	0.18	0.18	0.30
LONG TERM MEMORY PROBLEM			1.00	0.68	0.60	0.22
COGNITIVE PERFORMANCE SCALE (CPS)				1.00	0.71	0.16
SHORT TERM MEMORY PROBLEM					1.00	0.25
CC COGNITIVE IMPAIRMENT						1.00

### CPRU04 MODEL

COVARIATE CORRELATIONS	CC NURSING CMI	CC LATE LOSS ADL	NOT TOTALLY DEPENDENT IN TRANSFERRIN G	BOWEL INCONTINENC E	LOCOMOTION PROBLEM
CC NURSING CMI	1.00	0.59	0.30	0.30	0.30
CC LATE LOSS ADL		1.00	0.77	0.58	0.64
NOT TOTALLY DEPENDENT IN TRANSFERRING			1.00	0.26	0.58
BOWEL INCONTINENCE				1.00	0.41
LOCOMOTION PROBLEM					1.00

Attachment #5

Correlation Among Covariates: Post Acute Care QM Models

**PADLOX MODEL**

	<b>BOWEL INCONTINENCE</b>	<b>COGNITIVE PERFORMANCE SCALE (CPS)</b>	<b>PAC NURSING CMI</b>	<b>PSI: SUBSET 2</b>	<b>NO PRIOR RESIDENTIAL HISTORY</b>	<b>COMBINATION OF ALZHEIMER'S / OTHER DEMENTIA</b>
<b>COVARIATE CORRELATIONS</b>						
<b>BOWEL INCONTINENCE</b>	1.00	0.52	0.34	0.57	-0.17	0.30
<b>COGNITIVE PERFORMANCE SCALE (CPS)</b>		1.00	0.32	0.65	-0.22	0.51
<b>PAC NURSING CMI</b>			1.00	0.52	-0.15	0.14
<b>PSI: SUBSET 2</b>				1.00	-0.18	0.31
<b>NO PRIOR RESIDENTIAL HISTORY</b>					1.00	-0.19
<b>COMBINATION OF ALZHEIMER'S / OTHER DEMENTIA</b>						1.00

## PCNTOX MODEL

	PSI: SUBSET 2	PAC LATE LOSS ADL	COGNITIVE PERFORMANCE SCALE (CPS)	PAC NURSING CMI	NEEDS BED MOBILITY ASSISTANCE	FULL PSI	PSI: SUBSET 1	COMBINATION OF ALZHEIMER'S / OTHER DEMENTIA	NO PRIOR RESIDENTIAL HISTORY
<b>COVARIATE CORRELATIONS</b>									
<b>PSI: SUBSET 2</b>	1.00	0.73	0.65	0.52	0.43	0.88	0.35	0.31	-0.18
<b>PAC LATE LOSS ADL</b>		1.00	0.39	0.64	0.75	0.69	0.32	0.16	-0.12
<b>COGNITIVE PERFORMANCE SCALE (CPS)</b>			1.00	0.32	0.19	0.60	0.26	0.51	-0.22
<b>PAC NURSING CMI</b>				1.00	0.44	0.50	0.24	0.14	-0.15
<b>NEEDS BED MOBILITY ASSISTANCE</b>					1.00	0.43	0.22	0.06	-0.05
<b>FULL PSI</b>						1.00	0.74	0.30	-0.18
<b>PSI: SUBSET 1</b>							1.00	0.17	-0.11
<b>COMBINATION OF ALZHEIMER'S / OTHER DEMENTIA</b>								1.00	-0.19
<b>NO PRIOR RESIDENTIAL HISTORY</b>									1.00

## PPRUOX MODEL

	PAC NURSING CMI	PAC LATE LOSS ADL	PSI: SUBSET 2	BOWEL INCONTINENCE	PSI: SUBSET 1	NEEDS BED MOBILITY ASSISTANCE	FULL PSI	ULCER RESOLVED	PAC CLINICALLY COMPLEX
COVARIATE CORRELATIONS									
PAC NURSING CMI	1.00	0.64	0.52	0.34	0.24	0.44	0.50	0.11	0.38
PAC LATE LOSS ADL		1.00	0.73	0.47	0.32	0.75	0.69	0.09	0.50
PSI: SUBSET 2			1.00	0.57	0.35	0.43	0.88	0.10	0.43
BOWEL INCONTINENCE				1.00	0.31	0.27	0.57	0.09	0.27
PSI: SUBSET 1					1.00	0.22	0.74	0.08	0.21
NEEDS BED MOBILITY ASSISTANCE						1.00	0.43	0.05	0.32
FULL PSI							1.00	0.11	0.43
ULCER RESOLVED								1.00	0.08
PAC CLINICALLY COMPLEX									1.00



**PWALOX MODEL**

	<b>BOWEL INCONTINENCE</b>	<b>PAC NURSING CMI</b>	<b>PAC LATE LOSS ADL</b>	<b>PSI: SUBSET 2</b>	<b>NEEDS BED MOBILITY ASSISTANCE</b>	<b>COGNITIVE PERFORMANCE SCALE (CPS)</b>	<b>FULL PSI</b>	<b>NO PRIOR RESIDENTIAL HISTORY</b>
<b>COVARIATE CORRELATIONS</b>								
<b>BOWEL INCONTINENCE</b>	1.00	0.34	0.47	0.57	0.27	0.52	0.57	-0.17
<b>PAC NURSING CMI</b>		1.00	0.64	0.52	0.44	0.32	0.50	-0.15
<b>PAC LATE LOSS ADL</b>			1.00	0.73	0.75	0.39	0.69	-0.12
<b>PSI: SUBSET 2</b>				1.00	0.43	0.65	0.88	-0.18
<b>NEEDS BED MOBILITY ASSISTANCE</b>					1.00	0.19	0.43	-0.05
<b>COGNITIVE PERFORMANCE SCALE (CPS)</b>						1.00	0.60	-0.22
<b>FULL PSI</b>							1.00	-0.18
<b>NO PRIOR RESIDENTIAL HISTORY</b>								1.00

## Attachment #6

### Recoded Scales: Specifications and Frequencies (Chronic Care)

<b>R_ADL (Late Loss ADL Scale)</b>					
Original Values	Percentage	Dichotomous Scale	Percentage	Scaled Variables	Percentage
4	21.44%	R_ADL_D = 0	49.24%	R_ADL_4T10 = 1	44.55%
5	0.16%				
6	5.75%				
7	2.79%				
8	5.11%				
9	3.27%				
10	6.03%				
11	4.69%	R_ADL_D = 1	50.76%	R_ADL_11T14 = 1	25.08%
12	5.54%				
13	8.05%				
14	6.80%				
15	9.95%				
16	9.46%				
17	5.68%				
18	5.28%			R_ADL_17T18 = 1	10.96%

<b>R_BEH (Behavior Problems Scale)</b>					
Original Values	Percentage	Dichotomous Scale	Percentage	Scaled Variables	Percentage
0	91.33%	R_BEH_D = 0	91.33%	R_BEH_0 = 1	91.33%
1	3.66%	R_BEH_D = 1	8.66%	R_BEH_1 = 1	3.66%
2	5.00%			R_BEH_2 = 1	5.00%

<b>R_IMP (Cognitive Impairment Scale)</b>					
Original Values	Percentage	Dichotomous Scale	Percentage	Scaled Variables	Percentage
0	80.10%	R_IMP_D = 0	80.10%	R_IMP_0 = 1	80.10%
1	7.43%	R_IMP_D = 1	19.90%	R_IMP_1 = 1	7.43%
2	12.47%			R_IMP_2 = 1	12.47%

<b>R_CLN (Clinically Complex Scale)</b>					
Original Values	Percentage	Dichotomous Scale	Percentage	Scaled Variables	Percentage
0	64.49%	R_CLN_D = 0	64.49%	R_CLN_0 = 1	64.49%
1	12.18%	R_CLN_D = 1	35.50%	R_CLN_1 = 1	12.18%
2	17.69%			R_CLN_2 = 1	17.69%
3	5.63%			R_CLN_3 = 1	5.63%

<b>CPS (Cognitive Performance Scale)</b>					
Original Values	Percentage	Dichotomous Scale	Percentage	Scaled Variables	Percentage
0	13.60%	CPS_D = 0	13.60%	CPS_0 = 1	13.60%
1	11.66%	CPS_D = 1	86.41%	CPS_1 = 1	11.66%
2	14.26%			CPS_2 = 1	14.26%
3	30.17%			CPS_3 = 1	30.17%
4	9.23%			CPS_4 = 1	9.23%
5	9.19%			CPS_5 = 1	9.19%
6	11.90%			CPS_6 = 1	11.90%

<b>PSI (Personal Severity Index - Full)</b>					
Original Values	Percentage	Dichotomous Scale	Percentage	Scaled Variables	Percentage
0	12.49%	MFI_D = 0	28.26%	MFI_0 = 1	12.49%
1	15.77%			MFI_1 = 1	15.77%
2	13.42%	MFI_D = 1	72.73%	MFI_2 = 1	13.42%
3	11.69%			MFI_3T4 = 1	22.12%
4	10.43%				
5	9.27%			MFI_5T7 = 1	25.94%
6	7.76%				
7	8.91%			MFI_8T15 = 1	11.25%
8	6.19%				
9	2.72%				
10	0.96%				
11	0.30%				
12	0.08%				
13	1.00%				
14	0.00%				
15	0.00%				

<b>PSIS1 (Personal Severity Index - Diagnoses)</b>					
Original Values	Percentage	Dichotomous Scale	Percentage	Scaled Variables	Percentage
0	16.92%	MFIS1_D = 0	52.86%	MFIS1_0 = 1	16.92%
1	35.94%			MFIS1_1 = 1	35.94%
2	28.34%	MFIS2_D = 1	47.13%	MFIS1_2 = 1	28.34%
3	12.59%			MFIS1_3 = 1	12.59%
4	4.50%			MFIS1_4T9 = 1	6.20%
5	1.38%				
6	0.29%				
7	0.03%				
8	0.00%				
9	0.00%				

<b>PSIS2 (Personal Severity Index - Non-Diagnoses)</b>					
Original Values	Percentage	Dichotomous Scale	Percentage	Scaled Variables	Percentage
0	28.01%	MFIS2_D = 0	47.17%	MFIS2_0 = 1	28.01%
1	19.16%			MFIS2_1 = 1	19.16%
2	13.84%	MFIS2_D = 1	52.82%	MFIS2_2 = 1	13.84%
3	10.60%			MFIS2_3T4 = 1	19.49%
4	8.89%				
5	6.40%			MFIS2_5T10 = 1	19.49%
6	10.14%				
7	2.80%				
8	0.14%				
9	0.01%				
10	0.00%				

## Attachment #7

### Recoded Scales: Specifications and Frequencies (Post Acute Care)

<b>R_ADL (Late Loss ADL Scale)</b>					
Original Values	Percentage	Dichotomous Scale	Percentage	Scaled Variables	Percentage
4	7.14%	R_ADL_D = 0	40.72%	R_ADL_4T10 = 1	34.41%
5	0.04%				
6	4.00%				
7	0.76%				
8	7.57%				
9	2.38%				
10	12.52%				
11	6.31%	R_ADL_D = 1	59.27%	R_ADL_11T14 = 1	34.94%
12	8.32%				
13	11.86%			R_ADL_15T16 = 1	20.32%
14	8.45%				
15	10.68%			R_ADL_17T18 = 1	10.32%
16	9.64%				
17	5.68%				
18	4.64%				

<b>R_CLN (Clinically Complex Scale)</b>					
Original Values	Percentage	Dichotomous Scale	Percentage	Scaled Variables	Percentage
0	30.17%	R_CLN_D = 0	30.17%	R_CLN_0 = 1	30.17%
1	26.30%	R_CLN_D = 1	69.84%	R_CLN_1 = 1	26.30%
2	35.07%			R_CLN_2 = 1	35.07%
3	8.47%			R_CLN_3 = 1	8.47%

<b>CPS (Cognitive Performance Scale)</b>					
Original Values	Percentage	Dichotomous Scale	Percentage	Scaled Variables	Percentage
0	34.32%	CPS_D = 0	34.32%	CPS_0 = 1	34.32%
1	13.88%	CPS_D = 1	65.69%	CPS_1 = 1	13.88%
2	15.13%			CPS_2 = 1	15.13%
3	21.29%			CPS_3 = 1	21.29%
4	5.80%			CPS_4 = 1	5.80%
5	4.06%			CPS_5 = 1	4.06%
6	5.53%			CPS_6 = 1	5.53%

<b>PSI (Personal Severity Index - Full)</b>					
Original Values	Percentage	Dichotomous Scale	Percentage	Scaled Variables	Percentage
0	2.37%	MFI_D = 0	10.54%	MFI_0 = 1	2.37%
1	8.17%			MFI_1 = 1	8.17%
2	13.59%	MFI_D = 1	89.49%	MFI_2 = 1	13.59%
3	15.95%			MFI_3T4 = 1	31.62%
4	15.67%			MFI_5T7 = 1	31.89%
5	13.63%				
6	10.54%			MFI_8T15 = 1	12.39%
7	7.72%				
8	5.53%				
9	3.68%				
10	2.05%				
11	0.83%				
12	0.24%				
13	0.05%				
14	0.01%				
15	0.00%				

<b>PSIS1 (Personal Severity Index - Diagnoses)</b>					
Original Values	Percentage	Dichotomous Scale	Percentage	Scaled Variables	Percentage
0	4.31%	MFIS1_D = 0	21.83%	MFIS1_0 = 1	4.31%
1	17.52%			MFIS1_1 = 1	17.52%
2	28.30%	MFIS2_D = 1	78.17%	MFIS1_2 = 1	28.30%
3	26.84%			MFIS1_3 = 1	26.84%
4	15.79%			MFIS1_4T9 = 1	23.03%
5	5.85%				
6	1.25%				
7	0.14%				
8	0.00%				
9	0.00%				

<b>PSIS2 (Personal Severity Index - Non-Diagnoses)</b>					
Original Values	Percentage	Dichotomous Scale	Percentage	Scaled Variables	Percentage
0	24.39%	MFIS2_D = 0	43.94%	MFIS2_0 = 1	24.39%
1	19.55%			MFIS2_1 = 1	19.55%
2	24.21%	MFIS2_D = 1	56.07%	MFIS2_2 = 1	24.21%
3	12.70%			MFIS2_3T4 = 1	20.70%
4	8.00%				
5	4.91%			MFIS2_5T10 = 1	11.16%
6	4.78%				
7	1.33%				
8	0.13%				
9	0.01%				
10	0.00%				

## Attachment #8

### Logit Models and Retest Statistics: Chronic Care and Post Acute Care QMs

#### QM CADL03: Percent of residents who have improved in their ability to function

##### Estimate on 50% Sample

Parameter	Estimate
Intercept	-2.4703
R_CMIC	1.5793
R_CLN_1	0.1252
R_CLN_2	0.1224
R_CLN_3	-0.0644

#### Retest of Model on Five 20% Samples: Summary of Results

##### Right-Hand Side Variables: R\_CMIC R\_CLN

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.289	0.198	1386	59.9	61.8
2	0.288	0.193	1316	60.4	60.9
3	0.290	0.193	1325	60.0	61.2
4	0.284	0.195	1355	60.0	61.5
5	0.287	0.192	1298	59.5	61.6

## QM CBEH01: Percent of residents with inappropriate behavior (high & low risk)

### Estimate on 50% Sample

Parameter	Estimate
Intercept	-2.621
R_IMP_1	0.1383
R_IMP_2	0.2013
CPS_1	0.7109
CPS_2	0.5493
CPS_3	1.2125
CPS_4	1.4191
CPS_5	1.6902
CPS_6	0.9316
CWGT1_A	0.3112

### Retest of Model on Five 20% Samples: Summary of Results Right-Hand Side Variables: R\_IMP CPS CWGT1\_A

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.204	0.190	3442	63.1	60.5
2	0.206	0.195	3640	63.3	60.8
3	0.204	0.193	3563	63.4	60.5
4	0.206	0.190	3448	63.1	60.4
5	0.206	0.193	3552	63.3	60.6



## QM CBEH02: Percent of residents with inappropriate behavior (high risk)

### Estimate on 50% Sample

Parameter	Estimate
Intercept	-1.9439
CWGT1_A	0.1529
CBEH4_B	0.6549
CFAL1_B	0.9534

### Retest of Model on Five 20% Samples: Summary of Results

Right-Hand Side Variables: CWGT1\_A CBEH4\_B CFAL1\_B

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.240	0.134	1324	77.4	37.5
2	0.242	0.136	1364	77.6	37.5
3	0.241	0.134	1323	77.3	37.6
4	0.242	0.131	1254	77.1	37.4
5	0.242	0.136	1365	77.5	37.6

### QM CBEH03: Percent of residents with inappropriate behavior (low risk)

#### Estimate on 50% Sample

Parameter	Estimate
Intercept	-2.7352
CBEH4_B	0.9969
CPS_1	0.4164
CPS_2	0.3883
CPS_3	0.3253
CPS_4	0.323
CPS_5	0.3615
CPS_6	-0.1208

#### Retest of Model on Five 20% Samples: Summary of Results Right-Hand Side Variables: CBEH4\_B CPS

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.084	0.094	237.6	63.6	53.2
2	0.084	0.082	183.0	61.7	53.0
3	0.081	0.077	163.1	61.2	52.9
4	0.083	0.092	226.7	63.0	53.5
5	0.084	0.077	160.6	60.7	53.1

## QM CBEH04: Percent of residents whose behavior has worsened

### Estimate on 50% Sample

Parameter	Estimate
Intercept	-3.3212
CBEH4_B	0.5766
CPS_1	0.4119
CPS_2	0.6109
CPS_3	0.5871
CPS_4	0.539
CPS_5	0.6908
CPS_6	-0.2573

### Retest of Model on Five 20% Samples: Summary of Results Right-Hand Side Variables: CBEH4\_B CPS

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.075	0.102	1280	67.2	52.2
2	0.077	0.100	1219	66.5	52.2
3	0.076	0.100	1238	66.8	52.1
4	0.077	0.102	1282	67.2	52.0
5	0.077	0.103	1294	67.2	52.1

## QM CBMI0X: Percent of residents with a low BMI

### Estimate on 50% Sample

Parameter	Estimate
Intercept	-2.4579
PSIS1_1	0.3574
PSIS1_2	0.6887
PSIS1_3	0.9621
PSIS1_4T9	1.2873

### Retest of Model on Five 20% Samples: Summary of Results Right-Hand Side Variables: PSIS1

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.132	0.093	937.2	58.1	55.7
2	0.130	0.099	1050	58.9	55.8
3	0.130	0.100	1078	58.9	55.9
4	0.131	0.097	1020	58.8	55.7
5	0.130	0.093	929.3	57.9	55.9

## QM CCAT02: Percent of residents with indwelling catheters

### Estimate on 50% Sample

Parameter	Estimate
Intercept	-4.6407
CCAT1_B	1.649
R_CMIC	1.6888
R_CLN_1	-0.2599
R_CLN_2	0.4041
R_CLN_3	0.6005
CNUT1_B	1.7653

### Retest of Model on Five 20% Samples: Summary of Results

Right-Hand Side Variables: CCAT1\_B R\_CMIC R\_CLN CNUT1\_B

Obs	Mean 20% Sample	PHI	CHISQ	Mean	Sensitivity	Specificity
1	0.062	0.195	4430	0.062	64.2	73.4
2	0.062	0.191	4253	0.062	63.1	73.3
3	0.063	0.195	4437	0.062	63.7	73.5
4	0.062	0.193	4367	0.062	63.5	73.5
5	0.061	0.187	4068	0.062	62.2	73.7

## QM CCNT01: Percent of residents who are bladder or bowel incontinent (high & low risk)

### Estimate on 50% Sample

Parameter	Estimate
Intercept	-3.1921
PSIS1_1	2.3867
PSIS1_2	2.9021
PSIS1_3	2.7695
PSIS1_4T9	2.4632
PSIS2_1	0.0856
PSIS2_2	0.6827
PSIS2_3T4	1.4544
PSIS2_5T10	3.1512
R_ADL_11T14	1.0736
R_ADL_15T16	1.4012
R_ADL_17T18	1.5992

### Retest of Model on Five 20% Samples: Summary of Results

#### Right-Hand Side Variables: PSIS1 PSIS2 R\_ADL

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.577	0.621	41252	79.7	83.0
2	0.580	0.620	41148	79.9	82.8
3	0.575	0.620	41165	79.5	83.1
4	0.579	0.620	41189	79.7	83.0
5	0.579	0.613	40369	79.4	82.6

## QM CCNT02: Percent of residents with worsening bowel continence

### Estimate on 50% Sample

Parameter	Estimate
Intercept	-3.1416
R_CMIC	0.4537
PSIS1_1	0.542
PSIS1_2	0.7734
PSIS1_3	0.8622
PSIS1_4T9	0.8904
PSIS2_1	0.2415
PSIS2_2	0.4853
PSIS2_3T4	0.7038
PSIS2_5T10	0.9283
R_ADL_11T14	0.1949
R_ADL_15T16	0.1547
R_ADL_17T18	0.1413

### Retest of Model on Five 20% Samples: Summary of Results

#### Right-Hand Side Variables: R\_CMIC PSIS1 PSIS2 R\_ADL

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.142	0.177	2418	61.4	63.5
2	0.141	0.181	2513	62.2	63.4
3	0.139	0.173	2298	60.9	63.6
4	0.141	0.183	2582	62.5	63.4
5	0.141	0.172	2265	61.0	63.3

## QM CCNT03: Percent of residents with worsening bladder continence

### Estimate on 50% Sample

Parameter	Estimate
Intercept	-2.8269
PSIS1_1	0.1131
PSIS1_2	0.1735
PSIS1_3	0.2168
PSIS1_4T9	0.2435
PSIS2_1	0.1945
PSIS2_2	0.3359
PSIS2_3T4	0.3551
PSIS2_5T10	0.4359
CPS_1	0.1801
CPS_2	0.4049
CPS_3	0.5515
CPS_4	0.5963
CPS_5	0.6847
CPS_6	0.5183
R_CMIC	0.579

### Retest of Model on Five 20% Samples: Summary of Results Right-Hand Side Variables: PSIS1 PSIS2 CPS R\_CMIC

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.161	0.133	1366	59.5	58.5
2	0.160	0.130	1304	59.4	58.3
3	0.162	0.125	1213	58.7	58.2
4	0.165	0.131	1317	59.4	58.1
5	0.161	0.126	1219	58.7	58.3



## QM CCNT05: Percent of residents who are bladder or bowel incontinent (high risk)

### Estimate on 50% Sample

Parameter	Estimate
Intercept	-1.0264
PSIS1_1	2.5124
PSIS1_2	2.8734
PSIS1_3	2.8093
PSIS1_4T9	2.6017
PSIS2_1	-1.0474
PSIS2_2	-0.6885
PSIS2_3T4	-0.0296
PSIS2_5T10	1.2296
R_ADL_11T14	1.0563
R_ADL_15T16	1.7485
R_ADL_17T18	1.8998

### Retest of Model on Five 20% Samples: Summary of Results Right-Hand Side Variables: PSIS1 PSIS2

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.935	0.328	3045	80.0	76.9
2	0.934	0.326	3025	79.5	77.1
3	0.933	0.333	3144	79.7	77.6
4	0.934	0.333	3155	79.8	77.5
5	0.935	0.324	2999	79.5	76.7

## QM CCNT06: Percent of residents who are bladder or bowel incontinent (low risk)

### Estimate on 50% Sample

Parameter	Estimate
Intercept	-3.2535
PSIS1_1	2.3887
PSIS1_2	2.9421
PSIS1_3	2.8373
PSIS1_4T9	2.5812
PSIS2_1	0.0195
PSIS2_2	0.49
PSIS2_3T4	1.026
PSIS2_5T10	1.7297
R_ADL_11T14	1.203
R_ADL_15T16	1.4904
R_ADL_17T18	1.5393

### Retest of Model on Five 20% Samples: Summary of Results

#### Right-Hand Side Variables: PSIS1 PSIS2 R\_ADL

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.451	0.545	23453	71.2	82.7
2	0.453	0.544	23290	71.3	82.6
3	0.448	0.544	23386	70.9	83.0
4	0.452	0.543	23233	71.0	82.8
5	0.452	0.536	22671	70.6	82.5

## QM CCOM01: Percent of residents whose ability to communicate has worsened

### Estimate on 50% Sample

Parameter	Estimate
Intercept	-3.2952
CCOM1_B	0.2093
CWGT1_A	0.3073
CPS_1	0.5322
CPS_2	0.6347
CPS_3	0.9055
CPS_4	0.2129
CPS_5	0.9381
CPS_6	1.1833

### Retest of Model on Five 20% Samples: Summary of Results Right-Hand Side Variables: CCOM1\_B CWGT1\_A CPS

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.098	0.118	1240	69.7	50.5
2	0.099	0.115	1175	68.9	50.6
3	0.098	0.122	1320	70.2	50.6
4	0.099	0.117	1228	69.3	50.6
5	0.098	0.114	1166	69.2	50.4

**QM CDRG01: Percent of residents on antipsychotics without a diagnosis of psychosis (high & low risk)**

**Estimate on 50% Sample**

Parameter	Estimate
Intercept	-2.6295
CBEH4_C	0.7952
CBEH4_B	0.6773
R_BEH_1	0.6954
R_BEH_2	0.5573
R_IMP_1	0.2357
R_IMP_2	0.1735
CWGT1_A	0.1792
CPS_1	0.4494
CPS_2	0.4733
CPS_3	0.0932
CPS_4	-0.00036
CPS_5	0.1456
CPS_6	-0.6025
I1QU	0.6393

**Retest of Model on Five 20% Samples: Summary of Results**

**Right-Hand Side Variables: CBEH4\_C CBEH4\_B R\_BEH R\_IMP CWGT1\_A CPS I1QU**

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.202	0.250	5190	64.7	65.8
2	0.202	0.254	5373	65.4	65.7
3	0.203	0.245	4999	64.2	65.7
4	0.201	0.243	4919	64.4	65.4
5	0.202	0.249	5147	64.7	65.7

**QM CDRG02: Percent of residents on antipsychotics without a diagnosis of psychosis (high risk)**

**Estimate on 50% Sample**

Parameter	Estimate
Intercept	-0.8167
R_BEH_1	0.2809
R_BEH_2	0.3002
R_IMP_1	0.1281
R_IMP_2	0.1591
I1QU	0.5025

**Retest of Model on Five 20% Samples: Summary of Results**  
**Right-Hand Side Variables: R\_BEH R\_IMP I1QU**

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.424	0.118	232.6	79.3	31.3
2	0.424	0.131	285.2	80.1	31.7
3	0.421	0.117	228.0	79.0	31.6
4	0.418	0.116	225.0	78.9	31.6
5	0.424	0.103	177.5	78.9	30.3

**QM CDRG03: Percent of residents on antipsychotics without a diagnosis of psychosis (low risk)**

**Estimate on 50% Sample**

Parameter	Estimate
Intercept	-2.3488
R_BEH_1	0.8422
R_BEH_2	0.5682
R_IMP_1	0.5472
R_IMP_2	0.4305
I1QU	0.6697
CBEH4_B	0.1648
CBEH4_C	0.7662

**Retest of Model on Five 20% Samples: Summary of Results**

**Right-Hand Side Variables: R\_BEH R\_IMP I1QU CBEH4\_B CBEH4\_C**

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.160	0.181	2763	62.7	61.6
2	0.159	0.175	2592	62.1	61.5
3	0.162	0.174	2547	61.6	61.6
4	0.159	0.172	2503	61.9	61.3
5	0.160	0.176	2618	62.0	61.7

## QM CFAL01: Percent of residents who have fallen

### Estimate on 50% Sample

Parameter	Estimate
Intercept	-2.8153
CPRU4_D	-0.1701
CMOD3_A	0.81
CFAL1_C	0.4173
CFAL1_B	0.514
R_ADL_11T14	-0.1861
R_ADL_15T16	-0.3964
R_ADL_17T18	-0.4332

### Retest of Model on Five 20% Samples: Summary of Results

Right-Hand Side Variables: CPRU4\_D CMOD3\_A CFAL1\_C CFAL1\_B R\_ADL

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.091	0.150	1579	68.0	58.6
2	0.093	0.160	1798	68.8	59.4
3	0.092	0.152	1615	68.4	58.6
4	0.091	0.154	1665	68.4	58.9
5	0.091	0.153	1646	68.6	58.7

## QM CINF0X: Percent of residents with infections

### Estimate on 50% Sample

Parameter	Estimate
Intercept	-3.1957
R_CMIC	1.3932
R_CLN_1	0.3381
R_CLN_2	0.2997
R_CLN_3	0.2335

### Retest of Model on Five 20% Samples: Summary of Results Right-Hand Side Variables: R\_CMIC R\_CLN

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.143	0.143	2274	58.2	62.2
2	0.144	0.142	2229	58.0	62.1
3	0.143	0.143	2274	58.4	62.0
4	0.143	0.137	2081	57.4	62.0
5	0.145	0.141	2205	57.6	62.4



## QM CMOB01: Percent of residents who have declined in their ability to locomote

### Estimate on 50% Sample

Parameter	Estimate
Intercept	-2.4499
PSIS1_1	0.4215
PSIS1_2	0.6688
PSIS1_3	0.8069
PSIS1_4T9	0.9477
CMOB1_C	0.2639
CCOM1_A	0.4105

### Retest of Model on Five 20% Samples: Summary of Results Right-Hand Side Variables: PSIS1 CMOB1\_C CCOM1\_A

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.139	0.115	1086	70.5	46.0
2	0.141	0.120	1178	71.0	46.0
3	0.140	0.111	1014	69.6	46.2
4	0.142	0.119	1173	70.9	46.0
5	0.141	0.118	1142	70.8	46.0

## QM CNUT01: Percent of residents with a feeding tube

### Estimate on 50% Sample

Parameter	Estimate
Intercept	-5.7773
R_CLN_1	1.2814
R_CLN_2	2.9169
R_CLN_3	3.6345
CNUT1_A	2.1716
R_CMIC	0.6335

### Retest of Model on Five 20% Samples: Summary of Results Right-Hand Side Variables: R\_CLN CNUT1\_A R\_CMIC

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.073	0.438	22342	90.5	81.6
2	0.072	0.439	22493	90.6	81.7
3	0.072	0.440	22594	90.7	81.8
4	0.072	0.437	22325	90.2	81.8
5	0.071	0.435	22052	89.9	81.8

## QM CPAI0X: Percent of residents with pain

### Estimate on 50% Sample

Parameter	Estimate
Intercept	-1.3883
CPS_1	-0.3515
CPS_2	-0.5236
CPS_3	-0.7507
CPS_4	-1.1052
CPS_5	-1.165
CPS_6	-1.2631
CWGT1_A	-0.3906

### Retest of Model on Five 20% Samples: Summary of Results Right-Hand Side Variables: CPS CWGT1\_A

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.108	0.144	1994	54.3	68.3
2	0.110	0.148	2119	54.7	68.4
3	0.107	0.147	2064	54.6	68.4
4	0.108	0.152	2217	55.3	68.4
5	0.107	0.147	2077	54.8	68.4

## QM CPRU01: Percent of residents with pressure sores (high & low risk)

### Estimate on 50% Sample

Parameter	Estimate
Intercept	-5.0665
R_CMIC	1.334
R_CLN_1	0.2705
R_CLN_2	0.1762
R_CLN_3	0.12
PSIS1_1	0.3809
PSIS1_2	0.814
PSIS1_3	1.2151
PSIS1_4T9	1.551
PSIS2_1	0.0498
PSIS2_2	0.1024
PSIS2_3T4	0.0759
PSIS2_5T10	0.0693
R_ADL_11T14	0.5218
R_ADL_15T16	0.8938
R_ADL_17T18	0.9069

### Retest of Model on Five 20% Samples: Summary of Results

Right-Hand Side Variables: R\_CMIC R\_CLN PSIS1 PSIS2 R\_ADL

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.088	0.217	5659	71.4	66.3
2	0.089	0.218	5723	71.4	66.2
3	0.087	0.219	5754	71.4	66.4
4	0.087	0.219	5792	71.9	66.3
5	0.086	0.218	5720	71.5	66.6

## QM CPRU02: Percent of residents with pressure sores (high risk)

### Estimate on 50% Sample

Parameter	Estimate
Intercept	-3.8642
R_CMIC	1.4355
R_CLN_1	0.204
R_CLN_2	0.1067
R_CLN_3	0.1255
PSIS1_1	0.0428
PSIS1_2	0.4574
PSIS1_3	0.8648
PSIS1_4T9	1.2082

### Retest of Model on Five 20% Samples: Summary of Results Right-Hand Side Variables: R\_CMIC R\_CLN PSIS1

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.139	0.220	3157	59.1	71.2
2	0.140	0.209	2891	57.6	71.1
3	0.139	0.218	3101	58.8	71.2
4	0.138	0.215	3044	58.9	70.9
5	0.136	0.215	3019	58.0	71.7

### QM CPRU03: Percent of residents with pressure sores (low risk)

#### Estimate on 50% Sample

Parameter	Estimate
Intercept	-5.5574
R_CMIC	2.3185

#### Retest of Model on Five 20% Samples: Summary of Results Right-Hand Side Variables: R\_CMIC

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.027	0.100	547.3	44.1	81.1
2	0.027	0.114	709.2	47.8	81.1
3	0.026	0.102	577.9	44.9	81.0
4	0.026	0.105	603.9	45.9	81.0
5	0.026	0.111	673.1	47.1	81.3

## QM CPRU04: Percent of residents with worsening pressure sores

### Estimate on 50% Sample

Parameter	Estimate
Intercept	-4.4524
R_CMIC	1.116
R_ADL_11T14	0.6586
R_ADL_15T16	0.9044
R_ADL_17T18	0.8374

### Retest of Model on Five 20% Samples: Summary of Results Right-Hand Side Variables: R\_CMIC R\_ADL

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.052	0.109	1439	65.7	58.5
2	0.054	0.114	1585	66.7	58.3
3	0.053	0.117	1669	67.2	58.7
4	0.052	0.113	1547	66.7	58.5
5	0.052	0.114	1578	66.6	58.8

## QM CSOC02: Percent of residents engaging in little or no activity

### Estimate on 50% Sample

Parameter	Estimate
Intercept	-2.9269
R_CMIC	0.2813
R_ADL_11T14	0.1984
R_ADL_15T16	0.9063
R_ADL_17T18	1.2942

### Retest of Model on Five 20% Samples: Summary of Results Right-Hand Side Variables: R\_CMIC R\_ADL

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.100	0.167	3261	53.2	72.5
2	0.100	0.164	3143	52.9	72.4
3	0.100	0.166	3207	52.6	72.8
4	0.099	0.163	3100	52.7	72.5
5	0.098	0.162	3068	52.2	72.9



## QM CWAL0X: Percent of residents who walk as well or better than the previous assessment

### Estimate on 50% Sample

Parameter	Estimate
Intercept	2.2315
PSI_1	-0.3487
PSI_2	-0.6246
PSI_3T4	-0.7677
PSI_5T7	-0.8578
PSI_8T15	-0.9069

### Retest of Model on Five 20% Samples: Summary of Results Right-Hand Side Variables: PSI

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.845	0.094	616.6	47.2	65.7
2	0.844	0.098	674.9	47.2	66.3
3	0.846	0.098	672.4	47.5	66.0
4	0.846	0.097	655.7	47.3	66.1
5	0.849	0.098	670.0	47.3	66.3

## QM CWGT01: Percent of residents who have unexplained weight loss

### Estimate on 50% Sample

Parameter	Estimate
Intercept	-3.2071
PSIS1_1	0.3195
PSIS1_2	0.7452
PSIS1_3	1.2585
PSIS1_4T9	1.8676

### Retest of Model on Five 20% Samples: Summary of Results Right-Hand Side Variables: PSIS1

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.078	0.106	1090	63.4	56.7
2	0.076	0.108	1126	63.9	56.7
3	0.076	0.106	1083	63.5	56.8
4	0.077	0.108	1129	64.0	56.6
5	0.075	0.105	1071	63.2	57.0

## QM PADL0X: Percent of short-stay residents who have not improved since admission

### Estimate on 50% Sample

Parameter	Estimate
Intercept	0.0508
CPS_1	0.3543
CPS_2	0.4066
CPS_3	0.6606
CPS_4	0.8887
CPS_5	0.8767
CPS_6	1.6926
PSIS2_1	-0.0446
PSIS2_2	0.0282
PSIS2_3T4	0.2473
PSIS2_5T10	0.5634

### Retest of Model on Five 20% Samples: Summary of Results Right-Hand Side Variables: CPS PSIS2

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.632	0.187	1806	49.6	69.5
2	0.632	0.190	1863	49.8	69.7
3	0.634	0.186	1799	49.6	69.6
4	0.631	0.186	1790	49.6	69.4
5	0.630	0.191	1881	50.0	69.6

**QM PCNT0X: Percent of short-stay residents whose ability to control their bowel or bladder has not improved since admission**

**Estimate on 50% Sample**

Parameter	Estimate
Intercept	-2.5064
R_CMIP	0.6815
PSIS1_1	0.2772
PSIS1_2	0.6419
PSIS1_3	1.0118
PSIS1_4T9	1.379
PSIS2_1	0.2666
PSIS2_2	0.4975
PSIS2_3T4	1.2612
PSIS2_5T10	2.6217
R_ADL_11T14	0.5422
R_ADL_15T16	0.9156
R_ADL_17T18	1.2036

**Retest of Model on Five 20% Samples: Summary of Results**  
**Right-Hand Side Variables: R\_CMIP PSIS1 PSIS2 R\_ADL**

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.547	0.454	10616	68.2	77.4
2	0.549	0.447	10281	68.0	76.9
3	0.548	0.447	10291	67.8	77.0
4	0.545	0.452	10488	68.4	76.9
5	0.547	0.446	10233	68.1	76.6

## QM PPAI0X: Percent of short-stay residents with pain

### Estimate on 50% Sample

Parameter	Estimate
Intercept	-0.5808
CPS_1	-0.3184
CPS_2	-0.5289
CPS_3	-0.7543
CPS_4	-1.0964
CPS_5	-0.9655
CPS_6	-1.181
J4C	0.8737
I1QU	-0.4647

### Retest of Model on Five 20% Samples: Summary of Results Right-Hand Side Variables: CPS J4C I1QU

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.268	0.215	2362	67.3	56.9
2	0.264	0.208	2221	66.6	56.9
3	0.267	0.215	2349	67.1	57.1
4	0.265	0.212	2294	67.1	56.8
5	0.267	0.213	2324	67.1	56.9

## QM PPRU0X: Percent of short-stay residents whose pressure sores have not gotten better

### Estimate on 50% Sample

Parameter	Estimate
Intercept	-5.3296
R_CLN_1	0.3323
R_CLN_2	0.3877
R_CLN_3	0.4158
PSIS1_1	1.0672
PSIS1_2	1.7813
PSIS1_3	2.2924
PSIS1_4T9	3.039
PSIS2_1	0.00761
PSIS2_2	0.1264
PSIS2_3T4	0.0698
PSIS2_5T10	0.1943
R_CMIP	0.8857
R_ADL_11T14	0.3905
R_ADL_15T16	0.7078
R_ADL_17T18	0.7256

### Retest of Model on Five 20% Samples: Summary of Results

Right-Hand Side Variables: R\_CLN PSIS1 PSIS2 R\_CMIP R\_ADL

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.220	0.324	5568	72.9	65.8
2	0.221	0.321	5445	72.3	65.9
3	0.218	0.323	5527	72.4	66.2
4	0.221	0.319	5403	72.5	65.6
5	0.220	0.327	5678	73.0	66.0

**QM PRSP0X: Percent of short-stay residents who have developed a respiratory infection or have not gotten better**

**Estimate on 50% Sample**

Parameter	Estimate
Intercept	4.019
R_CLN_1	-1.882
R_CLN_2	-1.8841
R_CLN_3	-2.0817

**Retest of Model on Five 20% Samples: Summary of Results**  
**Right-Hand Side Variables: R\_CLN**

Obs	Mean 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.922	0.148	1132	32.2	93.1
2	0.922	0.149	1148	32.5	93.1
3	0.921	0.153	1214	32.8	93.4
4	0.922	0.154	1234	32.8	93.7
5	0.920	0.151	1190	32.4	93.3

**QM PWAL0X: Percent of short-stay residents who walk as well or better on day 14 as on day 5 of their stay**

**Estimate on 50% Sample**

Parameter	Estimate
Intercept	0.6885
R_ADL_11T14	-0.1792
R_ADL_15T16	-0.4745
R_ADL_17T18	-0.6418
PSIS2_1	-0.0976
PSIS2_2	-0.0216
PSIS2_3T4	-0.2996
PSIS2_5T10	-0.6269
R_CMIP	-0.7861
CPS_1	-0.2273
CPS_2	-0.265
CPS_3	-0.3746
CPS_4	-0.5079
CPS_5	-0.3328
CPS_6	-1.1708

**Retest of Model on Five 20% Samples: Summary of Results**  
**Right-Hand Side Variables: R\_ADL PSIS2 R\_CMIP CPS**

Obs	Mean, 20% Sample	PHI	CHISQ	Sensitivity	Specificity
1	0.307	0.201	2070	71.8	49.8
2	0.309	0.199	2030	71.4	50.0
3	0.307	0.201	2071	71.8	49.8
4	0.308	0.198	2011	71.5	49.8
5	0.310	0.201	2076	71.4	50.2



**Attachment 9**  
**Compared Effects of Adjustment on Facility QM Rankings: Overall Movement**  
**from Highest and Lowest QM Deciles**

Quality Measure	Category	FAP-Adjusted	Old Covariates	New Covariates
CBEH04	% moved from Decile 1 to 2-5	1.23	0.82	0.60
	% moved from Decile 10 to 5-9	2.78	1.50	1.25
	% Non-Movers	49.09	64.88	68.80
	Mean Difference for Movers	0.018	0.0114	0.0099
	<b>Correlation:obs/adj</b>	<b>0.926</b>	<b>0.977</b>	<b>0.984</b>
CCNT03	% moved from Decile 1 to 2-5	1.71	1.50	1.27
	% moved from Decile 10 to 5-9	2.36	2.02	1.91
	% Non-Movers	47.40	51.39	53.40
	Mean Difference for Movers	0.0286	0.0259	0.0223
	<b>Correlation:obs/adj</b>	<b>0.944</b>	<b>0.958</b>	<b>0.967</b>
CCOM01	% moved from Decile 1 to 2-5	0.61	0.51	0.63
	% moved from Decile 10 to 5-9	1.13	0.94	1.19
	% Non-Movers	69.55	75.17	69.66
	Mean Difference for Movers	0.0127	0.0105	0.0129
	<b>Correlation:obs/adj</b>	<b>0.986</b>	<b>0.991</b>	<b>0.986</b>
CMOB01	% moved from Decile 1 to 2-5	1.63	0.85	1.05
	% moved from Decile 10 to 5-9	2.24	1.29	1.51
	% Non-Movers	46.92	66.80	59.21
	Mean Difference for Movers	0.0253	0.0148	0.0183
	<b>Correlation:obs/adj</b>	<b>0.949</b>	<b>0.986</b>	<b>0.977</b>
CNUT01	% moved from Decile 1 to 2-5	3.54	3.35	4.21
	% moved from Decile 10 to 5-9	4.73	2.44	5.78
	% Non-Movers	36.98	52.86	28.85
	Mean Difference for Movers	0.0316	0.0165	0.0341
	<b>Correlation:obs/adj</b>	<b>0.735</b>	<b>0.957</b>	<b>0.713</b>
CPAI0X	% moved from Decile 1 to 2-5	2.10	1.03	1.18
	% moved from Decile 10 to 5-9	3.96	1.26	1.49
	% Non-Movers	36.08	65.67	60.83
	Mean Difference for Movers	0.0395	0.0169	0.0197
	<b>Correlation:obs/adj</b>	<b>0.841</b>	<b>0.983</b>	<b>0.976</b>
CPRU04	% moved from Decile 1 to 2-5	2.85	2.70	0.74
	% moved from Decile 10 to 5-9	4.22	3.35	2.58
	% Non-Movers	32.81	37.68	53.12
	Mean Difference for Movers	0.0228	0.0203	0.0113
	<b>Correlation:obs/adj</b>	<b>0.822</b>	<b>0.883</b>	<b>0.945</b>
CWGT01	% moved from Decile 1 to 2-5	1.05	0.95	1.48
	% moved from Decile 10 to 5-9	1.75	1.36	2.76
	% Non-Movers	59.99	66.22	45.90
	Mean Difference for Movers	0.0119	0.0107	0.0174
	<b>Correlation:obs/adj</b>	<b>0.970</b>	<b>0.978</b>	<b>0.932</b>
PPRU0X	% moved from Decile 1 to 2-5	3.35	1.83	3.05
	% moved from Decile 10 to 5-9	5.60	2.39	4.66
	% Non-Movers	22.87	43.99	28.04
	Mean Difference for Movers	0.0729	0.037	0.0691
	<b>Correlation:obs/adj</b>	<b>0.628</b>	<b>0.941</b>	<b>0.776</b>
PRSP0X	% moved from Decile 1 to 2-5	2.84	0.76	1.88
	% moved from Decile 10 to 5-9	2.88	2.75	2.97
	% Non-Movers	45.16	78.71	53.96
	Mean Difference for Movers	0.0252	0.0107	0.0167
	<b>Correlation:obs/adj</b>	<b>0.925</b>	<b>0.994</b>	<b>0.966</b>

Note: Correlation coefficients are in bold font

Shaded cells show where the new covariates perform "better" than alternative models

Better means: 1) higher percent moving from the extreme deciles to the middle deciles;

2) a smaller percent of non-movers; 3) a larger mean percentage point difference for movers;

4) a smaller correlation coefficient.

**Compared Effects of Adjustment on Facility QM Rankings: Overall Movement  
from Highest and Lowest QM Deciles**

Quality Measure	Category	FAP-Adjusted	Old Covariates	New Covariates
CBEH01	% moved from Decile 1 to 2-5	1.81		1.30
	% moved from Decile 10 to 5-9	3.39		1.59
	% Non-Movers	39.29		57.30
	Mean Difference for Movers	0.0509		0.0305
	<b>Correlation:obs/adj</b>	<b>0.870</b>		<b>0.974</b>
CBEH02	% moved from Decile 1 to 2-5	1.68		0.91
	% moved from Decile 10 to 5-9	3.34		1.31
	% Non-Movers	40.19		64.68
	Mean Difference for Movers	0.0545		0.0282
	<b>Correlation:obs/adj</b>	<b>0.882</b>		<b>0.983</b>
CBEH03	% moved from Decile 1 to 2-5	2.99		2.79
	% moved from Decile 10 to 5-9	2.11		1.62
	% Non-Movers	51.93		58.95
	Mean Difference for Movers	0.0159		0.014
	<b>Correlation:obs/adj</b>	<b>0.954</b>		<b>0.967</b>
CBMI0X	% moved from Decile 1 to 2-5	1.36		1.51
	% moved from Decile 10 to 5-9	2.40		2.15
	% Non-Movers	50.54		50.51
	Mean Difference for Movers	0.0211		0.0182
	<b>Correlation:obs/adj</b>	<b>0.947</b>		<b>0.963</b>
CCNT01	% moved from Decile 1 to 2-5	3.61		4.06
	% moved from Decile 10 to 5-9	3.76		4.36
	% Non-Movers	29.67		24.19
	Mean Difference for Movers	0.0729		0.087
	<b>Correlation:obs/adj</b>	<b>0.843</b>		<b>0.701</b>
CCNT05	% moved from Decile 1 to 2-5	2.36		5.07
	% moved from Decile 10 to 5-9	5.17		5.79
	% Non-Movers	44.88		27.35
	Mean Difference for Movers	0.0184		0.0355
	<b>Correlation:obs/adj</b>	<b>0.942</b>		<b>0.721</b>
CCNT06	% moved from Decile 1 to 2-5	3.00		3.57
	% moved from Decile 10 to 5-9	3.86		4.50
	% Non-Movers	32.27		25.64
	Mean Difference for Movers	0.0718		0.0872
	<b>Correlation:obs/adj</b>	<b>0.870</b>		<b>0.751</b>
CDRG01	% moved from Decile 1 to 2-5	2.05		1.94
	% moved from Decile 10 to 5-9	4.21		3.11
	% Non-Movers	33.79		40.08
	Mean Difference for Movers	0.0538		0.0382
	<b>Correlation:obs/adj</b>	<b>0.825</b>		<b>0.912</b>
CDRG02	% moved from Decile 1 to 2-5	2.82		1.15
	% moved from Decile 10 to 5-9	2.94		1.41
	% Non-Movers	40.74		68.12
	Mean Difference for Movers	0.0644		0.0297
	<b>Correlation:obs/adj</b>	<b>0.907</b>		<b>0.986</b>
CDRG03	% moved from Decile 1 to 2-5	1.69		1.27
	% moved from Decile 10 to 5-9	3.93		2.40
	% Non-Movers	36.63		49.30
	Mean Difference for Movers	0.0471		0.0273
	<b>Correlation:obs/adj</b>	<b>0.849</b>		<b>0.95</b>
CINFOX	% moved from Decile 1 to 2-5	1.57		1.49
	% moved from Decile 10 to 5-9	3.11		2.43
	% Non-Movers	42.95		49.25
	Mean Difference for Movers	0.0301		0.024
	<b>Correlation:obs/adj</b>	<b>0.924</b>		<b>0.947</b>

Quality Measure	Category	FAP-Adjusted	Old Covariates	New Covariates
CPRU01	% moved from Decile 1 to 2-5	1.12		2.22
	% moved from Decile 10 to 5-9	3.32		4.46
	% Non-Movers	45.48		34.08
	Mean Difference for Movers	0.0197		0.0261
	<b>Correlation:obs/adj</b>	<b>0.912</b>		<b>0.835</b>
CPRU02	% moved from Decile 1 to 2-5	1.11		1.84
	% moved from Decile 10 to 5-9	2.36		3.17
	% Non-Movers	51.88		40.24
	Mean Difference for Movers	0.0228		0.0292
	<b>Correlation:obs/adj</b>	<b>0.951</b>		<b>0.915</b>
CPRU03	% moved from Decile 1 to 2-5	6.87		7.37
	% moved from Decile 10 to 5-9	2.29		2.50
	% Non-Movers	43.74		40.21
	Mean Difference for Movers	0.0078		0.0086
	<b>Correlation:obs/adj</b>	<b>0.945</b>		<b>0.927</b>
CWALOX	% moved from Decile 1 to 2-5	1.66		1.30
	% moved from Decile 10 to 5-9	1.15		1.01
	% Non-Movers	57.56		63.35
	Mean Difference for Movers	0.019		0.0158
	<b>Correlation:obs/adj</b>	<b>0.976</b>		<b>0.984</b>
PCNTOX	% moved from Decile 1 to 2-5	4.76		4.33
	% moved from Decile 10 to 5-9	4.33		4.15
	% Non-Movers	22.13		27.03
	Mean Difference for Movers	0.0971		0.0873
	<b>Correlation:obs/adj</b>	<b>0.674</b>		<b>0.785</b>
PPAIOX	% moved from Decile 1 to 2-5	3.20		1.82
	% moved from Decile 10 to 5-9	5.78		2.33
	% Non-Movers	22.46		46.49
	Mean Difference for Movers	0.0982		0.0472
	<b>Correlation:obs/adj</b>	<b>0.623</b>		<b>0.952</b>
PWALOX	% moved from Decile 1 to 2-5	2.24		1.47
	% moved from Decile 10 to 5-9	3.52		2.13
	% Non-Movers	36.27		50.34
	Mean Difference for Movers	0.0651		0.0437
	<b>Correlation:obs/adj</b>	<b>0.891</b>		<b>0.959</b>

Note: Correlation coefficients are in bold font

Shaded cells show where the new covariates perform "better" than alternative models

Better means: 1) higher percent moving from the extreme deciles to the middle deciles;

2) a smaller percent of non-movers; 3) a larger mean percentage point difference for movers;

4) a smaller correlation coefficient.

**Compared Effects of Adjustment on Facility QM Rankings: Overall Movement  
from Highest and Lowest QM Deciles**

Quality Measure	Category	FAP-Adjusted	Old Covariates	New Covariates
CCAT02	% moved from Decile 1 to 2-5		0.99	1.26
	% moved from Decile 10 to 5-9		2.86	3.79
	% Non-Movers		47.19	41.14
	Mean Difference for Movers		0.0162	0.0191
	<b>Correlation:obs/adj</b>		<b>0.929</b>	<b>0.861</b>
CCNT02	% moved from Decile 1 to 2-5		1.85	1.63
	% moved from Decile 10 to 5-9		2.74	3.05
	% Non-Movers		44.70	44.63
	Mean Difference for Movers		0.0313	0.0305
	<b>Correlation:obs/adj</b>		<b>0.934</b>	<b>0.932</b>
CAFL01	% moved from Decile 1 to 2-5		0.92	1.05
	% moved from Decile 10 to 5-9		2.05	2.36
	% Non-Movers		55.11	52.62
	Mean Difference for Movers		0.0142	0.0157
	<b>Correlation:obs/adj</b>		<b>0.966</b>	<b>0.957</b>
PADLOX	% moved from Decile 1 to 2-5		0.53	1.28
	% moved from Decile 10 to 5-9		0.34	1.13
	% Non-Movers		83.74	59.31
	Mean Difference for Movers		0.0182	0.0438
	<b>Correlation:obs/adj</b>		<b>0.997</b>	<b>0.979</b>

Note: Correlation coefficients are in bold font

Shaded cells show where the new covariates perform "better" than alternative models

Better means: 1) higher percent moving from the extreme deciles to the middle deciles;

2) a smaller percent of non-movers; 3) a larger mean percentage point difference for movers;

4) a smaller correlation coefficient.

**Compared Effects of Adjustment on Facility QM Rankings: Overall Movement  
from Highest and Lowest QM Deciles**

Quality Measure	Category	FAP-Adjusted	Old Covariates	New Covariates
CCOG01	% moved from Decile 1 to 2-5	0.36	0.36	
	% moved from Decile 10 to 5-9	0.61	0.63	
	% Non-Movers	82.45	82.78	
	Mean Difference for Movers	0.0079	0.0079	
	<b>Correlation:obs/adj</b>	<b>0.995</b>	<b>0.996</b>	
CMOD03	% moved from Decile 1 to 2-5	1.85	1.33	
	% moved from Decile 10 to 5-9	2.36	0.75	
	% Non-Movers	47.13	71.25	
	Mean Difference for Movers	0.0268	0.0147	
	<b>Correlation:obs/adj</b>	<b>0.943</b>	<b>0.987</b>	
CPAN01	% moved from Decile 1 to 2-5	1.11	0.45	
	% moved from Decile 10 to 5-9	2.73	0.95	
	% Non-Movers	49.94	78.29	
	Mean Difference for Movers	0.0196	0.0082	
	<b>Correlation:obs/adj</b>	<b>0.950</b>	<b>0.994</b>	
PDELOX	% moved from Decile 1 to 2-5	7.49	7.00	
	% moved from Decile 10 to 5-9	3.89	0.25	
	% Non-Movers	28.98	66.74	
	Mean Difference for Movers	0.0201	0.006	
	<b>Correlation:obs/adj</b>	<b>0.741</b>	<b>0.996</b>	

Note: Correlation coefficients are in bold font

**Compared Effects of Adjustment on Facility QM Rankings: Overall Movement  
from Highest and Lowest QM Deciles**

Quality Measure	Category	FAP-Adjusted	Old Covariates	New Covariates
CBUROX	% moved from Decile 1 to 2-5	0.42		
	% moved from Decile 10 to 5-9	2.70		
	% Non-Movers	54.98		
	Mean Difference for Movers	0.0152		
	<b>Correlation:obs/adj</b>	<b>0.936</b>		
CDEL0X	% moved from Decile 1 to 2-5	0.38		
	% moved from Decile 10 to 5-9	2.16		
	% Non-Movers	61.83		
	Mean Difference for Movers	0.0226		
	<b>Correlation:obs/adj</b>	<b>0.936</b>		
CCAT01	% moved from Decile 1 to 2-5		6.90	
	% moved from Decile 10 to 5-9		0.90	
	% Non-Movers		60.78	
	Mean Difference for Movers		0.0042	
	<b>Correlation:obs/adj</b>		<b>0.986</b>	
CADL03	% moved from Decile 1 to 2-5			1.28
	% moved from Decile 10 to 5-9			2.37
	% Non-Movers			50.67
	Mean Difference for Movers			0.0382
	<b>Correlation:obs/adj</b>			<b>0.961</b>
CSOC02	% moved from Decile 1 to 2-5			3.57
	% moved from Decile 10 to 5-9			1.24
	% Non-Movers			65.43
	Mean Difference for Movers			0.0181
	<b>Correlation:obs/adj</b>			<b>0.984</b>

Note: Correlation coefficients are in bold font

**Attachment 10**

**Compared Effects of Adjustment on Facility QM Rankings: Targeted Movement of High and Low-Risk Facilities from Highest and Lowest QM Deciles**

Quality Measure	Category	Hi CMI Old Cvs	Lo CMI Old Cvs	Hi CMI New Cvs	Lo CMI New Cvs	Total: Old Cvs	Total: New Cvs	Low/Total Old Cvs	Low/Total FAP	Low/Total New Cvs	High/Total Old Cvs	High/Total FAP	High/Total New Cvs
<b>CBEH04</b>	% moved from Decile 1 to 2-5	0.051	0.123	0.043	0.122	0.816	0.602	15.05%	13.51%	20.24%			
	% Moving from 10 to 5-9	0.036	0.224	0.050	0.193	1.503	1.254				2.40%	2.08%	4.00%
	% Non-Movers	4.905	5.750	5.166	6.083	64.880	68.799						
	Mean Difference for Movers	0.010	0.014	0.009	0.012	0.011	0.010						
<b>CCNT03</b>	% moved from Decile 1 to 2-5	0.020	0.264	0.017	0.436	1.503	1.272	17.57%	18.42%	34.25%			
	% Moving from 10 to 5-9	0.274	0.091	0.348	0.044	2.021	1.908				13.57%	11.62%	18.26%
	% Non-Movers	4.124	3.382	3.484	4.817	51.391	53.397						
	Mean Difference for Movers	0.019	0.036	0.026	0.026	0.026	0.022						
<b>CCOM01</b>	% moved from Decile 1 to 2-5	0.066	0.162	0.096	0.125	0.509	0.627	31.89%	36.25%	20.00%			
	% Moving from 10 to 5-9	0.081	0.029	0.081	0.118	0.943	1.194				8.59%	7.83%	6.79%
	% Non-Movers	5.108	6.722	4.798	6.537	75.170	69.657						
	Mean Difference for Movers	0.011	0.012	0.013	0.014	0.011	0.013						
<b>CMOB01</b>	% moved from Decile 1 to 2-5	0.008	0.218	0.025	0.251	0.845	1.046	25.74%	39.03%	24.00%			
	% Moving from 10 to 5-9	0.151	0.042	0.209	0.042	1.289	1.515				11.69%	22.79%	13.81%
	% Non-Movers	4.595	6.043	3.916	5.682	66.803	59.208						
	Mean Difference for Movers	0.018	0.015	0.021	0.019	0.015	0.018						

Quality Measure	Category	Hi CMI Old Covs	Lo CMI Old Covs	Hi CMI New Covs	Lo CMI New Covs	Total: Old Covs	Total: New Covs	Low/Total Old Covs	Low/Total FAP	Low/Total New Covs	High/Total Old Covs	High/Total FAP	High/Total New Covs
CNU01	% moved from Decile 1 to 2-5	0.029	0.817	0.029	1.510	3.347	4.210	24.40%	25.13%	35.88%			
	% Moving from 10 to 5-9	0.540	0.029	1.590	0.088	2.436	5.778				22.16%	24.97%	27.53%
	% Non-Movers	3.697	5.155	1.342	1.999	52.858	28.847						
	Mean Difference for Movers	0.025	0.013	0.056	0.041	0.017	0.034						
CPAI0X	% moved from Decile 1 to 2-5	0.072	0.187	0.101	0.166	1.031	1.182	18.18%	18.53%	14.02%			
	% Moving from 10 to 5-9	0.101	0.137	0.130	0.187	1.261	1.492				8.00%	10.01%	8.70%
	% Non-Movers	4.865	6.371	4.404	5.996	65.675	60.829						
	Mean Difference for Movers	0.018	0.019	0.021	0.021	0.017	0.020						
CPRU04	% moved from Decile 1 to 2-5		0.031		0.395	2.702	0.740	1.15%	1.45%	53.40%			
	% Moving from 10 to 5-9	0.994	0.052	0.912	0.029	3.355	2.585				29.63%	33.37%	35.28%
	% Non-Movers	3.386	1.595	2.520	4.466	37.679	53.119						
	Mean Difference for Movers	0.011	0.028	0.018	0.014	0.020	0.011						
CWGT01	% moved from Decile 1 to 2-5	0.008	0.176	0.048	0.311	0.952	1.477	18.49%	19.82%	21.08%			
	% Moving from 10 to 5-9	0.176	0.080	0.287	0.120	1.360	2.763				12.94%	12.81%	10.40%
	% Non-Movers	4.921	5.529	3.505	3.992	66.216	45.900						
	Mean Difference for Movers	0.017	0.008	0.020	0.017	0.011	0.017						



Quality Measure	Category	Hi CMI Old Covs	Lo CMI Old Covs	Hi SMI New Covs	Lo CMI New Covs	Total: Old Covs	Total: New Covs	Low/Total Old Covs	Low/Total FAP	Low/Total New Covs	High/Total Old Covs	High/Total FAP	High/Total New Covs
PPRU0X	% moved from Decile 1 to 2-5	0.065	0.468	0.032	0.733	1.829	3.049	25.59%	18.52%	24.04%			
	% Moving from 10 to 5-9	0.468	0.054	0.903	0.021	2.395	4.664				19.55%	14.77%	19.36%
	% Non-Movers	2.754	3.092	1.402	1.976	43.991	28.039						
	Mean Difference for Movers	0.051	0.035	0.080	0.094	0.037	0.069						
PRSP0X	% moved from Decile 1 to 2-5	0.118	0.011	0.247	0.075	0.763	1.879	1.41%	1.13%	4.00%			
	% Moving from 10 to 5-9	0.193	0.397	0.161	0.430	2.749	2.974				7.03%	4.48%	5.42%
	% Non-Movers	5.681	6.777	4.070	4.188	78.713	53.957						
	Mean Difference for Movers	0.011	0.010	0.016	0.019	0.011	0.017						
CCAT02	% moved from Decile 1 to 2-5	0.007	0.153	0.007	0.350	0.988	1.260	15.44%		27.75%			
	% Moving from 10 to 5-9	0.741	0.051	1.217	0.036	2.856	3.788				25.95%		32.12%
	% Non-Movers	3.111	5.102	1.989	3.832	47.191	41.141						
	Mean Difference for Movers	0.020	0.017	0.033	0.022	0.016	0.019						
CCNT02	% moved from Decile 1 to 2-5	0.010	0.377	0.009	0.585	1.846	1.634	20.44%		35.83%			
	% Moving from 10 to 5-9	0.377	0.071	0.445	0.122	2.744	3.049				13.75%		14.61%
	% Non-Movers	3.193	3.509	2.804	4.411	44.696	44.628						
	Mean Difference for Movers	0.025	0.043	0.033	0.034	0.031	0.031						

Quality Measure	Category	Hi CMI Old Covs	Lo CMI Old Covs	Hi SMI New Covs	Lo CMI New Covs	Total: Old Covs	Total: New Covs	Low/Total Old C+H16ovs	Low/Total FAP	Low/Total New Covs	High/Total Old Covs	High/Total FAP	High/Total New Covs
CFAL01	% moved from Decile 1 to 2-5	0.158	0.098	0.293	0.060	0.923	1.051	10.57%		5.71%			
	% Moving from 10 to 5-9	0.030	0.203	0.030	0.330	2.048	2.365				1.47%		1.27%
	% Non-Movers	4.110	5.273	3.544	4.857	55.114	52.620						
	Mean Difference for Movers	0.014	0.015	0.018	0.016	0.014	0.016						
PADL0X	% moved from Decile 1 to 2-5	0.011	0.075		0.226	0.527	1.280	14.29%		17.65%			
	% Moving from 10 to 5-9	0.022	0.032	0.269	0.097	0.344	1.130				6.25%		23.81%
	% Non-Movers	6.188	7.264	3.701	5.056	83.739	59.312						
	Mean Difference for Movers	0.022	0.020	0.057	0.047	0.018	0.044						

**Attachment 11**  
**Case Studies: Comparing Observed and Adjusted Scores for 40**  
**Facilities Each in Seven QMs**

**CCNT03**

SYSTEM INTERNAL FACILITY ID	CMI	Observed QM	New Covariate Model	Old Covariate Model	FAP Adjusted Model
<b>High QM / High CMI</b>					
1	1.24	27.27%	28.13%	28.55%	30.08%
2	1.15	27.27%	25.54%	26.91%	26.50%
3	1.23	27.27%	23.58%	30.84%	30.57%
4	1.18	28.40%	23.04%	25.38%	23.51%
5	1.25	28.57%	25.60%	29.23%	27.21%
6	1.23	28.81%	26.37%	30.30%	28.70%
7	1.17	29.41%	27.31%	29.89%	30.76%
8	1.29	29.85%	25.21%	30.33%	28.31%
9	1.19	30.51%	28.03%	31.83%	31.61%
10	1.30	30.91%	30.25%	40.95%	42.92%
11	1.17	31.67%	28.06%	33.02%	35.22%
12	1.19	32.14%	29.15%	32.84%	33.50%
13	1.15	32.35%	29.33%	32.43%	31.06%
14	1.16	34.04%	28.28%	32.16%	30.27%
15	1.16	34.69%	35.16%	41.50%	41.25%
16	1.18	34.78%	31.84%	38.37%	39.99%
17	1.17	36.36%	37.71%	41.73%	40.98%
18	1.16	36.67%	34.72%	37.29%	35.94%
19	1.21	38.78%	34.09%	40.11%	39.06%
20	1.18	45.95%	39.91%	43.24%	44.52%
<b>Low QM / Low CMI</b>					
1	0.66	0.00%	0.35%	0.36%	0.42%
2	0.52	0.00%	0.77%		
3	0.71	0.00%	0.40%	0.62%	0.67%
4	0.67	0.00%	1.13%		
5	0.73	0.00%	1.16%		
6	0.72	1.25%	1.30%	1.29%	1.39%
7	0.69	2.30%	3.58%	1.92%	2.19%
8	0.73	2.33%	3.09%		
9	0.73	2.94%	2.93%	3.15%	3.54%
10	0.73	3.13%	2.96%		
11	0.72	3.28%	4.00%	6.74%	8.11%
12	0.70	3.45%	3.41%	4.19%	4.57%
13	0.74	4.00%	8.67%		
14	0.75	5.56%	6.13%		
15	0.67	5.71%	5.00%	2.84%	3.27%
16	0.73	5.77%	8.18%	9.05%	10.19%
17	0.74	5.77%	6.19%	8.07%	8.10%
18	0.75	5.88%	7.01%	6.82%	6.84%
19	0.71	6.00%	6.66%	5.86%	6.22%
20	0.59	6.44%	8.38%	11.94%	14.18%

# CINFOX

SYSTEM INTERNAL FACILITY ID	CMI	Observed QM	New Covariate Model	Old Covariate Model	FAP Adjusted Model
<b>High QM / High CMI</b>					
1	1.16	24.76%	20.22%		26.21%
2	1.15	25.00%	21.61%		17.94%
3	1.18	25.00%	20.92%		15.48%
4	1.20	25.00%	19.85%		20.11%
5	1.24	25.00%	19.02%		12.31%
6	1.15	26.19%	24.44%		16.69%
7	1.16	26.72%	24.88%		16.71%
8	1.18	28.21%	29.67%		17.52%
9	1.30	29.00%	15.94%		19.06%
10	1.21	29.73%	16.60%		24.03%
11	1.25	30.14%	24.20%		27.30%
12	1.22	30.26%	25.79%		23.80%
13	1.24	30.51%	21.58%		17.60%
14	1.15	33.33%	28.69%		21.19%
15	1.22	33.33%	28.89%		31.50%
16	1.19	34.57%	29.28%		22.98%
17	1.32	36.36%	22.11%		34.87%
18	1.20	36.84%	29.68%		27.27%
19	1.51	41.67%	20.95%		39.65%
20	1.55	50.00%	33.57%		31.09%
<b>Low QM / Low CMI</b>					
1	0.66	0.00%	0.64%		0.57%
2	0.62	0.00%	0.51%		0.48%
3	0.71	0.00%	0.65%		0.63%
4	0.67	0.00%	0.85%		0.72%
5	0.74	0.00%	0.57%		0.65%
6	0.74	0.00%	0.81%		0.79%
7	0.73	0.00%	0.56%		0.55%
8	0.74	0.00%			1.17%
9	0.59	0.68%	0.98%		1.06%
10	0.56	1.98%	2.83%		3.12%
11	0.73	2.04%	2.84%		2.39%
12	0.60	2.41%	3.69%		3.16%
13	0.73	2.70%	1.86%		3.72%
14	0.74	2.74%	3.53%		4.07%
15	0.68	3.33%	4.33%		4.73%
16	0.67	3.53%	5.60%		3.76%
17	0.69	4.00%	4.65%		6.23%
18	0.71	4.70%	6.07%		5.81%
19	0.62	4.92%	7.25%		6.97%
20	0.75	5.09%	5.78%		7.88%

**CNUT01**

SYSTEM INTERNAL FACILITY ID	CMI	Observed QM	New Covariate Model	Old Covariate Model	FAP Adjusted Model
<b>High QM / High CMI</b>					
1	1.20	15.15%	6.40%	10.93%	5.73%
2	1.21	16.54%	10.93%	14.21%	10.13%
3	1.25	17.02%	7.16%	13.08%	4.48%
4	1.19	17.96%	27.70%	23.98%	18.55%
5	1.15	18.00%	8.02%	15.29%	5.96%
6	1.19	19.84%	17.44%	22.91%	10.73%
7	1.17	20.73%	12.22%	15.62%	9.85%
8	1.16	20.97%	8.24%	12.87%	8.67%
9	1.17	22.86%	14.64%	21.10%	20.30%
10	1.18	22.95%	13.95%	18.13%	10.49%
11	1.22	26.56%	10.79%	20.22%	11.91%
12	1.17	27.78%	12.33%	17.05%	9.49%
13	1.27	28.57%	9.28%	26.97%	8.04%
14	1.22	28.79%	15.55%	26.48%	25.44%
15	1.28	29.94%	9.92%	21.40%	13.41%
16	1.20	30.65%	25.06%	29.22%	4.20%
17	1.36	32.94%	11.35%	26.20%	8.30%
18	1.17	33.65%	12.49%	26.14%	15.60%
19	1.18	40.35%	17.62%	48.35%	14.17%
20	1.22	47.37%	11.95%	33.34%	18.77%
<b>Low QM / Low CMI</b>					
1	0.71	0.00%	3.46%	0.50%	0.78%
2	0.67	0.00%	3.07%	0.93%	1.40%
3	0.75	0.00%	4.17%	0.91%	1.37%
4	0.73	0.00%	0.57%	0.39%	0.58%
5	0.72	0.00%	1.54%	0.28%	0.43%
6	0.68	0.00%	1.55%	0.63%	0.95%
7	0.69	0.00%	0.99%	0.46%	0.69%
8	0.71	0.00%	1.21%	0.30%	0.46%
9	0.61	0.00%	7.75%	1.13%	1.74%
10	0.65	0.00%	4.14%	0.70%	1.08%
11	0.71	0.00%	0.80%	0.61%	0.90%
12	0.73	0.00%	0.65%	0.33%	0.51%
13	0.75	0.00%	0.87%	0.53%	0.79%
14	0.58	0.00%	4.77%	0.61%	0.95%
15	0.70	0.00%	2.58%	0.36%	0.54%
16	0.74	0.00%	0.45%	0.39%	0.58%
17	0.60	0.00%	3.16%	0.44%	0.68%
18	0.75	0.00%	0.73%	0.47%	0.71%
19	0.72	0.00%	6.05%	0.98%	1.04%
20	0.71	0.00%	1.19%	0.54%	0.79%

# CPA10X

SYSTEM INTERNAL FACILITY ID	CMI	Observed QM	New Covariate Model	Old Covariate Model	FAP Adjusted Model
<b>High QM / High CMI</b>					
1	1.20	22.83%	24.95%	23.01%	9.09%
2	1.22	23.08%	20.00%	21.09%	15.49%
3	1.18	23.28%	21.77%	22.08%	16.14%
4	1.15	23.33%	29.66%	26.84%	16.70%
5	1.24	24.00%	21.88%	22.32%	10.82%
6	1.53	24.53%	18.02%	20.07%	24.45%
7	1.16	25.40%	28.83%	29.02%	25.77%
8	1.33	25.81%	24.02%	23.40%	13.09%
9	1.17	25.81%	18.78%	18.06%	8.78%
10	1.17	26.21%	28.37%	27.38%	9.78%
11	1.21	27.40%	25.84%	26.22%	16.81%
12	1.17	27.59%	25.37%	26.46%	7.07%
13	1.19	27.68%	21.37%	22.00%	13.93%
14	1.18	28.71%	26.83%	26.70%	20.64%
15	1.18	30.14%	26.87%	26.82%	13.74%
16	1.18	32.29%	31.54%	30.61%	30.97%
17	1.28	34.40%	33.22%	33.21%	26.04%
18	1.17	41.43%	42.14%	39.86%	27.59%
19	1.16	45.46%			
20	1.19	58.00%	65.14%	63.79%	49.03%
<b>Low QM / Low CMI</b>					
1	0.74	0.00%	0.48%	0.48%	1.24%
2	0.75	0.00%	0.86%	0.62%	1.17%
3	0.75	0.00%	0.57%	0.41%	0.93%
4	0.70	0.00%	0.41%	0.39%	0.85%
5	0.73	0.00%	0.50%	0.35%	0.74%
6	0.74	0.00%	0.78%	0.69%	0.64%
7	0.58	0.00%			
8	0.69	0.00%	0.31%	0.29%	0.47%
9	0.74	0.00%	0.24%	0.28%	0.28%
10	0.60	0.00%	0.59%	0.60%	1.19%
11	0.74	0.00%	0.43%	0.44%	0.75%
12	0.74	0.00%	0.40%	0.41%	0.47%
13	0.75	0.90%	0.86%	0.84%	1.49%
14	0.72	0.97%	0.92%	0.91%	0.67%
15	0.61	1.21%	1.14%	1.59%	3.70%
16	0.70	1.30%	1.11%	1.09%	1.43%
17	0.73	1.49%	1.78%	1.65%	0.35%
18	0.73	1.55%	2.00%	2.07%	4.02%
19	0.61	1.80%	1.68%	1.51%	2.83%
20	0.69	1.89%	2.24%	2.14%	2.07%

## CPRU01

SYSTEM INTERNAL FACILITY ID	CMI	Observed QM	New Covariate Model	Old Covariate Model	FAP Adjusted Model
<b>High QM / High CMI</b>					
1	1.27	15.18%	12.85%		10.44%
2	1.20	15.29%	18.34%		9.94%
3	1.15	15.91%	13.49%		6.30%
4	1.16	15.91%	13.86%		16.33%
5	1.23	16.30%	9.85%		10.06%
6	1.20	16.39%	14.93%		12.03%
7	1.31	16.43%	8.78%		10.25%
8	1.19	16.44%	9.69%		12.24%
9	1.20	16.51%	11.38%		13.29%
10	1.19	16.88%	10.26%		6.75%
11	1.23	17.47%	11.08%		11.87%
12	1.26	18.03%	10.58%		9.48%
13	1.16	18.44%	10.94%		11.18%
14	1.17	18.48%	14.39%		16.24%
15	1.30	21.98%	21.38%		19.33%
16	1.15	22.35%	16.13%		17.09%
17	1.27	22.73%	10.04%		21.78%
18	1.15	23.61%	14.14%		17.37%
19	1.16	24.24%			20.48%
20	1.44	25.00%	17.64%		15.84%
<b>Low QM / Low CMI</b>					
1	0.68	0.00%	1.94%		1.04%
2	0.68	0.00%	1.15%		0.48%
3	0.65	0.00%	1.23%		0.46%
4	0.63	0.00%	2.28%		0.52%
5	0.75	0.00%	0.54%		0.26%
6	0.66	0.00%	0.99%		0.42%
7	0.52	0.00%	0.79%		0.18%
8	0.71	0.00%			0.88%
9	0.71	0.00%	0.97%		0.93%
10	0.71	0.00%	0.63%		0.93%
11	0.72	0.00%	1.69%		1.17%
12	0.75	1.12%	1.45%		1.03%
13	0.71	1.49%	3.85%		2.17%
14	0.71	1.72%	2.16%		1.83%
15	0.71	1.92%	3.21%		2.56%
16	0.71	2.16%	3.43%		2.69%
17	0.75	2.22%	3.17%		3.21%
18	0.70	2.27%	2.96%		2.82%
19	0.73	2.44%	3.11%		3.39%
20	0.73	2.44%	4.19%		3.09%

# PPAI0X

SYSTEM INTERNAL FACILITY ID	CMI	Observed QM	New Covariate Model	Old Covariate Model	FAP Adjusted Model
<b>High QM / High CMI</b>					
1	1.35	45.71%	52.67%		42.27%
2	1.60	45.95%	58.29%		30.63%
3	1.37	46.67%	53.39%		59.32%
4	1.36	48.28%	37.12%		47.80%
5	1.43	48.84%	59.38%		20.11%
6	1.38	49.09%	39.87%		24.01%
7	1.37	50.00%			19.74%
8	1.39	50.00%	50.64%		33.82%
9	1.36	52.38%			33.19%
10	1.36	52.83%	45.78%		20.75%
11	1.51	52.94%	58.33%		28.56%
12	1.42	53.85%	46.28%		18.94%
13	1.35	55.56%	59.99%		30.01%
14	1.35	56.00%			38.84%
15	1.46	58.33%	60.82%		33.03%
16	1.35	60.66%	53.51%		26.83%
17	1.44	60.87%	62.61%		32.07%
18	1.36	61.91%			39.22%
19	1.36	68.18%	69.87%		48.64%
20	1.41	77.27%	83.45%		41.25%
<b>Low QM / Low CMI</b>					
1	1.06	0.00%	1.14%		1.89%
2	0.80	0.00%	1.07%		3.42%
3	1.13	0.00%			3.96%
4	1.08	0.00%			2.92%
5	1.07	0.00%	0.56%		0.96%
6	1.13	0.00%	1.34%		2.38%
7	1.07	0.00%	1.55%		3.78%
8	1.10	2.50%	2.88%		8.90%
9	1.06	3.03%			6.53%
10	1.06	3.45%	3.19%		4.09%
11	1.11	3.64%	4.94%		9.49%
12	1.03	3.70%	6.60%		6.72%
13	1.09	4.35%	4.44%		8.86%
14	1.12	4.44%	3.50%		3.91%
15	1.08	4.76%	5.70%		6.36%
16	1.12	4.76%	3.93%		6.81%
17	1.12	5.56%	5.24%		11.40%
18	1.10	7.32%	10.12%		22.79%
19	0.94	7.41%	11.54%		16.04%
20	1.10	7.84%	5.65%		18.93%



PWAL0X

SYSTEM INTERNAL FACILITY ID	CMI	Observed QM	New Covariate Model	Old Covariate Model	FAP Adjusted Model
<b>High QM / High CMI</b>					
1	1.39	50.00%	58.86%		60.75%
2	1.46	51.11%	66.72%		61.42%
3	1.45	51.49%	56.46%		55.96%
4	1.35	51.52%	57.99%		62.97%
5	1.36	51.54%	52.93%		50.67%
6	1.36	51.72%	56.48%		65.35%
7	1.40	51.85%	49.45%		52.41%
8	1.44	52.38%	57.03%		48.33%
9	1.35	52.54%	53.88%		58.97%
10	1.38	54.17%	63.09%		59.07%
11	1.35	54.17%	62.06%		55.66%
12	1.40	54.17%	56.20%		53.92%
13	1.57	54.55%	61.71%		63.23%
14	1.43	55.00%	64.65%		66.20%
15	1.51	55.07%	60.96%		60.13%
16	1.35	58.70%	63.05%		65.79%
17	1.41	58.97%	66.25%		54.76%
18	1.42	65.00%	69.86%		69.56%
19	1.70	69.05%	78.62%		66.30%
20	1.35	71.88%	71.57%		69.53%
<b>Low QM / Low CMI</b>					
1	1.13	0.00%	1.07%		1.84%
2	1.05	4.35%	3.52%		3.52%
3	1.02	5.00%	6.53%		3.44%
4	1.13	6.38%	6.12%		9.07%
5	1.10	8.00%	7.52%		8.86%
6	1.12	8.33%	9.23%		7.89%
7	1.12	8.48%	8.94%		7.71%
8	1.10	8.70%	9.14%		13.01%
9	1.10	8.70%	7.49%		7.32%
10	1.12	8.82%	9.03%		10.90%
11	1.13	9.09%	9.15%		6.30%
12	1.10	9.52%	7.62%		6.53%
13	1.12	10.00%	9.49%		17.89%
14	1.12	10.00%	8.82%		7.34%
15	1.12	11.11%	8.01%		7.06%
16	1.10	11.43%	13.21%		15.49%
17	1.11	11.43%	10.90%		16.08%
18	1.09	11.43%	10.65%		8.57%
19	1.12	11.54%	13.37%		16.12%
20	1.08	12.25%	10.27%		7.87%

# Attachment 12

## Distribution of QMs: Percent Moving from Deciles 1 and 10 with New Covariate Adjustment

QM	% of all facilities: dec. 1 to 2-5	QM	% of all facilities: dec. 10 to 5-9	QM	low CMI % of dec. 1 movers	QM	high CMI % of dec.10 movers
CBEH04	0.60	CWAL0X	1.01	CDRG02	0.00	PWAL0X	0.00
CCOM01	0.63	PADL0X	1.13	PWAL0X	1.47	CDRG01	1.25
CPRU04	0.74	CCOM01	1.19	CWAL0X	2.20	CFAL01	1.27
CBEH02	0.91	CSOC02	1.24	PRSP0X	4.00	CDRG03	2.15
CFAL01	1.05	CBEH04	1.25	CFAL01	5.71	CWAL0X	2.83
CMOB01	1.05	CBEH02	1.31	PPAI0X	5.97	CBEH02	3.07
CDRG02	1.15	CDRG02	1.41	CPRU02	6.82	CBEH01	3.18
CPAI0X	1.18	CPAI0X	1.49	CDRG03	7.46	PPAI0X	3.73
CCAT02	1.26	CMOB01	1.52	CDRG01	8.39	CBEH04	4.00
CCNT03	1.27	CBEH01	1.59	CCNT05	8.66	PRSP0X	5.42
CDRG03	1.27	CBEH03	1.62	CBEH01	10.01	CCOM01	6.79
PADL0X	1.28	CCNT03	1.91	CBEH03	12.52	CPAI0X	8.70
CADL03	1.28	PWAL0X	2.13	CPAI0X	14.02	CSOC02	8.82
CWAL0X	1.30	CBMI0X	2.15	CBEH02	14.12	CDRG02	9.08
CBEH01	1.30	PPAI0X	2.33	CPRU03	15.47	CBMI0X	9.46
PWAL0X	1.47	CFAL01	2.37	CSOC02	15.53	CPRU03	9.63
CWGT01	1.48	CADL03	2.37	PADL0X	17.65	CWGT01	10.40
Median	1.49		2.39		18.80		10.59
CINF0X	1.49	CDRG03	2.40	CBMI0X	19.95	CBEH03	10.78
CBMI0X	1.51	CINF0X	2.43	CADL03	19.99	CMOB01	13.81
CCNT02	1.63	CPRU03	2.50	CCOM01	20.00	CCNT02	14.61
PPAI0X	1.82	CPRU04	2.59	CBEH04	20.24	CCNT03	18.26
CPRU02	1.84	CWGT01	2.76	CWGT01	21.08	PPRU0X	19.36
PRSP0X	1.88	PRSP0X	2.97	CMOB01	24.00	CCNT01	19.51
CDRG01	1.94	CCNT02	3.05	PPRU0X	24.04	CCNT06	21.70
CPRU01	2.22	CDRG01	3.11	PCNT0X	27.70	CPRU02	21.76
CBEH03	2.79	CPRU02	3.17	CCAT02	27.75	PADL0X	23.81
PPRU0X	3.05	CCAT02	3.79	CCNT01	29.77	PCNT0X	26.82
CSOC02	3.57	PCNT0X	4.15	CINF0X	30.62	CNUT01	27.53
CCNT06	3.57	CCNT01	4.36	CCNT06	31.29	CCNT05	27.58
CCNT01	4.06	CPRU01	4.46	CPRU01	31.55	CINF0X	28.31
CNUT01	4.21	CCNT06	4.50	CCNT03	34.25	CPRU01	29.15
PCNT0X	4.33	PPRU0X	4.66	CCNT02	35.83	CADL03	30.43
CCNT05	5.07	CNUT01	5.78	CNUT01	35.88	CCAT02	32.12
CPRU03	7.37	CCNT05	5.79	CPRU04	53.40	CPRU04	35.28

**Attachment 13**  
**Proximity to Death, a Modeling Tool for Use in Nursing Homes**

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## Abstract

**Background.** While there has been an increase in the proportion of elders who die in U.S. nursing homes, there has been no systematic attempt by facilities to model who is at risk of death and then use this classification to target program initiatives towards these residents. Since 1990, all US nursing homes that participate in the Medicare and Medicaid programs have been mandated to complete an ongoing standardized, comprehensive assessment of each resident's clinical, diagnostic, functional, medical, psychosocial, and cognitive status. The assessment system is called the Minimum Data Set (MDS), and this item base contains the raw elements upon which a proximity to death model could be based. In this paper, we first create such a model (the MDS-Personal Severity Index or PSI), drawing on a diverse array of elements that have been shown to become more prevalent as death is approached, and we then use this information to suggest how this model may identify residents with discrete clinical problems, looking specifically at nutrition and skin status. And, finally, we put forward a recommendation concerning how to use this model to assign residents into a palliative-care follow-up cohort.

**Methods.** Information was drawn from two data sets. The utility of the MDS items as proximity to death markers was established using a series of consecutive assessment batteries from 2,400 residents at a large long-term care facility (HRCA). The applicability of the proximity to death model was established in a replication sample for facilities across three states: Massachusetts, New York, and Ohio (n=196,289). Analyses examined the relationship of putative risk factors and risk of death over a discrete six-month period of observation using logistic regression.

**Results.** Twelve percent (12.1%) of the HRCA residents died within six months, and 15% of the Massachusetts residents died within six months. An additive scale composed of items predictive of death in the HRCA sample -- the PSI scale -- has a monotonic relationship with proximity to death, with the probability of dying increasing in a stepped function as the count of risk factors rises. A high-risk cut off on the full scale was established at a count of nine or more of the 25 problems in the PSI; 15.4% of the residents in nursing homes from Massachusetts, New York, and Ohio fall into this high-risk category, and over six months they have a 35.7% death rate, as compared to the 13.5% death rate for the total three-

state nursing home sample. In the comparison of resident PSI score levels to the presence of nutrition and skin problems, there was a steep increase in problem rates for those in the high-risk PSI group.

**Conclusion.** The PSI should prove to be a useful tool for nursing facilities interested in assessing resident proximity to death, with the goal of moving from a usual program of care to a more palliative focused program of care. The index references a broad spectrum of individual risk factors, including age, ADL dependency, cognitive performance, mood status, and clinical complications such as incontinence, malnutrition, respiratory distress, skin problems. The tool may be useful in identifying residents at higher than average risk of death for whom advanced care planning might be instituted in order to avoid the introduction of unnecessary interventions.

## **Proximity to Death Model, a Modeling Tool for Use in Nursing Homes**

### **INTRODUCTION**

Approximately one in five of all deaths occur in nursing homes (1) and this rate has been rising over the past few years. At the same time, the care responsibilities of these facilities have become increasingly diverse. In addition to their traditional role as a provider of long-stay care for cognitively and physically impaired residents, nursing homes now serve as a major site of post-hospital rehabilitative and acute care management, specialty mental health care, pediatric care, and hospice care. In this new environment, as roles become more complex, these facilities require new tools to assist staff in carrying out these various functions. From an end-of-life perspective, facilities need a “ruler” that can help them flag residents who might be candidates for a palliative, symptom management care program. Under current Centers for Medicare and Medicaid Services (CMS) rules, all of these residents are subject to the standard MDS assessment and care management guidelines, but there has been little effort by the industry and the regulatory community to focus attention on this segment of the resident population.

Under CMS guidelines, nursing facilities must complete ongoing, standardized assessments on each resident and must use this information to address resident needs. The assessment system is known as the MDS, and since 1990, pursuant to a 1987 Congressional mandate, all U.S. nursing homes complete this assessment of each resident's clinical, diagnostic, functional, medical, psychosocial, and cognitive status (2-4). Assessments are required at admission (the Full assessment), at 90-day intervals throughout the year (the shortened Quarterly assessments), at the time of the annual anniversary of the admission (a Full), and on significant change in the resident's status. Trained clinical professionals (e.g., nurses, social workers, therapists) assess resident performance over all shifts during the prior seven-day period. Each item has its own explicit definition. Each assessor is told to interact with the resident, review the record, and gather information on resident performance from direct care and licensed professional staff.

This comprehensive information set includes a wide variety of items that are relevant to residents near the end of life, and there has been some progress in identifying MDS items that are predictive of the resident's terminal status (5). The most powerful predictor in the MDS is the item “End-stage disease, 6 or fewer months to live,” but as Finne-Soveri has noted, this item is checked for fewer than 1% of residents for any round of MDS assessments (26). It is difficult to make the explicit call as to when someone will

die. Simple yes/no designations on projected length of life, whether for six, three or even two months are fraught with uncertainty, and even the most experienced physicians are reluctant to make such a definitive call for their patients.

The goal of the work described in this paper is to bring together a reasonably comprehensive subset of relevant MDS items for inclusion in a proximity to death summary scale, the MDS Personal Severity Index (MDS-PSI). In addition, we wished to identify a threshold index value on the PSI at which facilities, or CMS under their MDS mandate, may consider moving the resident from the standard array of resident care protocols to a more focused set of palliative-care service protocols. Finally, using this index-value classification, we provide descriptive information relative to two of the most common problem syndromes as death is approached: nutrition and skin.

In constructing the PSI, we had to first assemble a balanced list of individual predictor variables, focusing on measures that others have shown to be associated with proximity to death. Prior research has found the following important in predicting mortality:

- ? Age and gender (5-11)
- ? Functional performance measures include ADLs, cognitive impairment, and general confusion (5-19).
- ? Clinical measures such as pressure ulcers (7), infections (8), incontinence (20), constipation (18), respiratory impairment or shortness of breath (5,6,21), low Body Mass Index or malnutrition (5,7,8,18,21,22,23), weight loss (10,19,21), and swallowing problem (5,19,21).
- ? Diagnostic conditions, including cardiac impairments (5-9,14), neurological impairment (6), diabetes (7), and cancer (14,17).

We are fortunate that most all of these items are in the MDS and available for modeling here.

## **METHODS**

In developing the MDS-PSI, we selected, *apriori*, a set of items likely to have an increasing prevalence as death was approached, drawing on measures that others have shown to be related to proximity to death (5,10). These were first tested in secondary analysis using data from a single long-term care facility that included documented dates of death; and then these relationships were replicated in a larger cross-facility data set from a single state. We recognized that for many of these items there would be considerable collinearity, and thus not all items were expected to be appropriate candidates for inclusion within

the final PSI risk index, even if they were individually predictive of mortality. In the following we describe our methods to develop the PSI.

**MDS Items Related to Proximity to Death.** Only one direct measure of possible proximity to death is included in the MDS: the end-stage judgement item. When present, this item has been shown to be an excellent predictor of subsequent length of life (16).

All other available items are more indirect, capturing functional, behavioral, clinical, and other factors that have been shown to have an associative relationship with proximity to death. Items were considered in six domains: demographics, functional measures, disease diagnoses, mood indicators, clinical complications, services utilization. Demographics included age and gender. In the domain of functional performance, we were interested in measures that could capture the cascade of losses as death is approached. We considered dependency in ADL, including ADLs that would be the first to be lost, such as personal hygiene and dressing, and those last to be lost, including bed mobility and eating. Other functional measures reviewed included cognition, communication skills, and balance. For these functional measures, we focused on aspects of performance that reflected the greatest level of dependency. In considering mood, we concentrated on items that reflected a sense of hopelessness, anxiety, and fear; while for diagnoses, we looked at neurological disease, cardiac deficiencies, cancer, diabetes, and anemia. The domain of clinical problems and conditions was the largest and the most diverse. We included indicators of delirium, pain, respiratory distress, infections, skin breakdown, malnutrition, and incontinence. Finally, we considered whether the resident was deemed to be terminally ill or unstable, what services were being received, and the resident's gender, and age.

These individual items are all derived from the MDS, and when scored by trained nurses following the CMS recommended process for completing the MDS assessments (8), these items have excellent reliability (24,25).

**Data.** The first of the two data sets used for these analyses tracks residents at the Hebrew Rehabilitation Center for Aged (HRCA) in Boston, merged with precise information on the date of death for all decedents. The HRCA is a 720-bed long-term care facility, specializing in the provision of life-care institutional services. The primary analytic file derived from this setting consists of the accumulated assessments for HRCA residents over an eight-year period (1994 - 2001), in which each quarterly and full assessment generates a new case record. Post-assessment death status is then precisely measured, with the



six-month status measure serving as the criterion variable in the bi-variate and logistic modeling effort -- with 12.5% of residents dying by this date. Using this discrete time survival analysis sample accumulation strategy, the analytic file includes 23,132 case records for 2,400 different residents during this period.

Our initial modeling efforts were then replicated in a sample derived from across all nursing homes in three states: Massachusetts, New York, and Ohio. This data set was limited to Medicaid and private pay residents who had been in residency a minimum of three months,  $N = 196,289$ , and over the ensuing six months 13.5% of these residents died.

**Analytic Strategy.** In developing the MDS Personal Severity Index (PSI), our goal was to create an index that had elements from across the widest possible array of risk factors found in the MDS. All of these variables were modeled against whether the resident died within six-months following the MDS assessment, and representative measures from each area were then summarized in the MDS-PSI. This was a four-step process. First, the items were identified in the data set. Second, bi-variate odds ratios were calculated for the six-month death status measure within the HRCA data set. Third, the significant items from the prior step were evaluated within a forward-stepping logistic model using the HRCA data set, conditioned on the requirement that the final model contain at least one item from each of the primary risk domains (e.g., delirium, ADL status, cognition). Fourth, these analyses were replicated in the combined Massachusetts, New York, and Ohio data set, and the tabular results presented in this paper are drawn from these analyses.

Two variants of the risk model were created: one using all of the available items in the full MDS assessment; the second limited to items on the shorter MDS quarterly assessment. Once created, we related these two variants of the MDS-PSI to resident death at 3, 6, and 12 months.

Finally, using the assignments of individuals in the Massachusetts, New York, and Ohio combined sample into high and low MDS-PSI status, we also provide descriptive information for two problem syndromes that become more prevalent as death is approached: nutrition and skin.

## RESULTS

**Distributions and Relationships among MDS Items and Six-Month Death Status .** For the full cohort of HRCA residents from 1994-2001, the unadjusted probability of death doubled over each succeeding three-month period. At three months 6.4% of residents had died; this percentage increased to

12.5% at six months and 23.4% at one year. For, the combined Massachusetts, New York, and Ohio cohort, the results were about the same, 7.4% through three months, 13.5% through 6 months, and 23.2% through 12 months.

The preliminary bi-variate analyses presented in Table 1 describe how each of the domains of MDS-based risk measures relate to death status at six months within the HRCA sample. These findings provide a first indication as to whether the hypothesized risk characteristics play a role in identifying residents who can be expected to die in the more immediate future.

#### TABLE 1 ABOUT HERE

In general, the findings suggest that a wide variety of risk factors have an associative relationship with death by six months. The perspective gained from these bivariate analyses is one of universal system decline, originating in diverse disease, with diverse clinical manifestations.

The second stage, logistic analyses, as summarized in Table 2 for the Massachusetts, New York, and Ohio cohort replication sample, examined each of the significant individual risk items to determine how the six-month death status measure could be replicated from these inputs. Several different analyses were initially completed on the HRCA sample. We first evaluated the items within domains, completing a domain-specific forward-stepping logistic model, and then selected the best candidates from each domain to enter the final model. Using these items, the final logistic model was established at HRCA.

#### TABLE 2 ABOUT HERE

Table 2 includes information from the Massachusetts, New York, and Ohio combined replication cohort on how each item is scored, its distribution in the three-state sample, the bi-variate odds-ratio for the item (all of which are significant), and the multivariate odds ratios for the items when entered into the two summary models (in this case, with indications as to which items are non-significant when entered into the summary equation).

In the HRCA data set, eighteen items were found useful to form the Quarterly model: Age, cognition, communication, delirium, four ADLs, two mood items, and eight clinical complications. In the replication sample, seventeen of these items enter significantly, including age, cognitive decision making, delirium, all four ADLs, the two mood-status items, and all eight clinical complications. The only measure that entered non-significantly was ability to understand. But, as indicated earlier, as our goal was to insure that each of the key concepts was represented in the summary PSI model, and because this item was

significantly related to six-month death status in the appropriate direction, the item will be retained in the summary Quarterly PSI model [note, in the HRCA sample, all of these items had made a significant independent contribution to the logistic model].

These results suggest that death is more imminent for those who have the following accumulating series of risk factors: they are older, more functionally restricted, more cognitively impaired, are experiencing delirium, sense that something terrible is going to happen to them, have experienced a recent acute episode, are unstable, are bowel incontinent, have lost weight, have a pressure ulcer, have a stasis ulcer, and are judged to have an end-stage disease.

In the Full logistic model, we forced all of the items from the Quarterly model, and stepped in an additional seven items from those selected in the HRCA bivariate analysis. In the final Full model, *none* of the previously significant Quarterly items became non-significant, while the ability to understand item remained non-significant. Added to the model are items that indicate that death is more imminent when the following risk conditions are present: inability to lie flat due to shortness of breath, receipt of oxygen therapy, a problem in swallowing, not being awake in the afternoon, having a skin tear or cut, having a cardiac dysrhythmia or congestive heart failure.

#### **Developing the MDS-PSI and Measuring its Relation to Death Status at 3, 6, and 12 Months .**

The purpose of this effort was to develop simple, yet clinically meaningful tools to indicate residents who have a complex array of conditions that place them at an elevated risk of death, although recognizing that the predictions would be rather inexact, and many of the high-risk residents would not die over the ensuing follow-up periods. We thus used the variables identified in our logistic regressions to form simple, additive “counting” scales – our MDS-PSI. Thus, each scale is a count of the number of the risk factors identified in Table 2, with each item condition present adding an equal value of one (1) to the final summary score. For the Quarterly PSI, the scale range is from 0 to 18. In our combine Massachusetts, New York, and Ohio replication sample, the mean value was 3.66 with a standard deviation of 2.89. Only 15.6% of residents had none of these risk factors, and 15.8 had one risk factor (Table 3). Of all of the conditions, residents with one risk factor were most likely to be 90 years of age or older (32%) or to be judged as having conditions or diseases that make them unstable (18%) or to be bowel incontinent (12%). At the other end of the continuum, using a count of five or more as being indicative of residents in the most complex subset, 38.2% of residents had five or more of these characteristics.

### TABLE 3 ABOUT HERE

For the Full PSI, the distributional properties are similar: 9.3% have none of the risk factors and 15.2% of the residents have nine or more of these characteristics. The mean value was 4.69, with a standard deviation of 3.39.

For each of the death periods, 3, 6, and 12, months, there is a monotonic relationship between risk classification and death status -- the probability of dying increases in a stepped function as the count of risk factors rises (Table 3). This applies to deaths at each of the three follow-up points, as well as to persons who are alive at a given follow-up point and who are then tracked forward for an additional period of time.

**Developing Thresholds for the MDS-PSI.** While measuring proximity to death has its origin in a number of different functional and clinical complications, it has not been our goal to focus on these specific items. In fact, for the Full PSI, when fewer than five of these risk factors are present, the rate of death in the ensuing period is actually lower than that of the average rate for the entire cohort. For the Full PSI, we would select a cut-point along the continuum of risk where the residents in the “swing” category have a death rate that is significantly higher than the rate of the average person in the cohort. For this purpose we concentrated on the category in which the death rate for the residents was at least 75% higher than the average death rate for the entire cohort. Thus, the rates of death through 3, 6 and 12 months would be approximately 13%, 24%, and 41%, respectively. Using this criterion, the palliative cut-point for the Full PSI is at 9; i.e., a score of 9 or higher would suggest that the resident should be considered for palliative care. This translates into an assignment of 15.4% of the cases to the palliative review subgroup. The death rates for persons with a score of 9 or higher over 3, 6, and 12 months, are 24.6%, 35.7%, and 49.5%, respectively. From a clinical perspective, once this level of risk was achieved, staff would be asked to consider whether the resident should continue under the traditional program of care or be moved onto a more focused palliative program of care. For the Quarterly PSI, the cut-point would be at 8, and this translates into an assignment of 11.5% of the cases to the palliative review subgroup and death rates over 3, 6, and 12 months of 20.4%, 31.2%, and 44.7%, respectively.

We also established cut-points for two sub-scales that can be derived from the PSI item pool: the PSI-Functional sub-scale (i.e., the items measuring decision making, personal hygiene, transfer, locomotion, and eating); and all other PSI items, i.e., the PSI-Clinical sub-scale (with separate subsets for the Quar-

terly and the Full PSI). Using the above criterion for establishing the cut point, the palliative threshold for the PSI-Functional sub-scale is 5; i.e., a score of 5 suggests that the resident should be considered for palliative care. This translates into an assignment of 15.9% of the cases to the palliative review subgroup, with these residents having a 6-month death rate of 22.2%. This is higher than the rate for the total cohort, but lower than the rates previously shown for the high-risk groups defined for the Full and Quarterly PSIs.

For the two PSI-Clinical sub-scales, a score of 4 or higher applies for the clinical sum calculated for the items on the Quarterly PSI, while a score of 5 or higher applies when the clinical items are derived from the Full PSI. For the Quarterly version of the PSI-Clinical sub group, this translates into an assignment of 10.0% of residents to the palliative review subgroup, and these residents have a 6-month death rate of 34.8%. For the Full version of the PSI-Clinical sub group, this translates into an assignment of 9.7% of residents to the palliative review subgroup, and these residents have a 6 month death rate of 37.0%.

The cross-walk between the PSI-Functional and PSI-Clinical sub-scales shows that while each plays a role in explaining resident proximity to death, the Clinical subset is the more important predictor. For persons who are not at risk on either sub-scale, 10.2% died in six months. For those classified to be at risk based on the Functional sub-scale, but not found to be at risk on the Clinical sub-scale, the 6-month death rate rose by 7%, to 17.4%; while for those residents who were at risk on only the Clinical sub-scale, the six-month death rate rose at three- times this rate, or to a 32.8% death rate by month 6. Finally, for resident's who were at risk on both the Functional and Clinical PSI sub-scales, 38.3% died by 6-months.

**Relation of PSI Risk-Group Assignment to two problem syndromes that become more prevalent as death is approached: nutrition and skin.** Table 4 presents findings for the Full PSI (the findings for the Quarterly PSI would be about the same), and in each area the high-risk PSI sub-group presents with a significant problem profile, and there are indications that the facilities have begun to respond to these needs. More specifically,

- ? 30% of the residents in the high-risk group have lost 5% or more of their weight in the last 30 days.
- ? 53% have a swallowing problem
- ? 44% have a chewing problem
- ? 47% left 25% or more of their food uneaten at most meals.

- ? In response to these nutritional challenges, facilities have mustered a variety of responsive care strategies.
- ? 62% of high-risk residents are on a mechanically altered, soft-food diet
- ? 41% are being monitored for the intake and output of fluids
- ? 28% are being fed through a tube
- ? 35% of the high-risk residents have a pressure ulcer. 15% have a skin tear and 21% have a bruise. In response to these emerging skin problems,
- ? 58% of high-risk residents have a pressure relieving device for their chair and 74% have such a device for their bed
- ? 77% of high-risk residents are on a turning/positioning program

TABLE 4 ABOUT HERE

## DISCUSSION

The PSI presents a complex view of resident status. It incorporates factors that are most relevant to residents at the end of life. The functional measures reflect situations of high dependency, where extensive weight bearing or total support is provided. The clinical measures in the model have a high probability of increasing presence as death is approached: respiratory distress, weight loss, bowel incontinence, pressure ulcers, stasis ulcers, and nutritional status. Mood status is represented by measures that capture repetitive calling out and recurrent statements that something terrible is going to happen. Other measures in the model indicate that the nurse assessor believes the resident is approaching death, is experiencing delirium, has recently declined, and is unstable.

When the PSI is cut into high- and low-risk subgroups, for example, using the thresholds provided earlier, a distinct palliative course is suggested for those in the high-risk group. As would be expected, these residents have declined functionally and cognitively, and they present with a discrete array of emerging clinical complications in areas such as nutrition and skin. They have experienced weight loss, and thus have major nutritional issues. Skin problems are much more common, as is the use of devices such as feeding tubes, and there will clearly be a need to balance issues of problem management with concerns for quality of life.

While these findings suggest that the PSI will have potential relevance in a number of clinical and research applications, and our findings rest on data from across a three-state nursing home cohort, for any wider scale use, we must be able to assume that the facility MDS data are accurate. The issue of data accuracy is crucial, and there have been both positive and more questioning reports in this regard. There is little doubt that when facilities follow the standard MDS assessment protocol instructions, accurate data can be expected (24). The only question has been whether large numbers of facilities follow such a course. And, in this regard, the most recent findings are encouraging. Only about 5% of facility homes are likely to have seriously compromised MDS data. In this situation, item reliabilities will mimic those that we have seen in other more research-based MDS work, and the PSI's can be relied upon.

Making a diagnosis of who is near death is difficult, and this new, easily applied tool will advance the ability of nursing homes to move more aggressively into the palliative care arena. In this regard, our analyses of how nutritional and skin problem measures relate to the PSI is instructive. Patients in the higher-risk PSI group are likely to have poor nutritional status and a variety of skin problems.

## LITERATURE

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**Table 1: Bivariate Relationship Between Individual Risk Factors and Death at 6 Months**

<b>Risk Domain</b>	<b>Number of MDS Elements Tested from the Domain</b>	<b>Number of Elements That Were Significantly Related to 6-Month Death Status</b>
<b>Demographic Measures</b>		
Age	1	1
Gender	1	1
<b>Functional Measures</b>		
ADL Performance	8	8
Balance and Falls	3	3
Cognition and Communication	5	5
<b>Diagnoses</b>		
End-Stage Judgement	1	1
Neurological	13	4
Heart and Circulatory	8	4
Cancer	1	1
Diabetes	1	0
Anemia	1	1
<b>Mood</b>		
Hopelessness	3	2
Anxiety, Fear	8	3
<b>Clinical Complications</b>		
Delirium	6	6
Nutritional Status	12	10
Shortness of Breath	3	3
Skin	9	6
Pain	2	0
Bladder and Bowel Incontinence	2	2
Constipation	1	1
Time Awake	3	3
Infection	9	3

Hallucination or Delusion	2	1
Unstable, Deteriorating	3	3
<b>Services</b>	20	14

**Table 2: MDS Predictive of Death Items in the Personal Severity Index (PSI) – For the combined Massachusetts, New York, and Ohio Sample (N=196,289)**

<i><b>VARIABLE NAME</b></i>	<i><b>MDS Defining Code</b></i>	<i><b>Percent of Sample With Condi- tion</b></i>	<i><b>Univariate Odds Ratio of Item With Di- chotomy of Died/Not Died in 6 Months [All Sig.]</b></i>	<i><b>For Quarterly MDS Items -- Multivariate Odds Ratio of Items With Di- chotomy of Died/Not Died in 6 Months (n=194,155) [ns=not sign]</b></i>	<i><b>For Full MDS Items -- Multi- variate Odds Ratio of Items With Dichotomy of Died/Not Died in 6 Months (n=89,171) [ns=not sign]</b></i>
<b>ITEMS ON FULL AND QUARTERLY<sup>1</sup></b>					
Age -- 90 or older	A3_year minus AA3_year	25.9	1.67	1.68	1.55
Cognitive Decision Making -- Se- verely impaired	B4 = 3	24.6	1.79	1.06	1.10
Delirium -- Periods of lethargy	B5e = 2	1.1	4.82	1.79	1.57
Ability to Understand -- Some- times/Rarely	C6 = 2,3	32.0	1.69	1.03 ns	1.00 ns
Transfer -- Extensive, Total , Did not occur	G1bA = 3,4,8	52.1	2.37	1.11	1.07
Locomotion -- Extensive, Total, Did not occur	G1eA = 3,4,8	47.1	2.66	1.46	1.31
Eating -- Extensive, Total, Did not occur	G1hA = 3,4,8	30.0	2.39	1.37	1.27
Personal Hygiene -- Total, Did not occur	G1jA = 4,8	42.5	2.10	1.05	1.09
Sad Mood, Repetitive Verbalizations -- Daily	E1c = 2	3.2	1.70	1.21	1.11
Sad Mood, Something Terrible About to Happen -- Daily	E1g = 2	0.4	1.59	1.18	1.49
Acute Episode -- Yes	J5b = 1	4.7	2.28	1.48	1.13
Unstable -- Yes	J5a = 1	22.7	1.99	1.51	1.43
Change in Care Needs -- Deterio- rated	Q2 = 2	8.7	2.85	1.61	1.46
End Stage Disease -- Yes	J5c = 1	1.0	9.67	5.16	4.56
Bowel -- Occasional, Frequent, In- continent	H1a = 2,3,4	51.4	2.04	1.16	1.20
Weight Loss -- Yes	K3a = 1	9.0	2.97	1.87	1.75
Pressure Ulcer -- Stages 1 thru 4	M2a = 1,2,3,4	9.2	2.86	1.70	1.58
Stasis Ulcers -- Yes	M2b = 1,2,3,4	1.5	2.29	1.92	1.81
<b>ITEMS ON FULL, BUT NOT ON QUARTERLY</b>					
Inability to Lie Flat Due to Shortness of Breath -- Yes	J1b = 1	3.2	3.15		1.36
Oxygen Therapy -- Yes	P1g = 1	7.6	3.51		1.90

Problem Swallowing -- Yes	K1b = 1	16.7	2.41		1.39
Time Awake Afternoon -- Yes	N1b = 0	16.3	2.09		1.31
Cardiac Dysrhythmias – Yes	I1e = 1	13.2	1.57		1.26
Congestive Heart Failure – Yes	I1f = 1	21.6	1.75		1.43
Skin Tears or Cuts – Yes	M4f = 1	5.6	2.59		1.65

**Table 3: Near Death Distribution Across the Personal Severity Index (PSI) -for the combined Massachusetts, New York, and Ohio Sample**

<b>SCALE SCORE</b>	<b>Quarterly Model – Percent in Each Category</b>	<b>Quarter - Percent in Each Category Who Died in Three Months</b>	<b>Quarter– Percent in Each Category Who Died in Six Months</b>	<b>Quarter - Percent in Each Category Who Died in Twelve Months</b>	<b>Full Model -- Percent in Each Category</b>	<b>Full - Percent in Each Category Who Died in Three Months</b>	<b>Full - Percent in Each Category Who Died In Six Months<sup>i</sup></b>	<b>Full - Percent in Each Category Who Died in Six Twelve Months</b>
0	15.6	1.9	4.4	9.5	9.3	1.4	2.9	6.3
1	15.8	3.2	7.3	14.6	12.0	2.2	5.1	10.8
2	11.7	4.6	9.5	18.4	11.5	3.7	7.7	14.9
3	9.7	5.3	11.4	20.9	10.4	4.7	9.7	18.6
4	9.0	6.6	13.2	23.4	9.3	5.7	11.7	21.2
5	8.4	8.2	15.3	26.6	8.5	7.7	14.0	24.3
6	7.8	10.0	18.3	30.2	7.9	9.1	16.7	28.4
7	10.1	10.6	18.6	29.8	8.1	10.3	18.3	29.9
8	7.0	14.6	24.7	37.8	7.8	12.1	20.9	32.8
9	3.0	22.3	33.8	48.4	6.0	16.7	26.3	39.6
10	1.2	34.3	47.2	60.1	4.0	21.1	32.1	47.0
11	0.5	44.2	55.8	68.5	2.4	27.3	40.7	55.5
12	0.2	54.8	62.7	73.8	1.4	37.6	50.4	63.7
13	0.1	67.5	76.6	80.0	0.7	46.2	58.0	71.4
14	0.0	57.9	84.2	89.5	0.4	52.3	63.4	74.0
15+	0.0				0.3	57.6	69.1	73.6
TOTAL		7.4	13.5	23.2				

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<sup>i</sup> .

**Table 4: Relationship of Personal Severity Index (PSI) for Full Model to Presence of Nutrition and Skin Problems for the combined Massachusetts, New York, and Ohio Sample** [note, all findings are significant]

Measure (QM)	PSI Risk	Group
	% Low Risk	% High Risk
<b>NUTRITIONAL MEASURES</b>		
Swallowing problem	10.1	53.1
Chewing problem	20.2	44.4
Weight loss of 5% or more in last 30 days	8.5	30.4
Leaves 25% or more of food uneaten at most meals	34.0	46.8
Dehydrated, output exceeds input	0.3	3.5
Insufficient fluid, did not consume all/almost all liquids provided during last 3 days	4.3	11.2
On a mechanically altered diet	38.6	61.7
Parenteral/IV for nutrition	0.5	3.9
Feeding Tube	4.7	28.5
Nutrition/hydration to manage skin problems	10.6	32.3
Monitoring on intake/output of fluids	16.2	41.4
<b>SKIN PROBLEMS</b>		
Skin desensitized to pain or pressure	4.2	10.2
Presence of pressure ulcer	7.2	34.7
Presence of stasis ulcer	1.5	3.1
Abrasions, bruises	9.4	20.9
Skin tears	3.9	15.0
Presence of surgical wound	4.2	7.3
Use of pressure relieving devices for chair	39.0	58.2
Use of pressure relieving devices for bed	45.8	74.0
Turning/positioning program in effect	28.6	77.2
Ulcer care	6.1	27.6
Application of dressings	9.7	30.6
Application of ointments	24.5	43.6



Other preventative or protective skin care	53.0	67.4
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<sup>1</sup> Gender could also have entered the Full PSI model, but the decision was made not to use this item.