Technical Notes for HHCAHPS Star Ratings

Revised March 2016

Overview of HHCAHPS Star Ratings

As part of a new initiative to add Star Ratings to its Compare websites, the Centers for Medicare & Medicaid Services (CMS) will add HHCAHPS Star Ratings to the Home Health Compare website in January 2016. Star Ratings make it easier for consumers to use the information on the CMS Compare websites and spotlight excellence in health care quality.

Five HHCAHPS Star Ratings will appear on Home Health Compare: one for each of the three publicly reported HHCAHPS composite measures, one for the Overall Rating of Care measure, and one Survey Summary Star, which is a simple average of the four HHCAHPS measure star ratings. CMS plans to update the HHCAHPS Star Ratings each quarter. HHCAHPS Star Ratings are based on the same patient survey results publicly reported on Home Health Compare since April 2012. The first public reporting of the HHCAHPS Star Ratings in January 2016 will be based on patients who received home health care between July 2014 and June 2015. The information in the appendices of this paper reflects survey data from patients who received home health care between July 1, 2013, and June 30, 2014. This information is provided for informational purposes only and is not data that will be reported in January 2016.

Measures Receiving HHCAHPS Stars

HHCAHPS Star Ratings will be applied to each of the three publicly reported composite measures, which are created from specific questions on the HHCAHPS Survey and to the publicly reported global rating, Overall Rating of Care. We are not assigning a star rating to the Willingness to Recommend measure because it mirrors the data in the Overall Rating, and it is not as stable as the Overall Rating measure. The HHCAHPS measures that are publicly reported for the Star Ratings are:

- HHCAHPS Composite Measures
    1. Care of Patients (HHCAHPS Survey questions Q9, Q16, Q19, and Q24),
    2. Communication Between Providers and Patients (HHCAHPS Survey questions Q2, Q15, Q17, Q18, Q22 and Q23),
    3. Specific Care Issues (HHCAHPS Survey questions Q3, Q4, Q5, Q10, Q12, Q13, and Q14), and
- HHCAHPS Global Item
    4. Overall Rating of Care (HHCAHPS Survey question Q20).

Minimum Number of Surveys for HHCAHPS Star Ratings

To receive HHCAHPS Star Ratings, home health agencies must have at least 40 completed HHCAHPS surveys over the publicly reported four-quarter period. HHAs with fewer than 40 completed HHCAHPS surveys will not receive Star Ratings; however, their individual HHCAHPS measure scores will still be publicly reported on Home Health Compare as long as they are eligible to be reported during that time period (i.e., the agency has 12 months of HHCAHPS Survey data).

1. Construction and Adjustment of HHCAHPS Linear Scores

CMS uses all survey responses in the construction of the HHCAHPS Star Ratings. The responses to the survey items used in each HHCAHPS measure (shown below) are combined and converted to a 0–100 linear-scaled score. Responses to the HHCAHPS Survey are converted to linear scores in the following manner:

For HHCAHPS Survey items 9 and 15–19:

- "Never" = 0; "Sometimes" = 33 1/3; "Usually" = 66 2/3; and "Always" = 100

For HHCAHPS Survey items 2–5, 10, 12–14, and 22:

- "No" = 0; and "Yes" = 100

For HHCAHPS Survey item 24:

- "Yes" = 0; and "No" = 100

For HHCAHPS Survey item 20:

- Overall Rating "0" = 0; Overall Rating "1" = 10; Overall Rating "2" = 20; …; Overall Rating "10" = 100

For HHCAHPS Survey item 23:

- "More than 14 days" = 0; "6–14 days" = 33 1/3; "1 to 5 days" = 66 2/3; and "Same day" = 100

The 0–100 linear-scaled HHCAHPS scores are then adjusted for the effects of patient mix through a series of steps, as described below.

CMS applies the patient-mix adjustment (PMA) to quarterly HHCAHPS scores to account for the tendency of certain patient subgroups to respond more positively or negatively to the HHCAHPS Survey. PMA allows for fair comparisons across HHAs by adjusting HHA scores as if all HHAs had an identical mix of patient characteristics. The PMA table can be found in **Appendix A**, Table 1, while **Appendix A**, Table 2 contains the national means for patient-mix variables. These tables will be updated each quarter. Additional information about the application of the HHCAHPS PMAs, including the definition of the PMA factors, can be found on the Home Health CAHPS website (https://homehealthcahps.org/), on the home page under the Information for HHAs box, via the link labelled "Patient Mix Adjustment Factors."

Four-quarter averages of HHCAHPS linear scores are rounded to integer values using standard rounding rules, as follows:

- Let X represent the unrounded four-quarter average for an HHCAHPS linear score.
- If X is less than [X.5], then round down to nearest whole integer.
- If X is equal to or greater than [X.5], then round up to nearest whole integer.

2. Conversion of Linear Scores Into HHCAHPS Star Ratings for the Four HHCAHPS Measures

Once the scores are linearized, adjusted and rounded, CMS assigns 1, 2, 3, 4, or 5 whole stars (only whole stars are assigned; partial stars are not used) for each of the four HHCAHPS measures by applying statistical methods that use relative distribution and clustering.

The Star Rating for each of the four HHCAHPS measures is determined by applying a clustering algorithm to the individual measure scores. Conceptually, the clustering algorithm identifies the "gaps" in the data and creates five categories (one for each star rating) such that scores of HHAs in the same score category (star rating) are as similar as possible, and scores of HHAs in different categories are as different as possible. This clustering algorithm is the same one used by CMS to determine Star Ratings for most of the Medicare Part C and Part D measures, and for Hospital CAHPS.

The goal of the clustering algorithm is to minimize the differences within each cluster, and to maximize the differences between each cluster.

The variance in measure scores is separated into within- and between-cluster sum of squares components. The algorithm develops clusters that minimize the variance of measure scores within the clusters. More specifically, the clustering algorithm minimizes the within-cluster sum of squares for each of the Star Ratings levels.

The cut points (boundaries) for star assignments are derived from the range of individual measure Star Ratings per cluster. The star levels associated with each cluster are determined by ordering the means of each cluster. The cut points for HHCAHPS Star Ratings for the period July 1, 2013, through June 30, 2014, are shown in **Appendix B**. These cut points will be updated each quarter. Additional information about the clustering method can be found in **Appendix C**.

3. Survey Summary Star

In addition to Star Ratings for the four HHCAHPS measures, CMS is introducing a new metric, the HHCAHPS Survey Summary Star Rating, which is the average of all of the Star Ratings of the HHCAHPS measures. The HHCAHPS Summary Star Rating is constructed from the following components:

- The three Star Ratings from each of the three HHCAHPS composite measures:
  - Care of Patients, Communication Between Providers and Patients, Specific Care Issues.
- A single Star Rating for the HHCAHPS Overall Rating of Care Provided by the HHA

The four Star Ratings (three composite measure Star Ratings + Star Rating for Overall Rating) are combined as a simple average to form the HHCAHPS Survey Summary Star Rating. In the final step, standard rounding rules (detailed in section 1 above) are applied to the four-measure average to arrive at the HHCAHPS Survey Summary Star Rating (1, 2, 3, 4, or 5 stars).

	Individual HHCAHPS Measure Star Ratings	HHCAHPS Survey Summary Star Rating Average (unrounded)	HHCAHPS Survey Summary Star Rating (rounded)
HHCAHPS Composite Measures		(4+3+4+4)/4 = 3.75	4
Care of Patients	4		
Communication Between Providers and Patients	3		
Specific Care Issues	4		
HHCAHPS Overall Rating	4		

Step 2: Lastly, round the HHCAHPS Survey Summary Star Rating Average using the rounding table below. In this example, the HHA's HHCAHPS Survey Summary Star Rating rounds to 4 stars.

CMS uses standard rounding rules for the assignment of HHCAHPS Survey Summary Stars, as follows:

4-Measure HHCAHPS Survey Summary Star Rating Average	HHCAHPS Survey Summary Star Rating Assignment
≥1.00 and <1.50	1 Star
≥1.50 and <2.50	2 Stars
≥2.50 and <3.50	3 Stars
≥3.50 and <4.50	4 Stars
≥4.50 and ≤5.00	5 Stars

Appendix A

Table 1. HHCAHPS Patient-Mix Adjustments of Linear Scores for Patients Who Received Home Health Care between Quarter 3, 2013, and Quarter 2, 2014 (July 1, 2013 to June 30, 2014)

Patient Mix Characteristic Patient Mix Level	Overall Rating	Care of Patients	Communication	Specific Care Issues
Proxy	0.501	0.135	−0.150	0.445
Non-English survey response	−1.958	0.121	0.050	−2.930
Age				
18–49	2.803	2.706	1.434	1.984
50–64	1.144	1.416	0.701	0.106
65–74	RC	RC	RC	RC
75–84	−0.018	−0.033	0.408	1.185
85+	0.248	0.053	0.897	2.333
Education				
< 8th grade	−0.221	0.290	0.259	−2.091
Some high school	−0.629	−0.002	−0.027	−1.679
High school graduate/GED	RC	RC	RC	RC
Some college	0.896	0.467	0.482	1.561
College graduate or more	1.976	1.069	1.112	4.313
Residence status				
Patient lived alone	0.862	1.155	1.281	2.095
Self-reported health status				
Excellent	−3.371	−1.804	−2.140	−5.783
Very good	−0.520	−0.309	−0.303	−0.727
Good	RC	RC	RC	RC
Fair	0.337	0.318	0.214	−0.183
Poor	1.276	1.194	1.042	0.207
Mental/emotional status				
Excellent/very good	−1.281	−0.873	−0.990	−0.262
Good	RC	RC	RC	RC
Fair/poor	0.678	0.566	0.753	0.524
Diagnoses				
Schizophrenia	1.830	1.833	2.177	4.218
Dementia/cerebral degeneration	0.488	0.317	0.730	1.015

RC = reference category.

Table 2. National Means on Patient-Mix Adjustment Factors (Four-Quarter Average for January 2015 Public Reporting Period, July 2013 to June 2014 Home Health Patients)

Patient Mix Characteristic Patient Mix Level	Mean
Proxy respondent used	0.115
Non-English survey response	0.047
Age	
18–49	0.034
50–64	0.119
65–74	0.252
75–84	0.314
85+	0.281
Education	
8th grade or less	0.135
Some high school	0.133
High school graduate/GED	0.340
Some college	0.227
College graduate or more	0.166
Residence status	
Patient lived alone	0.357
Self-reported health status	
Excellent	0.088
Very good	0.159
Good	0.300
Fair	0.326
Poor	0.127
Mental/emotional status	
Excellent/very good	0.418
Good	0.316
Fair/poor	0.266
Diagnoses	
Schizophrenia	0.006
Dementia/cerebral degeneration	0.030

Appendix B

Table 3. HHCAHPS Star Rating Cut Points for Patients Who Received Home Health Care Between Quarter 3, 2013 and Quarter 2, 2014 (July 1, 2013 to June 30, 2014)

	1 Star	2 Stars	3 Stars	4 Stars	5 Stars
HHCAHPS Composite Measures					
Care of Patients	<89	≥89 to 92	≥93 to 94	≥95 to 96	≥97
Communications between Providers and Patients	<86	≥86 to 89	≥90 to 91	≥92 to 94	≥95
Specific Care Issues	<77	≥77 to 80	≥81 to 84	≥85 to 88	≥89
HHCAHPS Global Item					
Overall Rating of Care	<88	≥88 to 91	≥ 92 to 94	≥95 to 96	≥97

Appendix C

Additional Information on the Clustering Method Used to Create the HHCAHPS Star Ratings

Appendix C outlines the sequence of steps taken in the clustering methodology to develop the four HHCAHPS Star Ratings. For each HHCAHPS linear measure, the clustering method:

1. Produces the individual measure distance matrix.
2. Groups the measure scores into an initial set of clusters.
3. Selects the final set of clusters.

Step 1. Produce the individual measure distance matrix.

For each pair of home health agencies j and k ($j >= k$) among the n home health agencies with measure score data, the Euclidian distance of the measure scores (e.g., the absolute value of the difference between the two measure scores) is computed. The clustering method then enters this distance in row j and column k of a distance matrix with n rows and n columns. This matrix is produced using the DISTANCE procedure in SAS.

Step 2. Create a tree of cluster assignments.

The distance matrix calculated in Step 1 is the input to the clustering procedure. The stored distance algorithm is implemented to compute cluster assignments. The following process is implemented by the CLUSTER procedure in SAS:

a. The input measure score distances are squared.

b. The clusters are initialized by assigning each home health agency to its own cluster.

c. To determine which pair of clusters to merge, Ward's minimum variance method is used to separate the variance of the measure scores into within- and between-cluster sum of squares components.

d. From the existing clusters, two clusters are selected for merging to minimize the within-cluster sum of squares over all possible sets of clusters that might result from a merge.

e. Steps b and c are repeated to reduce the number of clusters by one until a single cluster containing all home health agencies results.

Step 3. Select the final set of clusters from the tree of cluster assignments.

The process outlined in Step 2 produces a tree of cluster assignments from which the five final clusters (which represent the five star rating categories) are selected using the TREE procedure in SAS.