Design for *Nursing Home Compare* Five-Star Quality Rating System:

Technical Users' Guide

July 2018

July 2018 Revisions

Beginning with the July 2018 update of the Nursing Home Compare website and the Five-Star Quality Rating System, there are additional reasons why a nursing home may receive a one-star rating for Staffing and RN Staffing. Additionally, the method of estimating the RUG-IV case-mix index, which is used in the calculation of adjusted nurse staffing and adjusted RN staffing for assigning the star ratings has changed slightly. These changes are described in the Staffing Domain section of this document.

Additional text was added to the Health Inspection Domain section to explain how the health inspection rating is being calculated for nursing homes with two or more health inspections occurring on or after November 28, 2017.

May 2018 Revisions

Additional text was added to the staffing section to provide more detail about the resident census calculation.

April 2018 Revisions

Beginning with the April 2018 update of the Nursing Home Compare website and the Five-Star Quality Rating System, the Centers for Medicare and Medicaid Services (CMS) is replacing the existing staffing measures (derived from the CMS-671 form and case-mix based on RUG-III) with staffing reported through the payroll-based journal (PBJ) system, resident census derived from MDS assessments, and case-mix based on RUG-IV.

These changes as they affect the Five-Star Quality Rating System are described in detail in the Staffing Domain section of this document.

February 2018 Revisions

On November 28, 2017 the CMS instituted a new health inspection process along with an entirely new set of "tags". Beginning in February 2018, for a period of 12 months, CMS will not use deficiencies cited on surveys conducted on or after November 28, 2017 in calculating the health inspection rating for the Nursing Home Compare Five-Star Quality Rating System, to allow sufficient survey results to accumulate from the new-process surveys. During that time, the health inspection rating will be based on results from the two most recent standard surveys prior to November 28, 2017, as well as deficiencies arising from complaint investigations during the two-year period prior to November 28, 2017.

Standard surveys and complaint surveys that occurred on or after November 28, 2017 (under the new survey process) will be displayed on the Nursing Home Compare website, but will not be utilized to calculate the health inspection rating during the twelve-month period beginning in February 2018.

These changes are described in more detail in the Health Inspection Domain section of this document.

Introduction

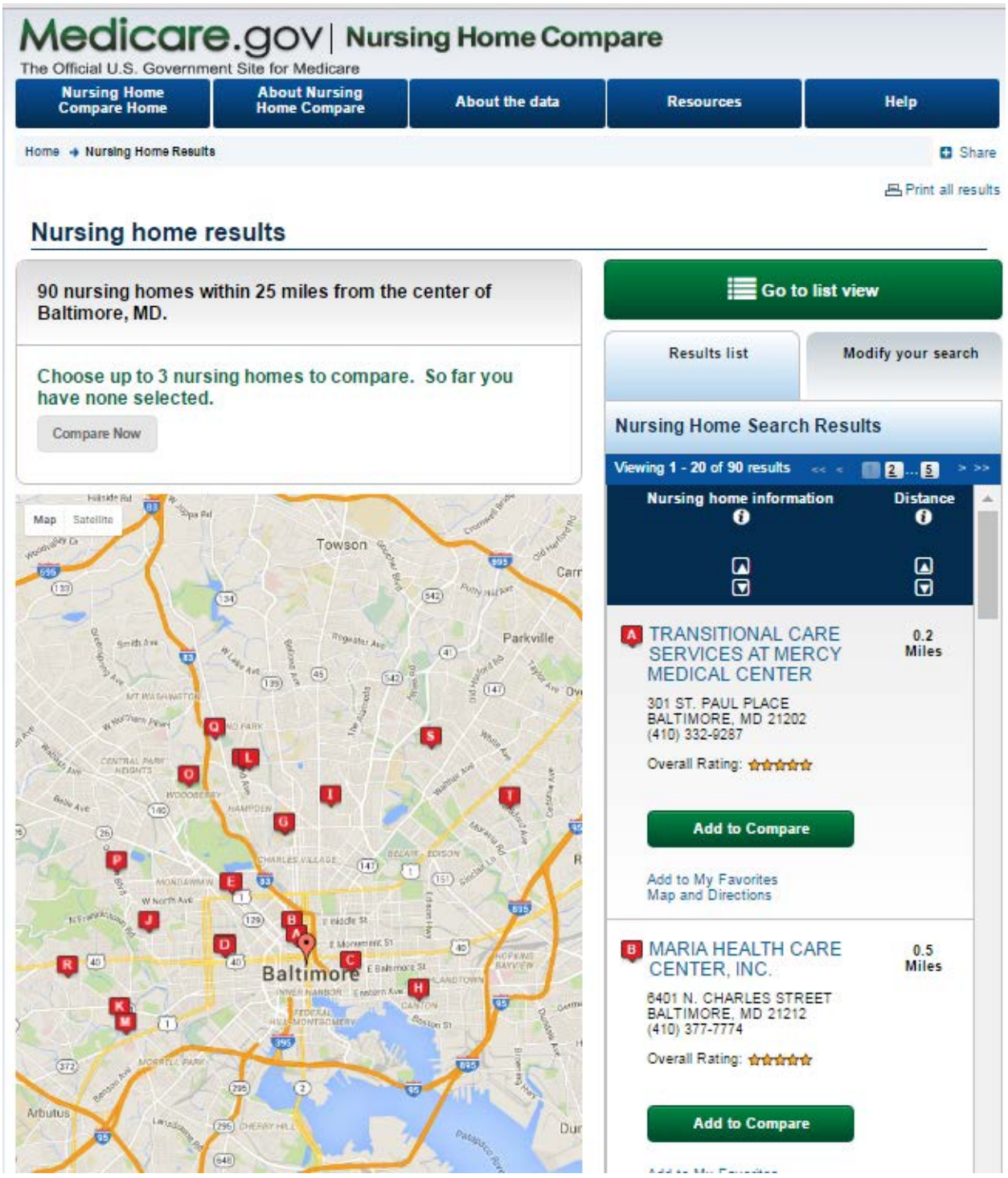
In December 2008, The Centers for Medicare & Medicaid Services (CMS) enhanced its *Nursing Home Compare* public reporting site to include a set of quality ratings for each nursing home that participates in Medicare or Medicaid. The ratings take the form of several "star" ratings for each nursing home. The primary goal of this rating system is to provide residents and their families with an easy way to understand assessment of nursing home quality, making meaningful distinctions between high and low performing nursing homes.

This document provides a comprehensive description of the design for the *Nursing Home Compare* Five-Star Quality Rating System. This design was developed by CMS with assistance from Abt Associates, invaluable advice from leading researchers in the long-term care field who comprise the Technical Expert Panel (TEP) for this project, and numerous ideas contributed by consumer and provider groups. All of these organizations and groups have continued to contribute their input as the rating system has been refined and updated to incorporate newly available data. We believe the Five-Star Quality Rating System continues to offer valuable and comprehensible information to consumers based on the best data currently available. The rating system features an Overall Quality Rating of one to five stars based on facility performance for three types of measures, each of which has its own five-star rating:

- ***Health Inspections - Measures based on outcomes from State health inspections:*** Facility ratings for the health inspection domain are based on the number, scope, and severity of deficiencies identified during the two most recent annual inspection surveys occurring prior to November 28, 2017, as well as substantiated findings from complaint investigations occurring in the 24 months prior to November 28, 2017. All deficiency findings are weighted by scope and severity. This measure also takes into account the number of revisits required to ensure that deficiencies identified during the health inspection survey have been corrected.
- ***Staffing - Measures based on nursing home staffing levels:*** Facility ratings on the staffing domain are based on two measures: 1) Registered nurse (RN) hours per resident day; and 2) total staffing (RN+ licensed practical nurse (LPN) + nurse aide hours) hours per resident per day. Other types of nursing home staff, such as clerical or housekeeping staff, are not included in the staffing rating calculation. The staffing measures are derived from data submitted each quarter through the Payroll-Based Journal System (PBJ), along with daily resident census derived from Minimum Data Set, Version 3.0 (MDS 3.0) assessments, and are case-mix adjusted based on the distribution of MDS 3.0 assessments by Resource Utilization Groups, version IV (RUG-IV group).
- ***QMs - Measures based on MDS and claims-based quality measures (QMs):*** Facility ratings for the quality measures are based on performance on 16 of the 24 QMs that are currently posted on the *Nursing Home Compare* website, and that are based on MDS 3.0 assessments as well as hospital and emergency department claims. These include nine long-stay measures and seven short-stay measures.

In recognition of the multi-dimensional nature of nursing home quality, *Nursing Home Compare* displays information on facility ratings for each of these domains alongside the overall performance rating. In addition to the overall staffing rating mentioned above, a five-star rating for RN staffing is also displayed separately on the Nursing Home Compare website, when users seek more information on the staffing component.

An example of the rating information included on *Nursing Home Compare* is shown in the figure below. Users of the website can drill down on each domain to obtain additional details on facility performance.



A companion document to this Technical Users' Guide (*Nursing Home Compare* – Five Star Quality Rating System: Technical Users' Guide – State-Level Cut Point Tables) provides the data for the state-level cut points for the star ratings included in the health inspection. The data table in the companion document will be updated monthly. Cut points for the QM and staffing ratings have been fixed and do not

vary monthly. Data tables giving the cut points for the staffing ratings are included in Tables 4 and 5 in this Technical Users' Guide. Table 7 provides the cut points for the QM ratings, and the cut points for the individual QMs are in Appendix Table A-3.

Methodology for Constructing the Ratings

Health Inspection Domain

Nursing homes that participate in the Medicare and/or Medicaid programs have an onsite recertification (standard) ("comprehensive") inspection annually *on average*, with very rarely more than fifteen months elapsing between inspections for any one particular nursing home. Inspections are unannounced and are conducted by a team of health care professionals who spend several days in the nursing home to assess whether the nursing home is in compliance with federal requirements. These inspections provide a comprehensive assessment of the nursing home, reviewing facility practice and policies in such areas as resident rights, quality of life, medication management, skin care, resident assessment, nursing home administration, environment, and kitchen/food services. The methodology for constructing the health inspection rating is based on the two most recent recertification surveys prior to November 28, 2017, complaint deficiencies during the two-year period prior to November 28, 2017, and any repeat revisits needed to verify that required corrections have brought the facility back into compliance. The Five-Star Quality Rating System uses more than 200,000 records for the health inspection domain alone.

Scoring Rules

Beginning in February 2018, CMS calculates a health inspection score based on points assigned to deficiencies identified in each active provider's two most recent recertification health inspections prior to November 28, 2017, as well as on deficiency findings from the most recent two years of complaint inspections prior to November 28, 2017.

- ***Health Inspection Results***: Points are assigned to individual health deficiencies according to their scope and severity –more serious, widespread deficiencies receive more points, with additional points assigned for substandard quality of care (see Table 1). If the status of the deficiency is "past non-compliance" and the severity is "immediate jeopardy" (i.e., J-, K- or L-level), then points associated with a G- level deficiency are assigned. Deficiencies from Life Safety surveys are not included in calculations for the Five-Star rating. Deficiencies from Federal Comparative Surveys are not reported on *Nursing Home Compare* or included in *Five Star* calculations, though the results of State Survey Agency determinations made during a Federal Oversight Survey are included.
- ***Repeat Revisits - Number of repeat revisits required to confirm that correction of deficiencies have restored compliance***: No points are assigned for the first revisit; points are assigned only for the second, third, and fourth revisits and are proportional to the health inspection score for the survey cycle (Table 2). If a provider fails to correct deficiencies by the time of the first revisit, then these additional revisit points are assigned up to 85 percent of the health inspection score for the fourth revisit. CMS' experience is that providers who fail to demonstrate restored compliance with safety and quality of care requirements during the first revisit have lower quality of care than other nursing homes. More revisits are associated with more serious quality problems.

Table 1
Health Inspection Score: Weights for Different Types of Deficiencies

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

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

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

* If the status of the deficiency is "past non-compliance" and the severity is Immediate Jeopardy, then points associated with a 'G-level" deficiency (i.e., 20 points) are assigned.

Source: Centers for Medicare & Medicaid Services

Table 2
Weights for Repeat Revisits

Revisit Number	Noncompliance Points
First	0
Second	50 percent of health inspection score
Third	70 percent of health inspection score
Fourth	85 percent of health inspection score

Note: The health inspection score includes points from deficiencies cited on the standard health inspection and complaint inspections during a given survey cycle.

CMS calculates a total health inspection score for each facility. The total score is calculated as the facility's weighted deficiency score (including any repeat revisit points). Note that a lower survey score corresponds to fewer deficiencies and revisits, and thus better performance on the health inspection domain. In calculating the total weighted score, more recent surveys are weighted more heavily than earlier surveys with the most recent period (rating cycle 1) being assigned a weighting factor of 60 percent and the previous period (rating cycle 2) having a weighting factor of 40 percent. The individual weighted scores for each cycle are then summed to create the total weighted survey score for each facility.

Complaint inspections are assigned to a time period based on the 12-month period in which the complaint survey occurred. Complaint inspections that occurred between November 28, 2016 and November 27, 2017 receive a weighting factor of 60 percent; those occurring between November 28, 2015 and November 27, 2016 have a weighting factor of 40 percent. There are some deficiencies that appear on both standard and complaint inspections. To avoid potential double-counting, deficiencies that appear on complaint inspections that are conducted within 15 days of a recertification inspection (either prior to or

after the recertification inspection) are counted only once. If the scope or severity differs between the two inspections, the highest scope-severity combination is used. Points from complaint deficiencies from a given period are added to the health inspection score before calculating revisit points, if applicable.

Facilities with only one standard health inspection prior to November 28, 2017 are considered to have insufficient data to determine a health inspection rating and are reported as "Too New to Rate" for the health inspection domain. For these facilities, no overall quality rating is assigned, and no ratings are reported for the staffing or QM domains, even if data for these domains are available.

Facilities with two or more health inspections on or after November 28, 2017

Results (dates, counts and lists of citations) from the three most recent health inspections are displayed on Nursing Home Compare, regardless of whether these surveys took place before or after November 28, 2017. For example:

- For facilities with one survey conducted *on or after* November 28, 2017, the posted results from the three most recent health inspections would include:
    - One survey conducted after November 28, 2017; and
    - two surveys conducted prior to November 28, 2018

For nursing homes that have had two surveys *on or after* November 28, 2017, the rating will still be based on the last two surveys conducted *prior* to November 28, 2017. However, since the results from the three most recent surveys are posted, the results from the oldest survey will not be displayed on the main website. For example:

- For facilities with two surveys conducted *on or after* November 28, 2017, the posted results from the three most recent health inspections would include:
    - Two surveys conducted after November 28, 2017; and
    - one survey conducted prior to November 28, 2018.

In other words, the oldest survey will still be used to calculate a facility's rating, but the results from that survey will not be displayed on the main website. Interested users can find these earlier survey results in the health inspection files that are available at https://data.medicare.gov/data/nursing-home-compare.

Rating Methodology

Health inspections are based on federal regulations, which surveyors implement using national interpretive guidance and a federally-specified survey process. Federal staff train State inspectors and oversee State performance. The federal oversight includes quality checks based on a 5% sample of the health inspections performed by States, in which Federal inspectors either accompany State inspectors or replicate the inspection within 60 days of the State and then compare results. These control systems are designed to improve consistency in the survey process. Nonetheless there remains variation among states in both inspection process and outcomes. Such variation derives from many factors, including:

- ***Survey Management:*** Variation among states in the skill sets of inspectors, supervision of inspectors, and the inspection processes;
- ***State Licensure***: State licensing laws set forth different expectations for nursing homes and affect the interaction between State enforcement and Federal enforcement (for example, a few states conduct many complaint investigations based on State licensure, and issue citations based on State licensure rather than on the Federal regulations);

- ***Medicaid Policy:*** Medicaid pays for the largest proportion of long term care in nursing homes. Nursing home eligibility rules, payment, and other policies in the State-administered Medicaid program may be associated with differences in survey outcome.

For the above reasons, CMS bases Five-Star quality ratings in the health inspection domain on the relative performance of facilities within a state. This approach helps control for variation among states. CMS determines facility ratings using these criteria:

- The top 10 percent (with the lowest health inspection weighted scores) in each state receive a health inspection rating of five stars.
- The middle 70 percent of facilities receive a rating of two, three, or four stars, with an equal number (approximately 23.33 percent) in each rating category.
- The bottom 20 percent receive a one-star rating.

Rating thresholds are re-calibrated each month so that the distribution of star ratings within states remains relatively constant over time. However, the rating for a given facility is held constant until there is a change in the weighted health inspection score for that facility, regardless of changes in the statewide distribution. While changes to health inspection scores (and thus rating changes) during the time period when surveys conducted under the new process will be rare, there are a few reasons why facilities may have a change. Items that could change the health inspection score include the following:

- If a survey occurred prior to November 28, 2017 that has not yet entered the national database, then it will result in a change to a provider's health inspection score in the month following its entry into the national database;
- A second, third, or fourth revisit occurs that is associated with a survey occurring prior to November 28, 2017;
- Resolution of Informal Dispute Resolutions (IDR) or Independent Informal Dispute Resolutions (IIDR) resulting in changes to the scope and/or severity of deficiencies for a survey that occurred prior to November 28, 2017.

In the very rare case that a state or territory has fewer than five facilities upon which to generate the cut points, the national distribution of health inspection scores is used. Cut points for the health inspection ratings can be found in the Cut Point Table in the companion document to this Technical Users' Guide: Five Star Quality Rating System State-Level Cut Point Tables available in the 'downloads' section at: https://www.cms.gov/medicare/provider-enrollment-and-certification/certificationandcomplianc/fsqrs.html.

Staffing Domain

There is considerable evidence of a relationship between nursing home staffing levels and resident outcomes. The CMS Staffing Study[1], among other research, found a clear association between nurse staffing ratios and nursing home quality of care.

The rating for staffing is based on two quarterly case-mix adjusted measures:

- Total nursing hours per resident day (RN + LPN + nurse aide hours)
- RN hours per resident day

The source for reported staffing hours is the Payroll-based Journal (PBJ) system[2]. These data are submitted quarterly and are due 45 days after the end of each reporting period. Only data submitted and accepted by the deadline are used by CMS for staffing calculations and the Five-Star Rating System. The resident census is based on a daily resident census measure that is calculated by CMS using MDS assessments.

The specific PBJ job codes that are used in the RN, LPN, and nurse aide hours calculations are:

- RN hours: Includes RN director of nursing (job code 5), registered nurses with administrative duties (job code 6), and registered nurses (job code 7).
- LPN hours: Includes licensed practical/licensed vocational nurses with administrative duties (job code 8) and licensed practical/vocational nurses (job code 9)
- Nurse aide hours: Includes certified nurse aides (job code 10), aides in training (job code 11), and medication aides/technicians (job code 12)

Note that the PBJ staffing data include both facility employees (full-time and part-time) and individuals under an organization (agency) contract or an individual contract. The PBJ staffing data do not include "private duty" nursing staff reimbursed by a resident or his/her family. Also not included are hospice staff and feeding assistants.

The daily resident census, used in the denominator of the reported nurse staffing ratios, is derived from MDS resident assessments and is calculated as follows:

1) Identify the reporting period (quarter) for which the census will be calculated (e.g., CY 2017 Q4: October 1 – December 31, 2017).
2) Extract MDS assessment data for all residents of a facility beginning one year prior to the reporting period to identify all residents that *may* reside in the facility (i.e., any resident with an MDS assessment may still reside in the facility). For example, for the CY 2017 Q4 reporting period, extract MDS data from October 1, 2016 through December 31, 2017.
3) Identify discharged residents using the following criteria:

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[1] Kramer AM, Fish R. "The Relationship Between Nurse Staffing Levels and the Quality of Nursing Home Care." Chapter 2 in Appropriateness of Minimum Nurse Staffing Ratios in Nursing Homes: Phase II Final Report. Abt Associates, Inc., Winter 2001.

[2] More detailed information about the PBJ system is available at: https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/NursingHomeQualityInits/Staffing-Data-Submission-PBJ.html

a) If a resident has an MDS Discharge assessment, use the discharge date reported on that assessment and assume that the resident no longer resides in the facility as of the date of discharge on the last assessment. If there is a subsequent admission assessment, then assume that the resident re-entered the nursing home on the entry date indicated on the admission assessment.

b) For any resident with an interval of 150 days or more with NO assessments, assume the resident no longer resides in the facility as of the 150th day from the last assessment. (This assumption is based on the requirement for facilities to complete MDS assessments on all residents at least quarterly). If no assessment is present, assume the resident was discharged, but the facility did not transmit a Discharge assessment.

For any particular date, residents whose assessments do not meet the criteria in #3 above prior to that date are assumed to reside in the facility. The count of these residents is the census for that particular day. NOTE ON RESIDENT MATCHING: MDS assessments for a given resident are linked using the Resident Internal ID. The Resident Internal ID is a unique number, assigned by the Quality Improvement Evaluation System (QIES) Assessment Submission and Processing (ASAP) system, which identifies a resident. The combination of State and Resident Internal ID uniquely identifies a resident in the national repository. The process by which the Resident Internal ID is created is described by the *MDS 3.0 Provider User's Guide - Appendix B* (https://qtso.cms.gov/download/guides/MDS/mds_30/Prvdr_Users_AppB.pdf). The following MDS items are used to define the Resident Internal ID:

- State ID
- Facility Internal ID (QIES ASAP system number)
- Social Security Number (SSN)
- Last Name
- First Name
- Date of Birth
- Gender

Therefore, in order to achieve an accurate census, it is imperative that, in addition to having complete assessment data for each resident including discharge assessment data, residents are assigned correct Resident Internal IDs. To facilitate this, providers must ensure that MDS items, in particular the items indicated above, are entered correctly on each assessment. Providers must also carefully monitor the Final Validation Report, generated upon MDS submission, for any errors. Providers should work with their State RAI Coordinator or State Automation Coordinator to correct any errors that arise during assessment submission. In addition to using their Final Validation Report to validate the file structure and data content of each successful MDS submission, providers can monitor their MDS data using additional Certification and Survey Provider Enhanced Reports (CASPER) Reports. There are CASPER Reports for Admissions, Discharges, Duplicate Residents, Errors, and daily Rosters, among others. Full descriptions of these reports are available in Section 6 of the *CASPER Reporting MDS Provider User's Guide* available at the following link: https://qtso.cms.gov/download/guides/casper/cspr_sec6_mds_prvdr.pdf. Information about Final Validation Reports and error messages in the reports is available in Sections 4 and 5 of the *MDS 3.0 Provider User's Guide* available at the following link: https://qtso.cms.gov/mdstrain.html.

The nurse staffing hours reported through PBJ and the daily MDS census are both aggregated (summed) across the quarterly reporting period. The quarterly reported nurse staffing hours per resident per day (HRD) are then calculated by dividing the aggregate reported hours by the aggregate resident census. Only days that have at least some (>0) nurse staffing (for any job category 5-12) and at least one resident are included in the calculations.

CMS uses a set of exclusion criteria to identify facilities with highly improbable PBJ staffing data and neither staffing data nor a staffing rating are reported for these facilities (displaying "Data Not Available" on the Nursing Home Compare website). These exclusion criteria are as follows:

- The nursing home has 5 or more days with at least one resident but no nurse (RN, LPN or nurse aide) staffing hours reported. Because nurse aides in training cannot operate independently as nurses, nurse aides in training (job code 11) are not included.
- Total nurse staffing (job codes 5-12), aggregated over all days in the quarter with both nurses and residents is excessively low (<1.5 HRD)
- Total nurse staffing (job codes 5-12), aggregated over all days in the quarter with both nurses and residents is excessively high (>12 HRD)
- Nurse aide staffing (job codes 10-12) aggregated over all days in the quarter with both nurses and residents is excessively high (>5.25 HRD)

Case-Mix Adjustment

CMS adjusts the reported staffing ratios for case-mix, using the Resource Utilization Group (RUG-IV) case-mix system. The CMS Staff Time Resource Intensity Verification (STRIVE) Study measured the number of RN, LPN, and nurse aide minutes associated with each RUG-IV group (using the 66 group version of RUG-IV). CMS calculates case-mix adjusted hours per resident day for each facility for each staff type using this formula:

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

The "reported" hours are those reported by the facility through PBJ as described above. "National average" hours for a given staff type represent the national mean of expected hours across all facilities active on the last day of the quarter and that submitted valid nurse staffing data for the quarter (shown in Table 3). The National Average Hours values shown in Table 3 will be updated each quarter (in January, April, July and October).

The "expected" values for each nursing home are based on the daily distribution of residents by RUG-IV group in the same quarter as that covered by the PBJ reported staffing and estimates of daily expected RN, LPN, and nurse aide hours from the CMS STRIVE Study (see Table A1). Specifically, expected nurse staffing hours per resident day for a given nursing home are calculated as follows:

1) The MDS is used to assign a RUG-IV group to each resident for each day in the quarter. The method is similar to that used for calculating the daily MDS census and is described below.
2) This information is aggregated to generate a count of residents in each of the 66 RUG-IV groups in the nursing home for each day in the quarter. RUG-IV groups that are not represented on a given day are assigned a count of 0. Residents for whom there is insufficient MDS information to assign a RUG-IV category are not included.

3) Based on the number of residents in each RUG-IV group, expected total nursing and RN hours are calculated by multiplying by nursing time estimates for each RUG-IV group from the STRIVE study (Table A1).

4) Aggregate expected nursing and RN hours for the quarter are calculated by summing across all days and RUG-IV groups. These are the numerators in the calculations of expected total nursing and RN hours per resident day. The denominator for these calculations is the count of the total number of resident-days in the quarter for which there is a valid RUG-IV group.

5) Expected total nursing and RN hours per resident day for each nursing home are calculated by dividing aggregate expected hours (total nursing or RN) by the number of resident-days.

To determine the number of residents in each RUG-IV grouping for each day of the quarter for each facility, the same algorithm is used as that used to generate the daily MDS census (with slight adjustment to count RUG-IV groupings specifically, instead of just counting residents):

1) Identify the reporting period (quarter) for which the RUG groupings will be collected (e.g., CY 2017 Q4: October 1 – December 31, 2017).

2) Extract MDS assessment data (including RUG-IV 66 Hierarchical group) for all residents of a facility beginning one year prior to the reporting period to identify all residents that may reside in the facility (i.e., any resident with an MDS assessment may still reside in the facility). For example, for the CY 2017 Q4 reporting period, extract MDS data from October 1, 2016 through December 31, 2017.

3) Identify discharged residents using the following criteria:

   a) If a resident has an MDS Discharge assessment, use the discharge date reported on that assessment and assume that the resident no longer resides in the facility as of the date of discharge on the last assessment. If there is a subsequent admission assessment, then assume that the resident re-entered the nursing home on the entry date indicated on the admission assessment.

   b) For any resident with an interval of 150 days or more with NO assessments, assume the resident no longer resides in the facility as of the 150th day from the last assessment. (This assumption is based on the requirement for facilities to complete MDS assessments on all residents at least quarterly). If no assessment is present, assume the resident was discharged, but the facility did not transmit a Discharge assessment.

For any particular date, residents whose assessments do not meet the criteria in #3 above prior to that date are assumed to reside in the facility. The RUG IV 66 Hierarchical groupings assigned to those residents on their most recent assessments as of that date are counted as the RUG groupings for that facility on that date.

Table 3
National Average Hours per Resident Day Used To Calculate Adjusted Staffing (as of July 2018)[1]

Type of staff	National average expected hours per resident per day
Total nursing staff (Aides + LPNs + RNs)	3.2146
Registered nurses	0.3763

[1]These values will be updated each quarter and will be available in the State Averages table at (https://data.medicare.gov/data/nursing-home-compare)

The calculations of “expected”, “reported”, and “national average” hours are performed separately for RNs and for all staff delivering nursing care (RNs, LPNs, and nurse aides). Adjusted hours are also calculated for both groups using the formula discussed earlier in this section.

A downloadable file that contains the “expected”, “reported” and “case-mix adjusted" hours used in the staffing calculations is available at: http://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/CertificationandComplianc/FSQRS.html. The file, referred to as the “Expected and Adjusted Staff Time Values Data Set,” contains data for both RNs and total staff for each individual nursing home.

Scoring Rules

The two staffing measures (RN and total nursing staff) are given equal weight. For each of RN staffing and total staffing, a 1 to 5 rating is assigned based on a percentile-based method (Table 4). For each facility, the overall staffing rating is assigned based on the combination of the two staffing ratings (Table 5).

The percentile cut points (data boundaries between star categories) were determined using the data available as of March 2018. This was the first update of the cut points since December 2011 and was necessary because of changes in the expected staffing due to the transition to RUG-IV. The cut points were set so that the changes in expected staffing due to RUG-IV would not impact the overall distribution of the five-star ratings; that is, they were selected so that the proportion of nursing homes in each rating category would initially (i.e., for April 2018) be the same as it was in March 2018. CMS will evaluate whether further rebasing is needed on a quarterly basis.

Table 4

National Star Cut Points for Staffing Measures, Based on Case-Mix Adjusted Hours per Resident Day (updated April 2018)

Staff type	1 star	2 stars	3 stars	4 stars	5 stars
RN	< 0.246	0.246 - 0.382	0.383 – 0.586	0.587 – 0.883	≥0.884
Total	< 3.176	3.176 – 3.551	3.552 - 4.009	4.010 – 4.237	≥4.238

Note: Adjusted staffing values are rounded to three decimal places before the cut points are applied.

Rating Methodology

Facility ratings for overall staffing are based on the combination of RN and total nurse (RNs, LPNs, and nurse aides) staffing ratings as shown in Table 5. To receive an overall staffing rating of five stars, facilities must achieve a rating of five stars for both RN and total staffing. To receive a four-star staffing rating, facilities must receive at least a three-star rating on one (either the RN or total nurse staffing) and a rating of four or five stars on the other.

Table 5

Staffing Hours and Rating (updated April 2018)

RN rating and hours		Total nurse staffing rating and hours (RN, LPN and nurse aide)				
		1	2	3	4	5
		< 3.176	3.176 – 3.551	3.552 – 4.009	4.010 – 4.237	≥4.238
1	< 0.246	★	★	★★	★★	★★★
2	0.246 - 0.382	★	★★	★★★	★★★	★★★
3	0.383 – 0.586	★★	★★★	★★★	★★★★	★★★★
4	0.587 – 0.883	★★	★★★	★★★★	★★★★	★★★★
5	≥0.884	★★★	★★★	★★★★	★★★★	★★★★★

Note: Adjusted staffing values are rounded to three decimal places before the cut points are applied.

Scoring Exceptions

As of July 2018, there are the following exceptions to the scoring rules described above for assigning the staffing rating and RN staffing rating.

- Providers that fail to submit any staffing data by the required deadline will receive a one-star rating for overall staffing and RN staffing for the quarter.
- Providers that submit staffing data indicating that there were seven or more days in the quarter with no RN staffing (job codes 5-7) but on which there were one or more residents in the facility will receive a one-star rating for overall staffing and RN staffing for the quarter.
- CMS conducts audits of nursing homes to verify the data submitted and to ensure accuracy. Facilities that fail to respond to these audits and those for which the audit identifies significant discrepancies between the hours reported and the hours verified will receive a one-star rating for overall staffing and RN staffing for three months from the time at which the deadline to respond to audit requests passes or discrepancies are identified.

Quality Measure Domain

A set of quality measures (QMs) has been developed from Minimum Data Set (MDS) and Medicare claims data to describe the quality of care provided in nursing homes. These measures address a broad range of function and health status indicators. The facility rating for the QM domain is based on its performance on a subset of 13 (out of 24) of the MDS-based QMs and three MDS- and Medicare claims-based measures currently posted on Nursing Home Compare. The measures were selected based on their validity and reliability, the extent to which facility practice may affect the measure, statistical performance, and importance.

Measures for Long-Stay residents (residents in the facility for greater than 100 days) that are derived from MDS assessments:

- Percentage of residents whose need for help with activities of daily living has increased
- Percentage of residents whose ability to move independently worsened

- Percentage of high risk residents with pressure ulcers (sores)
- Percentage of residents who have/had a catheter inserted and left in their bladder
- Percentage of residents who were physically restrained
- Percentage of residents with a urinary tract infection
- Percentage of residents who self-report moderate to severe pain
- Percentage of residents experiencing one or more falls with major injury
- Percentage of residents who received an antipsychotic medication

Measures for Short-Stay residents that are derived from MDS assessments:

- Percentage of residents whose physical function improves from admission to discharge
- Percentage of residents with pressure ulcers (sores) that are new or worsened
- Percentage of residents who self-report moderate to severe pain
- Percentage of residents who newly received an antipsychotic medication

Measures for Short-Stay residents that are derived from claims data and MDS assessments:

- Percentage of residents who were re-hospitalized after a nursing home admission
- Percentage of residents who have had an outpatient emergency department visit
- Percentage of residents who were successfully discharged to the community

Table 6 contains more detailed information on these measures.

Technical specifications for the complete set of MDS-based QMs are available at: https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/NursingHomeQualityInits/Downloads/MDS-30-QM-Users-Manual-V10.pdf

Technical specifications for the claims-based measures are available at: https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/CertificationandComplianc/Downloads/New-Measures-Technical-Specifications-DRAFT-04-05-16-.pdf.

Values for five of the MDS-based QMs (mobility decline, catheter, long-stay pain, short-stay functional improvement, and short-stay pressure ulcers) are risk adjusted, using resident-level covariates that adjust for resident factors associated with differences in the performance on the QM. For example, the catheter risk-adjustment model takes into account whether or not residents had bowel incontinence or pressure sores on the prior assessment. Additionally, all three of the claims-based measures are also risk adjusted using both items from Medicare Part A claims that preceded the start of the nursing home stay and information from the first MDS assessment associated with the nursing home stay.

The risk-adjustment methodology is described in more detail in the technical specification documents referenced above. The covariates and the coefficients used in the risk-adjustment models are reported in Table A-2 in the Appendix.

CMS calculates ratings for the QM domain using the **four** most recent quarters for which data are available. This time period specification was selected to increase the number of assessments available for calculating the QM rating. This increases the stability of estimates and reduces the amount of missing data. The adjusted four-quarter QM values for each of the MDS-based QMs used in the five-star algorithm are computed as follows:

$$QM_{4Quarter} = [(QM_{Q1} * D_{Q1}) + (QM_{Q2} * D_{Q2}) + (QM_{Q3} * D_{Q3}) + (QM_{Q4} * D_{Q4})]/(D_{Q1} + D_{Q2} + D_{Q3} + D_{Q4})$$

Where QM_{Q1}, QM_{Q2}, QM_{Q3}, and QM_{Q4} correspond to the adjusted QM values for the four most recent quarters and D_{Q1}, D_{Q2}, and D_{Q3} D_{Q4} are the denominators (number of eligible residents for the particular QM) for the same four quarters.

Values for the three claims-based measures are calculated in a similar manner, except that the data used to calculate the measures use a full year of data rather than being broken out separately by quarter.

Table 6 Quality Measures Used in the Five-Star Quality Measure Rating Calculation

Measure	Comments
MDS Long-Stay Measures	
Percentage of residents whose ability to move independently worsened	This measure is a change measure that reports the percent of long-stay residents who have demonstrated a decline in independence of locomotion when comparing the target assessment to a prior assessment. Residents who lose mobility may also lose the ability to perform other activities of daily living, like eating, dressing, or getting to the bathroom.
Percentage of residents whose need for help with activities of daily living has increased[1]	This measure reports the percentage of long-stay residents whose need for help with late-loss Activities of Daily Living (ADLs) has increased when compared to the prior assessment. This is a change measure that reflects worsening performance on at least two late loss ADLs by one functional level or on one late loss ADL by more than one functional level compared to the prior assessment. The late loss ADLs are bed mobility, transfer, eating, and toileting. Maintenance of ADLs is related to an environment in which the resident is up and out of bed and engaged in activities. The CMS Staffing Study found that higher staffing levels were associated with lower rates of increasing dependence in ADLs.
Percentage of high-risk residents with pressure ulcers	This measure captures the percentage of long-stay, high-risk residents with Stage II-IV pressure ulcers**.** Residents at high risk for pressure ulcers are those who are impaired in bed mobility or transfer, who are comatose, or who suffer from malnutrition.
Percentage of residents who have/had a catheter inserted and left in their bladder	This measure reports the percentage of residents who have had an indwelling catheter in the last seven days. Indwelling catheter use may result in complications, like urinary tract or blood infections, physical injury, skin problems, bladder stones, or blood in the urine.
Percentage of residents who were physically restrained	This measure reports the percentage of long-stay residents who are physically restrained on a daily basis. A resident who is restrained daily can become weak, lose his or her ability to go to the bathroom without help, and develop pressure ulcers or other medical complications.
Percentage of residents with a urinary tract infection	This measure reports the percentage of long-stay residents who have had a urinary tract infection within the past 30 days. Urinary tract infections can often be prevented through hygiene and drinking enough fluid. Urinary tract infections are relatively minor but can lead to more serious problems and cause complications like delirium if not treated.
Percentage of residents who self-report moderate to severe pain	This measure captures the percentage of long-stay residents who report either (1) almost constant or frequent moderate to severe pain in the last five days or (2) any very severe/horrible pain in the last 5 days.

Table 6 Quality Measures Used in the Five-Star Quality Measure Rating Calculation

Measure	Comments
Percentage of residents experiencing one or more falls with major injury	This measure reports the percentage of long-stay residents who have experienced one or more falls with major injury reported in the target period or look-back period (one full calendar year).
Percentage of residents who received an antipsychotic medication	This measure reports the percentage of long-stay residents who are receiving antipsychotic drugs in the target period. Reducing the rate of antipsychotic medication use has been the focus of several CMS initiatives.
MDS Short-Stay Measures	
Percentage of residents whose physical function improves from admission to discharge	This measure assesses the percentage of short-stay residents whose independence in three mobility functions (i.e., transfer, locomotion, and walking) increases over the course of the nursing home care episode.
Percentage of residents with pressure ulcers that are new or worsened	This measure captures the percentage of short-stay residents with new or worsening Stage II-IV pressure ulcers.
Percentage of residents who self-report moderate to severe pain	This measure captures the percentage of short-stay residents, with at least one episode of moderate/severe pain or horrible/excruciating pain of any frequency, in the last 5 days.
Percentage of residents who newly received an antipsychotic medication	This measure reports the percentage of short-stay residents who are receiving an antipsychotic medication during the target period but not on their initial assessment.
Claims-Based Short-Stay Measures	
Percentage of residents who were re-hospitalized after a nursing home admission	This measure reports the percentage of all new admissions or readmissions to a nursing home from a hospital where the resident was re-admitted to a hospital for an inpatient or observation stay within 30 days of entry or reentry.
Percentage of short-stay residents who have had an outpatient emergency department (ED) visit	This measure reports the percentage of all new admissions or readmissions to a nursing home from a hospital where the resident had an outpatient ED visit (i.e., an ED visit not resulting in an inpatient hospital admission) within 30 days of entry or reentry.
Percentage of short-stay residents who were successfully discharged to the community	This measure reports the percentage of all new admissions to a nursing home from a hospital where the resident was discharged to the community within 100 calendar days of entry and for 30 subsequent days, did not die, was not admitted to a hospital for an unplanned inpatient stay, and was not readmitted to a nursing home.

[1]Indicates ADL QM as referenced in scoring rules
Sources: Based on information from the AHRQ Measures Clearinghouse and the NHVBP Draft Design Report and the MDS 3.0 Quality Measures User's Manual.

Missing Data and Imputation

Consistent with the specifications used for *Nursing Home Compare,* MDS-based measures are reported if the measure can be calculated for at least 20 residents' assessments (summed across **four** quarters of data to enhance measurement stability) for both the long- and short-stay QMs. The claims-based measures are reported if the measure can be calculated for at least 20 nursing home stays over the course of the year.

For facilities with missing data or an inadequate denominator size for one or more QMs, meeting the criteria described below, all available data from the facility are used. The remaining assessments (or stays) are imputed to get the facility to the minimum required sample size of 20. For example, if a facility had actual data for 12 resident assessments, the data for those 12 assessments would be used and the remaining eight assessments would be imputed using the state average to get to the minimum sample size to include the measure in the scoring for the QM rating. Missing values are imputed based on the

statewide average for the measure. The imputation strategy for the missing values depends on the pattern of missing data.

- For facilities that have an adequate denominator size for at least five of the nine long-stay QMs, values are imputed for the long-stay measures with fewer than 20 assessments as described above. Points are then assigned for all nine long-stay QMs according to the scoring rules described below.
- For facilities that have an adequate denominator size for at least four of the seven short-stay QMs (including at least one of the three claims-based measures), values are imputed for the short-stay measures with smaller denominators as described above. Points are then assigned for all seven short-stay QMs according to the scoring rules described below.
- For facilities with adequate denominator sizes on four or fewer long-stay QMs, the QM rating is based on the short-stay measures only. Values for the missing long-stay QMs are not imputed, and no long-stay measures are used in determining the QM rating.
- Similarly, for facilities with adequate denominator sizes for three or fewer short-stay QMs or no claims-based QMs, the QM rating is based on the long-stay measures only. Values for the missing short-stay QMs are not imputed, and no short-stay measures are used in determining the QM rating. One exception to this is for a small number of nursing homes that have adequate denominators for all four of the MDS-based short-stay measures but none of the claims-based measures. For these nursing homes, values are not imputed for the claims-based measures; however, the points assigned for the MDS-based short-stay measures are used in generating the QM rating according to the scoring rules described below.

Note that while values are imputed according to the rules described above for the purposes of assigning points for the QM score, imputed data for QMs is not reported on the Nursing Home Compare website nor included in the downloadable databases available at Data.Medicare.gov. QM values are publicly reported only for providers meeting the minimum denominator requirements prior to any imputation.

Scoring Rules for the Individual QMs

For each measure, 20 to 100 points are assigned based on facility performance relative to the national distribution of the QM. Points are assigned after any needed imputation of individual QM values, with the points determined in the following way:

- For long-stay ADL worsening, long-stay pressure ulcers, long-stay catheter, long-stay urinary tract infections, long-stay pain, long-stay injurious falls, and short-stay pain: facilities are grouped into quintiles based on the national distribution of the QM. The quintiles are assigned 20 points for the poorest performing quintile, 100 points for the best performing quintile, and 40, 60 or 80 points for the second, third and fourth quintiles respectively.
- The **long-stay physical restraint** and **short-stay pressure ulcer** QMs are treated slightly differently because they have low prevalence – specifically, substantially more than 20 percent (i.e. a quintile) of nursing homes have zero percent rates on these measures.
    - For the **long-stay physical restraint** QM, facilities achieving the best possible score on the QM (i.e. zero percent of residents triggering the QM) are assigned 100 points; this is about 60 percent of facilities (or three quintiles). The remaining facilities are divided into two evenly sized groups, (each with about 20 percent of nursing homes); the poorer

performing group is assigned 20 points, and the better performing group is assigned 60 points.

  - The **short-stay pressure ulcer** QM is treated similarly: facilities achieving the best possible score on the QM (i.e. zero percent of residents triggering the QM) are assigned 100 points; this is about one-third of nursing homes. The remaining facilities are divided into three evenly sized groups, (each with about 23 percent of nursing homes) and assigned 25, 50 or 75 points.

- For measures that were added to the QM rating beginning in February 2015, the following scoring rules use used:
  - For the **long-stay antipsychotic medication**, **long-stay mobility decline**, **short-stay functional improvement**, and the **three claims-based measures**, facilities are divided into five groups based on the national distribution of the measure. The top-performing 10 percent of facilities receive 100 points; the poorest performing 20 percent of facilities receive 20 points; the middle 70 percent of facilities are divided into three equally sized groups (each including approximately 23.3 percent of nursing homes) and receive 40, 60 or 80 points.
  - The **short-stay antipsychotic medication** QM is treated similarly; however, because approximately 20 percent of facilities achieve the best possible score on this QM (i.e. zero percent of residents triggering the QM), these facilities all receive 100 points; the poorest performing 20 percent of facilities receive 20 points; the remaining facilities are divided into three equally sized groups (each including approximately 20 percent of nursing homes) and receive 40, 60 or 80 points.

Note that, for all of the measures, the groupings are based on the national distribution of the QMs, prior to any imputation. For each of the MDS-derived QMs, the cut points are based on the QM distributions averaged across the four quarters of 2015. For the claims-based QMs, the cut points are based on the national distribution of the measures calculated for the period of Quarter 3 of 2014 through Quarter 2 of 2015.

Rating Methodology

After any needed imputation for individual QMs, the points are summed across all QMs based upon the scoring rules above to create a total score for each facility. The total possible score ranges between 325 and 1,600.

Facilities that receive a QM rating are in one of the following categories:

- They have points for all of the QMs.
- They have points for only the nine long-stay QMs (long-stay facilities).
- They have points for the nine long-stay QMs and the 4 MDS-based short-stay QMs
- They have points for only the seven short-stay QMs (short-stay facilities)
- They have points for only the four MDS-based short-stay QMs
- No values are imputed for nursing homes with data on fewer than five long-stay QMs and fewer than four short-stay QMs. No QM rating is generated for these nursing homes.

To ensure that all facilities are scored on the same scale, the total score is rescaled for long and short-stay facilities:

- If the facility has data for only the nine long-stay measures, the average of these point values is assigned for each of the seven (missing) short-stay measures and the total score is recalculated.
- If the facility has data for the nine long-stay QMs and the four MDS-based short-stay QMs but not the claims-based QMs, the average of the point values for the MDS-based short-stay QMs is assigned for each of the three (missing) claims-based measures and the total score is recalculated.
- If the facility has data for only the seven short-stay measures, the average of these point values is assigned for each of the nine (missing) long-stay measures and the total score is recalculated.
- If the facility has data for only the four MDS-based short stay QMs, but none of the long-stay QMs or the claims-based QMs, the average of the point values for the MDS-based short-stay QMs is assigned for each of the nine (missing) long-stay measures and each of the three (missing) claims-based measures and the total score is recalculated.

Once the summary QM score is computed for each facility as described above, the five-star QM rating is assigned, according to the point thresholds shown in Table 7. These thresholds were set so that the overall proportion of nursing homes would be approximately 25 percent five-star, 20 percent for each of two-, three-, and four-star and 15 percent one-star, which was the distribution in February 2015 (the previous time that new measures were added and rebasing was required). The cut points associated with these star ratings will be held constant for a period of at least one year (from January 2017), allowing the distribution of the QM rating to change over time.

Table 7
Star Cut-points for Quality Measure Summary Score

QM Rating	Point Range
★	325 – 789
★★	790 – 889
★★★	890 – 969
★★★★	970 – 1054
★★★★★	1055 – 1600

Overall Nursing Home Rating (Composite Measure)

Based on the star ratings for the health inspection domain, the staffing domain and the MDS quality measure domain, CMS assigns the overall Five-Star rating in three steps:

Step 1: Start with the health inspection rating.

Step 2: Add one star to the Step 1 result if the staffing rating is four or five stars ***and greater than*** the health inspection rating; subtract one star if the staffing rating is one star. The overall rating cannot be more than five stars or less than one star.

Step 3: Add one star to the Step 2 result if the quality measure rating is five stars; subtract one star if the quality measure rating is one star. The overall rating cannot be more than five stars or less than one star.

Note: If the health inspection rating is one star, then the overall rating cannot be upgraded by more than one star based on the staffing and quality measure ratings. If the nursing home is a Special Focus Facility (SFF) that has not graduated, the maximum overall rating is three stars.

The rationale for upgrading facilities in Step 2 that receive a rating of four of five stars for staffing (rather than limiting the upgrade to those with five stars) is that the criteria for the staffing rating is quite stringent. However, requiring that the staffing rating be greater than the health inspection rating in order for the score to be upgraded ensures that a facility with four stars on health inspections and four stars on staffing (and more than one star on the quality measure rating) does not receive an overall rating of five stars.

The rationale for limiting star rating upgrades is that two self-reported data domains should not significantly outweigh the rating from actual onsite visits from trained surveyors who have found very serious quality of care problems. Since the health inspection rating is heavily weighted toward the most recent findings, a health inspection rating of one star reflects both a serious and recent finding.

The rationale for limiting the overall rating of a Special Focus Facility (SFF) is that the health inspection rating is weighted toward more recent results and may not fully capture the long history of "yo-yo" or "in and out" of compliance with federal safety and quality of care requirements that some nursing homes exhibit. That type of history can be characteristic of the SFF nursing homes. The Nursing Home Compare website should reflect the most recent data available so consumers can monitor facility performance, however, the overall rating will be capped out of caution that the prior "yo-yo" pattern could be repeated. Once a facility graduates from the SFF initiative by sustaining improved compliance for about 12 months, the cap will be removed for the former SFF nursing home.

The method for determining the overall nursing home rating does not assign specific weights to the health inspection, staffing, and QM domains. The health inspection rating is the most important dimension in determining the overall rating, but, depending on the performance on the staffing and QM domains, the overall rating for a facility may be increased or decreased by up to two stars.

If a facility has no health inspection rating, then no overall rating is assigned. If a facility has no health inspection rating because it is too new to have two standard surveys, then no ratings for any domain are displayed.

Change in Nursing Home Rating

Facilities may see a change in their overall rating for a number of reasons. Since the overall rating is based on three individual domains, a change in any one of the domains can affect the overall rating.

Provided below are some potential reasons that a change in a domain could occur:

New Data for the Facility

Any new data for a facility could potentially change a star rating domain.

Events that could change the health inspection score include:

- A new health inspection (that occurred prior to November 28, 2017),
- New complaint deficiencies (that occurred prior to November 28, 2017),
- A second, third, or fourth revisit (for a survey that occurred before November 28, 2017),
- Resolution of Informal Dispute Resolutions (IDR) or Independent Informal Dispute Resolutions (IIDR) resulting in changes to the scope and/or severity of deficiencies (for surveys prior to November 28, 2017),

The data will be included as soon as they become part of the CMS database. The timing for this can vary by state and depends on having the complete survey package for the State Survey Agency to upload to the national database. Additional inspection data may be added to the database at any time because of complaint investigations, outcomes of revisits, Informal Dispute Resolutions (IDR), or Independent Informal Dispute Resolutions (IIDR). These data may not be added in the same cycle as the standard inspection data.

PBJ staffing data are reported quarterly, so new staffing measures and ratings will be calculated and posted quarterly. Changes in a facility's staffing measure or rating may be due to differences in the number of hours submitted for staff, changes in the daily census, or changes in risk adjustment from the previous quarter.

Quality Measure data for the MDS-based QMs are updated on Nursing Home Compare on a quarterly basis, and the nursing home QM rating is updated at the same time. The updates typically occur in January, April, July, and October towards the end of these months. The claims-based QM data typically update every six months (in April and October). Changes in the quality measures may change the star rating.

Since the cut-points between star categories for the health inspection rating are based on percentile distributions that are not fixed, those cut-points may vary slightly depending on the current facility distribution in the database. However, while the cut-points for the health inspection ratings may change from month to month, the rating for a given facility is held constant until there is a change in the weighted health inspection score for that facility.

Appendix

Table A1
RUG-IV Based Case-Mix Adjusted Nurse and Aide Staffing Minute[1] Estimates

Major RUG Group	RUG-IV Code	STRIVE Study Average Times (Minutes)[1]				
		RN	LPN	Total Licensed	Nurse Aide	Total Nurse (RN+LPN+Aide)
Rehab Plus Extensive	RUX	68.37	111.44	179.81	131.11	310.92
	RUL	109.06	63.87	172.93	199.94	372.87
	RVX	29.24	95.88	125.12	145.94	271.06
	RVL	67.74	97.39	165.13	139.99	305.12
	RHX	128.79	51.92	180.71	155.24	335.95
	RHL	67.28	48.41	115.69	135.32	251.01
	RMX	97.54	74.61	172.15	148.44	320.59
	RML	133.82	84.01	217.83	153.24	371.07
	RLX	133.82	84.01	217.83	153.24	371.07
Rehab	RUC	27.80	66.41	94.21	148.95	243.16
	RUB	45.01	71.09	116.10	141.03	257.13
	RUA	35.18	54.55	89.73	101.01	190.74
	RVC	34.22	68.45	102.67	156.53	259.20
	RVB	28.86	56.56	85.42	119.90	205.32
	RVA	31.30	59.35	90.65	113.73	204.38
	RHC	36.62	54.88	91.50	156.14	247.64
	RHB	36.42	47.88	84.30	119.48	203.78
	RHA	27.09	51.76	78.85	99.82	178.67
	RMC	32.58	56.05	88.63	148.87	237.50
	RMB	32.10	55.47	87.57	134.74	222.31
	RMA	25.99	48.79	74.78	98.81	173.59
	RLB	33.86	44.58	78.44	185.83	264.27
	RLA	15.46	43.58	59.04	118.93	177.97
Extensive Services	ES3	130.49	58.49	188.98	152.12	341.10
	ES2	65.19	75.23	140.42	146.65	287.07
	ES1	72.81	49.49	122.30	127.62	249.92
Special Care High	HE2	21.25	67.93	89.18	190.47	279.65
	HD2	41.89	70.63	112.52	153.76	266.28
	HC2	35.13	53.63	88.76	154.72	243.48
	HB2	60.64	67.91	128.55	133.86	262.41
	HE1	19.20	67.73	86.93	149.47	236.40
	HD1	16.89	54.54	71.43	141.80	213.23
	HC1	22.43	54.17	76.60	135.33	211.93
	HB1	21.65	50.50	72.15	106.77	178.92

Major RUG Group	RUG-IV Code	STRIVE Study Average Times (Minutes)[1]				
		RN	LPN	Total Licensed	Nurse Aide	Total Nurse (RN+LPN+Aide)
Special Care Low	LE2	22.16	58.83	80.99	176.15	257.14
	LD2	19.59	58.10	77.69	153.29	230.98
	LC2	27.44	47.80	75.24	116.12	191.36
	LB2	29.52	50.73	80.25	128.44	208.69
	LE1	22.11	52.25	74.36	143.41	217.77
	LD1	11.78	43.94	55.72	130.80	186.52
	LC1	15.72	46.56	62.28	124.77	187.05
	LB1	18.99	48.66	67.65	106.16	173.81
Clinically Complex	CE2	21.05	44.13	65.18	162.70	227.88
	CD2	20.01	45.17	65.18	175.51	240.69
	CC2	19.77	36.95	56.72	132.92	189.64
	CB2	23.50	36.46	59.96	114.97	174.93
	CA2	20.69	44.63	65.32	80.92	146.24
	CE1	21.26	33.75	55.01	159.10	214.11
	CD1	15.31	41.90	57.21	151.40	208.61
	CC1	16.00	35.10	51.10	126.91	178.01
	CB1	16.17	34.99	51.16	118.45	169.61
	CA1	22.39	40.22	62.61	72.76	135.37
Behavioral Symptoms and Cognitive Performance	BB2	11.30	33.26	44.56	117.96	162.52
	BA2	18.34	41.18	59.52	101.56	161.08
	BB1	14.93	32.83	47.76	114.30	162.06
	BA1	13.60	31.57	45.17	86.06	131.23
Reduced Physical Functioning	PE2	15.11	39.76	54.87	163.58	218.45
	PD2	12.09	38.01	50.10	163.38	213.48
	PC2	8.14	33.51	41.65	124.90	166.55
	PB2	15.49	38.95	54.44	118.83	173.27
	PA2	5.50	35.91	41.41	73.16	114.57
	PE1	19.91	36.07	55.98	161.23	217.21
	PD1	16.18	33.58	49.76	147.31	197.07
	PC1	14.07	36.94	51.01	123.74	174.75
	PB1	12.49	31.80	44.29	95.60	139.89
	PA1	14.32	32.42	46.74	70.77	117.51

[1]Note that time estimates in minutes are converted to hours (by dividing by 60) before being used in the calculations for adjusted staffing.

Table A2
Coefficients for Risk-Adjustment Model

Quality Measure/Covariate	Constant (Intercept)	Coefficient
Percentage of long-stay residents who had a catheter inserted and left in their bladder	-3.645993	
1. Indicator of frequent bowel incontinence on prior assessment		0.545108
2. Indicator of pressure sores at stages II, III, or IV on prior assessment		1.967017
Percentage of long-stay residents who self-report moderate to severe pain	-2.428281	
1. Indicator of independence or modified independence in daily decision making on the prior assessment		1.044019
Percentage of short-stay residents with pressure ulcers that are new or worsened	-5.204646	
1. Indicator of requiring limited or more assistance in bed mobility on the initial assessment		1.013114
2. Indicator of bowel incontinence at least occasionally on initial assessment		0.835473
3. Indicator of diabetes or peripheral vascular disease on the initial assessment		0.412676
4. Indicator of low body mass index on the initial assessment		0.373643

Source: http://www.cms.hhs.gov/NursingHomeQualityInits/Downloads/NHQIQMUsersManual.pdf

Table A3
Ranges for Point Values for Quality Measures, Using Four Quarter Average Distributions[1]

Quality measure	For QM values		Number of QM points is…
	between...	and...	
ADL Decline (long-stay)	0.00000000	0.10049021	100
	0.10049022	0.13483145	80
	0.13483146	0.16778523	60
	0.16778524	0.20794393	40
	0.20794394	1.00000000	20
Moderate to Severe Pain (long-stay)	0.00000000	0.02201134	100
	0.02201135	0.04988420	80
	0.04988421	0.08311380	60
	0.08311381	0.13081113	40
	0.13081114	1.00000000	20
High risk pressure Ulcers (long-stay)	0.00000000	0.02654868	100
	0.02654869	0.04453437	80
	0.04453438	0.06181819	60
	0.06181820	0.08633095	40
	0.08633096	1.00000000	20
Catheter (long-Stay)	0.00000000	0.01073927	100
	0.01073928	0.02094371	80
	0.02094372	0.03178361	60
	0.03178362	0.04745521	40
	0.04745522	1.00000000	20
Urinary Tract Infection (long-stay)	0.00000000	0.01851851	100
	0.01851852	0.03423682	80
	0.03423683	0.05128203	60
	0.05128204	0.07598784	40
	0.07598785	1.00000000	20
Physical Restraints (long-stay)	0.00000000	0.00000000	100
	0.00000001	0.01424503	60
	0.01424504	1.00000000	20

Quality measure	For QM values		Number of QM points is…
	between...	and...	
Injurious Falls (long-stay)	0.00000000	0.01315789	100
	0.01315790	0.02403848	80
	0.02403849	0.03511052	60
	0.03511053	0.05035973	40
	0.05035974	1.00000000	20
Antipsychotic Meds (long-stay)	0.00000000	0.06843265	100
	0.06843266	0.12704916	80
	0.12704917	0.17391305	60
	0.17391306	0.23979592	40
	0.23979593	1.00000000	20
Moderate to Severe Pain (short-stay)	0.00000000	0.07359305	100
	0.07359306	0.13229570	80
	0.13229571	0.18827161	60
	0.18827162	0.26041665	40
	0.26041666	1.00000000	20
New or Worsening Pressure Ulcers (short-stay)	0.00000000	0.00000000	100
	0.00000001	0.00692691	75
	0.00692692	0.01566247	50
	0.01566248	1.00000000	25
Antipsychotic Meds (short-stay)	0.00000000	0.00000000	100
	0.00000001	0.00999998	80
	0.00999999	0.01912567	60
	0.01912568	0.03486237	40
	0.03486238	1.00000000	20
Mobility decline (long-stay)	0.00000000	0.08022493	100
	0.08022494	0.14454544	80
	0.14454545	0.19333225	60
	0.19333226	0.24905966	40
	0.24905967	1.00000000	20

Quality measure	For QM values		Number of QM points is…
	between...	and...	
Functional Improvement (short-stay)	0.81666872	1.00000000	100
	0.70966590	0.81666871	80
	0.62861965	0.70966589	60
	0.52015014	0.62861964	40
	0.00000000	0.52015013	20
Hospital readmission (short-stay)	0.00000000	0.13839278	100
	0.13839279	0.18716279	80
	0.18716280	0.21886203	60
	0.21886204	0.25689121	40
	0.25689122	1.00000000	20
ED Visits (short-stay)	0.00000000	0.05488714	100
	0.05488715	0.08944665	80
	0.08944666	0.11696705	60
	0.11696706	0.15529003	40
	0.15529004	1.00000000	20
Successful community discharge (short-stay)	0.66448731	1.00000000	100
	0.59926791	0.66448730	80
	0.54906047	0.59926790	60
	0.47667646	0.54906046	40
	0.00000000	0.47667645	20

[1]For the claims-based measures (hospital readmission, ED visit, community discharge), points are based on data from 2014Q3 – 2015Q2. For the MDS-based measures (all others), points are based on data from 2015Q1 – 2015Q4. A higher QM value corresponds to better performance for all measures except functional improvement and successful community discharge where lower QM values correspond to better performance.