

# CAHPS Hospital Survey Podcast Series—Transcript

## HCAHPS Linear Mean Scores and Star Ratings Calculations

Note: The information covered in this podcast was current at the time of posting. CMS will occasionally update guidelines and calculations.

### *Slide 1-HCAHPS Linear Mean Scores and Star Ratings Calculations*

Welcome to the CAHPS Hospital Survey Podcast Series. This podcast will review the calculation of HCAHPS linear mean scores and Star Ratings.

### *Slide 2-Overview*

Topics will include the purpose of HCAHPS Star Ratings, linear mean score calculation, conversion of linear mean scores into HCAHPS Star Ratings, and the HCAHPS Summary Star Rating calculation.

### *Slide 3-Purpose of HCAHPS Star Ratings*

CMS publishes HCAHPS Star Ratings to provide consumers with a simple and recognizable summary of HCAHPS performance. Five-star healthcare quality ratings have become a popular feature on Hospital Compare.

### *Slide 4-HCAHPS Star Ratings Calculations*

To be eligible for HCAHPS Star Ratings, a hospital must attain 100 or more completed HCAHPS surveys in a four-quarter reporting period. Hospitals receive Star Ratings for each of the ten publicly reported HCAHPS measures. Please note that a Star Rating is not created for the Communication about Pain measure.

Star Ratings are derived from HCAHPS linear mean scores, which are closely related to publicly reported “top-box,” “middle-box,” and “bottom-box” scores. Linear mean scores incorporate the full range of survey response categories into a single metric for each HCAHPS measure. Whereas, “top-box” scores measure the rate of only the most positive response options to HCAHPS survey items.

### *Slide 5-Five Steps in Calculation of Linear Mean Scores*

The first task in obtaining HCAHPS Star Ratings is to calculate a four-quarter average for linear mean scores. The five steps to calculate a linear mean score include linear scoring and averaging of survey responses, adjustment of HCAHPS linear means scores, rescaling the linear mean scores, application of quarterly weights, and final rounding.

*Slide 6-Step 1: Linear Scoring of Survey Responses*

Individual survey responses to each HCAHPS item are scored linearly. Linear scoring for items 1 through 9, 11, 16, 17, 19, and 20 are shown on this slide. For example, for question 1 on the survey, a patient response of “Never” is scored as 1, “Sometimes” as 2, “Usually” as 3, and “Always” as 4. Using these item specific linear scoring rules, each individual survey item response is given a linear score.

*Slide 7-Step 1: Linear Scoring of Survey Responses cont’d*

Next is linear scoring for items 21 and 22 from the HCAHPS survey. For item 21, a patient response of “0” is scored as zero, a “1” is scored as one and so on, up to a patient response of “10” scored as 10. For item 22, a patient response of “Definitely No” is scored as 1, “Probably No” as 2, “Probably Yes” as 3, and “Definitely Yes” as 4.

*Slide 8 Step 1: Linear Scoring of Survey Responses cont’d*

For survey items 23, 24, and 25 a patient response of “Strongly Disagree” is scored as 1, “Disagree” as 2, “Agree” as 3, and “Strongly Agree” as 4.

*Slide 9 Step 1: Linear Scoring of Survey Responses cont’d*

After all patient responses are assigned a linear value, the item responses are averaged for a given hospital to form the hospital-level mean for each measure.

*Slide 10-Step 2: Adjustment of HCAHPS Linear Mean Scores*

CMS applies adjustments for the effects of patient mix and survey mode. Patient-mix and survey mode adjustments are applied to linear mean scores at the quarterly level before transformation into a 0-100 linear-scaled score. National patient-level adjustments for linear mean scores can be found in Table 1 of the Appendices in the [HCAHPS Star Ratings Technical Notes](#) on HCAHPS online. The national means of patient-mix variables can be found in in Table 2.

Hospital patient-mix adjustment, or PMA, for linear mean scores are calculated using similar methods as hospital PMA for top-box scores. However, national patient-level adjustments are specific to the linear scale. Survey mode adjustments for linear mean scores can be found in Appendix B of the [HCAHPS Star Ratings Technical Notes](#) and are applied to linear mean scores after patient-mix adjustment.

*Slide 11-Step 3: Rescaling HCAHPS Linear Mean Scores*

After adjusting for hospital patient mix and survey mode, the linear mean score is transformed into a 0-100 linear-scaled score using the equation shown. The equation is comprised of the adjusted hospital-level measure mean, denoted as “M”; minus the lowest possible response to the measure, denoted as “R”; divided by the highest possible response to the measure, denoted by “K”; minus the lowest response, “R.”

*Slide 12 Step 4: Four-Quarter Averages Using Quarterly Weights*

The HCAHPS linear mean scores published by CMS on Hospital Compare represent a rolling four-quarter average for each hospital. These averages are weighted proportionately by the number of eligible patients seen by a hospital in each quarter of the reporting period. A hospital's quarterly weight is equal to the quarter's eligible discharge size divided by the total eligible discharge size in the four-quarter reporting period.

*Slide 13-Step 5: Rounding HCAHPS Linear Mean Scores*

The HCAHPS linear mean four-quarter averages are rounded to integer values using standard rounding rules. The rounded four-quarter average linear mean scores for each of the 10 HCAHPS measures can be found in publicly available downloadable databases on [data.medicare.gov](http://data.medicare.gov).

*Slide 14-Example of Linear Mean Score Calculation, Step 1*

The following is an example of linear mean score calculation for a hypothetical hospital. In this example the Cleanliness measure is used.

First, individual patient responses are converted to numerical linear values. For quarter one for hypothetical Hospital A, which employs the Telephone Only mode, five patients responded to the Cleanliness survey item as follows: Always, Always, Usually, Sometimes, and Always.

Linear scoring converts these patient responses to the values of 4, 4, 3, 2, and 4, respectively. The average of these patient responses yields a linear mean score of 3.4 for the Cleanliness measure for Hospital A in quarter one.

*Slide 15-Example of Linear Mean Score Calculation, Step 2*

For step 2, assume that Hospital A has a total PMA of minus 0.038 and receives a survey mode adjustment of minus 0.018 corresponding to the Telephone Only mode. Recall, the Telephone Only mode adjustment for Cleanliness and all other HCAHPS measures can be found in Appendix B of the [HCAHPS Star Ratings Technical Notes](#) on HCAHPS online.

In this example, add Hospital A's PMA of minus 0.038 to the Cleanliness linear mean of 3.4, resulting in 3.362. Next, the Cleanliness Telephone Only mode adjustment of minus 0.018 is added. This results in Hospital A receiving a fully adjusted Cleanliness score of 3.344 for hypothetical quarter 1.

*Slide 16-Example of Linear Mean Score Calculation, Step 3*

In step 3, the fully adjusted quarterly linear mean score for Hospital A is rescaled from 3.344 into a 0-100 linear-scaled score. Using the equation previously discussed, insert the appropriate values for M, K, and R. After multiplying by 100, Hospital A receives a rescaled linear mean score equal to 78.13 for the Cleanliness measure for quarter 1.

*Slide 17-Example of Linear Mean Score Calculation, Step 4*

In step 4, quarterly weights are applied to calculate the weighted four-quarter average Cleanliness score.

For Hospital A, assume there were 80 eligible discharges in quarter 1 and 300 eligible discharges across the four-quarter reporting period. To calculate the quarterly weight for quarter 1, divide 80 by 300 to yield 0.27 or 27%.

Note that if the four quarters had equal eligible discharges then each quarterly weight would be 25%.

*Slide 18-Example of Linear Mean Score Calculation, Step 4 cont'd*

This table shows Hospital A's number of eligible patients for each of the four quarters, along with hypothetical unweighted quarterly Cleanliness scores.

As shown in the previous slide for quarter one, quarterly weights are calculated by dividing the number of eligible patients in each quarter by total eligible discharges across all four quarters. The weighted quarterly score is calculated by multiplying the quarterly weight by the unweighted quarterly score.

For quarter one, this calculation yields a weighted quarterly score of 21.10 for Hospital A. Summing the weighted quarterly scores in the last column results in the unrounded, four-quarter average linear mean Cleanliness score. In this example, Hospital A has an unrounded, HCAHPS linear mean score of 82.02 for the Cleanliness measure.

*Slide 19-Example of Linear Mean Score Calculation, Step 5*

Using standard rounding rules, round Hospital A's weighted, four-quarter average Cleanliness score of 82.02 to 82. This is Hospital A's HCAHPS linear mean Cleanliness score that will be publicly reported.

*Slide 20-Conversion of Linear Mean Scores into HCAHPS Star Ratings*

Linear mean scores are used to create Star Ratings for each of the 10 HCAHPS measures. These linear mean scores can be found in hospital Preview Reports and are publicly available on [data.medicare.gov](https://data.medicare.gov).

A Star Rating of 1, 2, 3, 4, or 5 whole stars is assigned for each HCAHPS measure, based on cut points derived from CMS applying a clustering algorithm to the individual linear mean measure scores. There are no pre-determined quotas for the star categories. Instead, the clustering algorithm identifies gaps in the data so that linear mean scores of hospitals in the same Star Rating category are as similar as possible and linear mean scores of hospitals in different Star Rating categories are as different as possible. This same method is used for many CMS Part C and Part D Star Ratings.

For further technical information on how the clustering algorithm is applied, see Appendix D of the [HCAHPS Star Ratings Technical Notes](#) on HCAHPS online.

### *Slide 21-Star Rating Assignment*

The clustering algorithm is applied for each HCAHPS measure yielding measure-specific cut points. These cut points are used to assign Star Ratings for the ten HCAHPS measures.

This table shows a partial view of the cut points from Appendix C of the [Star Ratings Technical Notes](#) for the October 2018 Reporting Period. Note that cut points may change from one reporting period to the next and the Star Ratings Technical Notes are updated accordingly.

Continuing with Hospital A as an example, consult the cut points table for the Cleanliness of Hospital Environment measure to determine the star assignment. Here, a linear mean Cleanliness score of 82 translates to a Cleanliness Star Rating equal to 1 for Hospital A in the October 2018 Reporting Period.

### *Slide 22-HCAHPS Summary Star Rating*

In addition to Star Ratings for the 10 HCAHPS measures, CMS also calculates and publicly reports the HCAHPS Summary Star Rating for each eligible hospital.

The HCAHPS Summary Star Rating is constructed from the Star Ratings from each of the 6 HCAHPS Composite Measures, a single Star Rating for the two HCAHPS hospital environment items, and a single Star Rating for the two HCAHPS global items.

The Star Rating for the HCAHPS hospital environment items is simply the average of the Star Ratings assigned to Cleanliness of Hospital Environment and Quietness of Hospital Environment.

Similarly, the Star Rating for the HCAHPS global items is the average of the Star Ratings assigned to Hospital Rating and Recommend the Hospital items.

### *Slide 23-Example Calculation of the HCAHPS Summary Star Rating*

The second column in this table shows the 10 HCAHPS measure Star Ratings for hypothetical Hospital A.

The Star Rating for HCAHPS hospital environment items is calculated by averaging the Star Ratings for Cleanliness of Hospital Environment and Quietness of Hospital Environment, resulting in 2 stars. The Star Rating for HCAHPS global items is calculated by averaging the Star Ratings for Hospital Rating and Recommend the Hospital, resulting in 3.5. For these two calculations, do not round the average.

Next, HCAHPS Summary Star Rating is calculated by averaging the 6 Composite Measure Star Ratings, the Star Rating for HCAHPS environment items and the Star Rating for HCAHPS global items, resulting in 3.438. Finally, round the 8-measure HCAHPS Summary Star Rating average using standard rounding rules. In this case, 3.438 is rounded down to 3 whole stars for the HCAHPS Summary Star Rating for hypothetical Hospital A.

*Slide 24 - Key Points: HCAHPS Star Ratings*

Please note that the Star Rating for the HCAHPS Hospital Rating measure is based on responses to a single HCAHPS item.

In contrast, the HCAHPS Summary Star Rating encompasses all publicly reported HCAHPS measures.

Finally, the CMS Overall Hospital Star Rating reported on Hospital Compare is different than the HCAHPS Summary Star Rating. HCAHPS represents only a portion of the CMS quality measurements used in CMS' Overall Hospital Star Rating.

*Slide 25 - Questions and HCAHPS Technical Support*

Please contact HCAHPS technical assistance at [HCAHPS@hcqis.org](mailto:HCAHPS@hcqis.org) or 1-888-884-4007 for any questions. For more information about the HCAHPS survey, you can visit the HCAHPS website at: [www.hcahpsonline.org](http://www.hcahpsonline.org).

Thank you for listening to the HCAHPS Linear Mean Scores and Star Ratings Calculations podcast.

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