Maryland
Quality Measures
Data Center

Maryland Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) Raw Score Calculation and Adjustment Methodology

Introduction

HCAHPS (Hospital Consumer Assessment of Healthcare Providers and Systems) is a standardized survey instrument, endorsed by the National Quality Forum, for measuring patients' perceptions of their hospital care. The HCAHPS survey asks patients 27 questions about their hospital experience, including communication with doctors, communication with nurses, responsiveness of hospital staff, cleanliness and quietness of hospital environment, pain management, communication about medicines, discharge information, overall rating of the hospital, and recommendation of the hospital. (The HCAHPS Survey Questions are included in Appendix A to this document. A Glossary of terms used in this document is provided in Appendix B.)

To ensure that publicly reported HCAHPS scores allow fair and accurate comparisons across hospitals, it is necessary to adjust for factors that are not directly related to hospital performance. This process allows for comparison across providers by removing the influence of patient-specific factors and biases that could be introduced by the mode of survey administration utilized (i.e., mail, telephone, mail with telephone follow-up, or interactive voice recognition). This document describes the methodology used to calculate adjusted HCAHPS scores for providers in the State of Maryland. The methodology has been prepared by the Iowa Foundation for Medical Care (IFMC), under contract with the Maryland Health Care Commission (MHCC).

The Centers for Medicare & Medicaid Services (CMS) publishes national means and adjustment coefficients which are utilized in the calculation of national, adjusted HCAHPS scores as reported on the www.hospitalcompare.gov website. The HCAHPS adjustment methodology for the State of Maryland uses CMS-provided information and independent statistical analysis of the HCAHPS raw scores.

The MHCC is committed to providing value added reporting and data analysis. Preview reports, which are available to hospitals, provide individual quarter and aggregate reporting by service line (medical, surgical, and maternity) in order to enhance targeted quality improvement opportunities.

Calculation of HCAHPS Adjusted Results for an Individual Quarter of Data

Step 1: Calculate Unadjusted HCAHPS Scores

The first step in the calculation of adjusted HCAHPS scores is to calculate the raw (unadjusted) HCAHPS scores for a given provider. For each provider, individual patient responses are utilized for each of the ten HCAHPS measures for all valid and complete surveys within a discharge quarter. These measures include six composite items, two global items, and two individual items. The composite measures are each comprised of two to three questions from the HCAHPS survey.

HCAHPS Measures

Composite Measures

1. Communication with Nurses (Q1, Q2, Q3)
2. Communication with Doctors (Q5, Q6, Q7)

3. Responsiveness of Hospital Staff (Q4, Q11)
4. Pain Management (Q13, Q14)
5. Communication about Medicine (Q16, Q17)
6. Discharge Information (Q19, Q20)

Individual Items

1. Cleanliness of Hospital Environment (Q8)
2. Quietness of Hospital Environment (Q9)

Global Items

1. Overall Hospital Rating (Q21)
2. Recommend the Hospital (Q22)

"Top Box," "Middle Box" and "Bottom Box" scores are calculated for each of the measures. The Top Box score is the percentage of survey respondents giving the most favorable responses on the measure. The Bottom Box score is the percentage of respondents giving the least favorable responses on a measure. (See table A for more information on which survey responses are considered Top and Bottom Box for each measure.) The Middle Box score is calculated as 100% – (Top Box %) – (Bottom Box %). Once these calculations are performed, the result is thirty scores for each measure within a given provider: three scores (Top, Bottom, and Middle Boxes) for each of the 10 composite survey items.

Note: Middle Box scores are used for reporting unadjusted HCAHPS scores to providers, but are not used in calculating the adjusted HCAHPS Middle Box scores. Top and Bottom Box Responses for 10 HCAHPS Measures:

Measure	**Top Box Responses**	**Bottom Box Responses**
Communication with Nurses	"Always"	"Sometimes", "Never"
Communication with Doctors	"Always"	"Sometimes", "Never"
Responsiveness of Hospital Staff	"Always"	"Sometimes", "Never"
Pain Management	"Always"	"Sometimes", "Never"
Communication about Medicine	"Always"	"Sometimes", "Never"
Discharge Information	"Yes"	"No"
Cleanliness of Hospital Environment	"Always"	"Sometimes", "Never"
Quietness of Hospital Environment	"Always"	"Sometimes", "Never"
Overall Hospital Rating	9, 10	0, 1, 2, 3, 4, 5, 6
Recommend Hospital	"Definitely yes"	"Definitely no", "Probably no"

Step 2: Calculate Patient Mix Adjustment

The intent of this step is to remove any positive or negative influence on survey responses attributable to patient characteristics such as age, education level, health status, etc. We utilize the raw HCAHPS survey data in order to determine the patient-mix adjustments required for each of the 10 HCAHPS measures. First, we calculate the mean of non-null values for the provider on each of the CMS patient-mix adjustment variables. These include:

- Patient age 18-24 (1 if "Yes", 0 if "No", null if "Missing")
- Patient age 25-34 (1 if "Yes", 0 if "No", null if "Missing")
- Patient age 35-44 (1 if "Yes", 0 if "No", null if "Missing")
- Patient age 45-54 (1 if "Yes", 0 if "No", null if "Missing")
- Patient age 55-64 (1 if "Yes", 0 if "No", null if "Missing")
- Patient age 65-74 (1 if "Yes", 0 if "No", null if "Missing")
- Patient age 75-84 (1 if "Yes", 0 if "No", null if "Missing")
- Patient age 85+ (1 if "Yes", 0 if "No", null if "Missing")
- Education Level (8th grade or less = 1, Some high school = 2, High school graduate or GED = 3, Some college or 2-year degree = 4, 4-year college graduate = 5, More than 4-year college degree = 6)
- Non-English Primary Language(1 if "English", 0 if not)
- Self-Rated Health Status (Excellent = 1, Very Good = 2, Good = 3, Fair = 4, Poor = 5)
- ER Admission (1 if ER admission, 0 if not)
- Response percentile (ranking of survey response time; see glossary for calculation instructions)
- Maternity Service (1 if "Yes", 0 if "No", null if "Missing")
- Surgical Service (1 if "Yes", 0 if "No", null if "Missing")
- Medical Service (1 if "Yes", 0 if "No", null if "Missing")
- Interaction of Age and Maternity (value of Age group variable when Maternity service – else 0)
- Interaction of Age and Surgical (value of Age group when Surgical service – else 0)

Once the provider's means have been calculated for each of the above variables, we calculate a difference score for the provider by subtracting the quarterly national mean published by CMS (see http://www.hcahpsonline.org/modeadjustment.aspx) from the provider's mean. These scores indicate how

far off from, and in what direction, the provider's mean is from the national mean and how much adjustment will be required. A larger difference score (either positive or negative) will result in a larger adjustment factor. Once a difference score has been calculated for each of the patient mix variables, we determine the most recently published patient-mix coefficients for both Bottom Box and Top Box scores (see http://www.hcahpsonline.org/modeadjustment.aspx) for each of the variable/measure combinations. A set of Top Box adjustment values are calculated for each measure by multiplying each of the provider's differences scores by its corresponding coefficient in the Top Box matrix.

Example – Top and Bottom Box PMA Adjustments for Self-Rated Health Status on Composite Measure 1:

Difference Score for Self-Rated Health Status = (Provider's Mean Self-Rated Health – National Mean Self-Rated Health)

Top Box PMA Adjustment for Self-Rated Health Status on Composite Measure 1 = Provider's Difference Score for Self-Rated Health Top Box PMA Coefficient for Self-Rated Health for Composite Measure 1*

*Bottom Box PMA Adjustment for Self-Rated Health Status on Composite Measure 1 = Provider's Difference Score for Self-Rated Health * Bottom Box PMA coefficient for Self-Rated Health for Composite Measure 1*

The same process is followed for each measure for the Bottom Box, yielding two sets of 18 adjustment coefficients per measure for Bottom Box and 18 coefficients per measure for Top Box. (Note: Adjustment coefficients for the Medical service line variable and the Age grouping 85 years+ will always be zero because these were reference variables used by CMS in determining adjustment coefficients for other age groupings and service types). For each measure, Top Box and Bottom Box adjustment values are summed up separately, resulting in an overall Patient Mix adjustment for Top Box and an overall Patient Mix adjustment for Bottom Box, for each of the 10 HCAHPS measures.

Example – Top and Bottom Box PMA Adjustment for Composite Measure 1:

Total Top Box PMA-Adjustment for Composite Measure 1=
(Top Box PMA Adjustment for Patient age 18-24)
+ (Top Box PMA Adjustment for Patient age 25-34)
+ (Top Box PMA Adjustment for Patient age 35-44)
+ (Top Box PMA Adjustment for Patient age 45-54)
+ (Top Box PMA Adjustment for Patient age 55-64)
+ (Top Box PMA Adjustment for Patient age 65-74)
+ (Top Box PMA Adjustment for Patient age 75-84)
+ (Top Box PMA Adjustment for Patient age 85+)
+ (Top Box PMA Adjustment for Education Level)
+ (Top Box PMA Adjustment for Non-English Primary Language)
+ (Top Box PMA Adjustment for Self-Rated Health Status)
+ (Top Box PMA Adjustment for ER Admission)
+ (Top Box PMA Adjustment for Response percentile)
+ (Top Box PMA Adjustment for Maternity Service)
+ (Top Box PMA Adjustment for Surgical Service)
+ (Top Box PMA Adjustment for Medical Service)
+ (Top Box PMA Adjustment for Interaction of Age and Maternity)
+ (Top Box PMA Adjustment for Interaction of Age and Surgical)

Total Bottom Box PMA- Adjustment for Composite Measure 1=
(Bottom Box PMA Adjustment for Patient age 18-24)
+ (Bottom Box PMA Adjustment for Patient age 25-34)
+ (Bottom Box PMA Adjustment for Patient age 35-44)
+ (Bottom Box PMA Adjustment for Patient age 45-54)
+ (Bottom Box PMA Adjustment for Patient age 55-64)
+ (Bottom Box PMA Adjustment for Patient age 65-74)
+ (Bottom Box PMA Adjustment for Patient age 75-84)
+ (Bottom Box PMA Adjustment for Patient age 85+)
+ (Bottom Box PMA Adjustment for Education Level)
+ (Bottom Box PMA Adjustment for Non-English Primary Language)
+ (Bottom Box PMA Adjustment for Self-Rated Health Status)
+ (Bottom Box PMA Adjustment for ER Admission)
+ (Bottom Box PMA Adjustment for Response percentile)
+ (Bottom Box PMA Adjustment for Maternity Service)
+ (Bottom Box PMA Adjustment for Surgical Service)
+ (Bottom Box PMA Adjustment for Medical Service)
+ (Bottom Box PMA Adjustment for Interaction of Age and Maternity)
+ (Bottom Box PMA Adjustment for Interaction of Age and Surgical)

Step 3: Apply Patient Mix Adjustment (PMA)

Using the unadjusted scores previously calculated in Step 1, and the patient mix adjustment values calculated in Step 2, apply the patient mix adjustment to both Top and Bottom Box for each measure as shown in the following formula:

Top Box Patient Mix Adjusted Score = Top Box Unadjusted score + (Top Box Unadjusted score × Top Box PMA value)

Bottom Box Patient Mix Adjusted Score = Bottom Box Unadjusted score + (Bottom Box Unadjusted score × Bottom Box PMA value)

These formulas will yield the patient mix adjusted Top and Bottom Box scores on each of the 10 HCAHPS measures for the provider. The Top and Bottom Box scores are rounded. From the Top and Bottom Box numbers we can now calculate the Middle Box adjusted score. This is equal to the difference between the sum of the top and bottom box and 100%.

Patient-Mix Adjusted Middle Box Score = 100% – (Rounded Patient-Mix Adjusted Top Box Score + Rounded Patient-Mix Adjusted Bottom Box Score)

Step 4: Mode Adjustment

A mode adjustment is performed on the patient-mix adjusted Top and Bottom Box scores calculated for each measure in Step 3. The intent of this step is to adjust for the survey mode selected by a provider to remove any biases that could be introduced by the particular survey method. There is no mode adjustment necessary for Mail Only surveys because CMS uses this survey method as a reference in determining adjustments necessary for all other survey administration methods. Using the CMS-published matrixes of *mode adjustment coefficients* (see http://www.hcahpsonline.org/modeadjustment.aspx), the appropriate adjustment coefficient is selected based on the survey mode utilized by the provider (i.e., Mail with Telephone follow-up, Telephone Only, Active IVR). The Top Box mode adjustment value is then

added the provider's patient-mix adjusted Top Box score and the Bottom Box mode adjustment value is added to the provider's patient-mix adjusted Bottom Box score for each measure.

Final Adjusted Top Box Score = Patient-Mix Adjusted Top Box Score + Mode Adjustment Value for Top Box

Final Adjusted Bottom Box Score = Patient-Mix Adjusted Bottom Box Score + Mode Adjustment Value for Bottom Box

This yields a provider's final adjusted Top Box score and final adjusted Bottom Box score for each of the ten HCAHPS measures. Because the mode and patient mix adjustments made can, in some cases, result in Top and Bottom box scores that either exceed 100% or are less than 0%, it is necessary at this point to round any scores that are greater than 100% down to 100% and any results less than 0% up to 0%.

Rounding Rules:

In order to ensure that the Top, Middle and Bottom Box scores add up to 100%, the Top and Bottom box scores will be rounded prior to the calculation of the Middle Box as noted in step three above. Scores are rounded to the nearest whole number.

The following rounding rules will be applied when rounding Top, Middle and Bottom Box scores:

- If the digit to the right of the decimal is '5' and the digit to the left of the decimal is even, the number will be rounded down. E.g. 86.5 would round up to 86
- If the digit to the right of the decimal is '5' and the digit to the right of the decimal is odd, the number will be rounded up. E.g. 89.5 would round down to 90

Top, Middle and Bottom Box scores are calculated for each of the ten HCAHPS measures. Composite 6 only has two ratings, %Yes and % No. Due to rounding of scores prior to the calculation of the Middle Box, there is the potential that the Middle Box score for Composite 6 could result in '1' which results in the total of the Top and Bottom box scores as 99%.

Service Line Breakout:

The preceding instructions apply to the calculation of overall HCAHPS scores (across all services lines and for all surveys). Within service lines, calculations differ slightly from those outlined above. To calculate adjusted HCAHPS scores within a service line (Maternity, Medical, or Surgical), follow the same process as outlined with slight modification in steps 1-3.

- Step 1: Calculations are limited to surveys within the service line selected. The total number of respondents becomes the number of survey respondents within the service line, and all other calculations (Top Box, Bottom Box, etc.) are made accordingly.
- Step 2: Service line adjustments are omitted from the patient-mix adjustments since calculations are being made for a single service line. Therefore, no adjustment value for Maternity, Surgical, Age × Maternity or Age × Surgical is calculated.
- Step 3: The sum of the patient mix adjustment values (minus the service line adjustments typically included) is applied to the unadjusted scores for the measures as in the overall calculation method.
- Step 4: No modification to the mode adjustment is necessary for within service line calculations

Aggregation of Quarterly Scores:

The above steps describe how to calculate adjusted HCAHPS scores within a quarter for a given provider. To aggregate quarterly data into annual scores an un-weighted average of each of the four quarters of unrounded data is used.

Appendix A

HCAHPS Survey Questions

Question Number	Question Description
1	During this hospital stay, how often did nurses treat you with courtesy and respect?
2	During this hospital stay, how often did nurses listen carefully to you?
3	During this hospital stay, how often did nurses explain things in a way you could understand?
4	During this hospital stay, after you pressed the call button, how often did you get help as soon as you wanted it?
5	During this hospital stay, how often did doctors treat you with courtesy and respect?
6	During this hospital stay, how often did doctors listen carefully to you?
7	During this hospital stay, how often did doctors explain things in a way you could understand?
8	During this hospital stay, how often were your room and bathroom kept clean?
9	During this hospital stay, how often was the area around your room quiet at night?
10	During this hospital stay, did you need help from nurses or other hospital staff in getting to the bathroom or in using a bedpan?
11	How often did you get help in getting to the bathroom or in using a bedpan as soon as you wanted?
12	During this hospital stay, did you need medicine for pain?
13	During this hospital stay, how often was your pain well controlled?
14	During this hospital stay, how often did the hospital staff do everything they could to help you with your pain?
15	During this hospital stay, were you given any medicine that you had not taken before?
16	Before giving you any new medicine, how often did hospital staff tell you what the medicine was for?
17	Before giving you any new medicine, how often did hospital staff describe possible side effects in a way you could understand?
18	After you left the hospital, did you go directly to your own home, to someone else's home, or to another health facility?

19	During this hospital stay, did doctors, nurses or other hospital staff talk with you about whether you would have the help you needed when you left the hospital?
20	During this hospital stay, did you get information in writing about symptoms or health problems to look out for after you left the hospital?
21	Using any number from 0 to 10, where 0 is the worst hospital possible and 10 is the best hospital possible, what number would you use to rate this hospital during your stay?
22	Would you recommend this hospital to your friends and family?
23	In general, how would you rate your overall health?
24	What is the highest grade or level of school that you have completed?
25	Are you of Spanish, Hispanic or Latino origin or descent?
26	What is your race? Please choose one or more.
27	What language do you mainly speak at home?

Source: www.hcahpsonline.org

Appendix B

Glossary

Bottom Box Responses – The responses that are least favorable for a given survey item.

Middle Box Responses – Responses that are neither Top Box nor Bottom Box responses. Some questions, such as those with only "yes" or "no" response options, will not have any Middle Box responses.

Response Percentile – To calculate the response percentile for survey respondents, we ranked respondents lag time (this variable is provided in the HCAHPS data and represents time taken to respond to survey) in ascending order. In the case of ties among the ranks (i.e. two or more survey respondents have the same value for lag time), we assigned the average of the ranks to each of the tied observations. For example, if two respondents both had a lag time of 3 days and were ranked 3rd and 4th for lag time, both respondents would receive a rank of 3.5, which represents the mean of their respective ranks (3 and 4).

Top Box Responses – The responses that are most favorable for a given survey item.

Unadjusted Score – The score on a particular HCAHPS measure which is based on the raw data reported by the provider, without adjustment for survey mode or patient-mix variables.