Overall Hospital Quality Star Rating on *Hospital Compare:* January 2020 Updates and Specifications Report

January 2020

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Acknowledgments

This work is a collaborative effort, and the authors gratefully acknowledge and thank our many colleagues and collaborators for their thoughtful and instructive input. Acknowledgment of input does not imply endorsement of the methodology and policy decisions.

We would like to acknowledge and thank: Lein Han, PhD; Joseph Clift, EdD, MPH, MS; Vinitha Meyyur, PhD; Michelle Schreiber, MD; Cynthia Tourison, MSHI; and Reena Duseja, MD at the Centers for Medicare & Medicaid Services (CMS) for their contributions to this work.

We would also like to acknowledge and thank the contribution and work from: Dawn Beard, LPN from the Lantana Consulting Group, as well as Rachel Singer, PhD, MPH, MPA and Eve Shapiro, MPH, from NORC at the University of Chicago.

Additionally, we would like to acknowledge Hospital Consumer Assessment of Healthcare Providers Systems (HCAHPS), Centers for Disease Control & Prevention (CDC), Mathematica Policy Research (MPR), and Sharon-Lise Normand, PhD, who provided statistical consultation.

We would also like to thank: Lisa Suter, MD; Elizabeth Drye, MD, SM; Lori Geary, MPH; and Tamara Mohammed, MHA, CHE from CORE.

Finally, we would like to recognize the commitment and contributions of the members of our Technical Expert Panel (TEP), our Patient & Patient Advocate Work Group, and our Provider Leadership Work Group (PLWG).

1. How to Use This Report

Under contract with the Centers for Medicare & Medicaid Services (CMS), Yale New Haven Health Services Corporation – Center for Outcomes Research & Evaluation (CORE) has developed a methodology for the Overall Hospital Quality Star Rating, summarizing the quality information conveyed by measures publicly reported on *Hospital Compare*. The purpose of this report is to provide an overview of the methodology for calculating the Star Rating and provide updated national results for the January 2020 *Hospital Compare* release. This report also details the updates made in January 2020. The detailed Star Rating methodology report, outlining the methodology and process for developing the Star Rating ("Comprehensive Methodology Report (v3.0)"), can be found on *QualityNet* at www.qualitynet.org > Hospitals-Inpatient > Overall Hospital Ratings > Methodology. Questions regarding the Overall Hospital Quality Star Rating can be sent to the *QualityNet* Question and Answer Tool.

This Overall Hospital Quality Star Rating: January 2020 Updates and Specifications Report is organized into the following sections:

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2. Objective of Overall Hospital Quality Star Rating

The primary objective of the Overall Hospital Quality Star Rating project is to summarize information from existing measures reported on *Hospital Compare* in a way that is useful and easy to interpret for patients and consumers through the development of a statistically sound methodology. Consistent with other CMS Star Rating programs, this methodology assigns each hospital a rating from one to five stars reflecting the hospital's overall performance on *Hospital Compare* quality measures.

The Overall Hospital Quality Star Rating is designed to provide summary information for patients and consumers about existing publicly-reported quality data. In the case of *Hospital Compare*, the Overall Hospital Quality Star Rating complements existing efforts, such as the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) star ratings (implemented in April 2015), and will not replace the reporting of any individual quality measures. In what follows, "Star Rating(s)" refers to the Overall Hospital Quality Star Rating unless otherwise noted.

3. Overall Hospital Quality Star Rating Methodology

3.1. Summary of Updates to the January 2020 Star Rating

Table 1. Summary of January 2020 Star Rating Updates

Update	Description	Rationale
1. Use of previous quarter data	The January 2020 Star Ratings were calculated using the measure data from the October 2019 update of *Hospital Compare*	To allow hospitals more time to preview results prior to public release of Star Ratings

3.2. Overview of Six Steps of the Star Rating Methodology

The methodology to calculate a facility's Star Rating comprises a six-step process. These steps are listed below and are described in greater detail in subsequent sections (see Appendix A).

Step 1: Selection and standardization of measures for inclusion in the Star Rating
Step 2: Assignment of measures to groups
Step 3: Calculation of latent variable model group scores
Step 4: Calculation of hospital summary scores as a weighted average of group scores
Step 5: Application of public reporting thresholds for receiving a star rating
Step 6: Application of clustering algorithm to translate a summary score into a star rating

In Step 1, measures are selected for inclusion based on their relevance and importance as determined through stakeholder and expert feedback and standardized to be consistent in terms of direction and magnitude (with outlying values trimmed). In Step 2, the measures are organized into seven measure groups based on the dimension of quality represented. In Step 3, the standardized measures within each group are used to construct a latent variable statistical model (LVM) that reflects the dimension of quality represented by its measures. Each of the seven LVM models generate a hospital-specific group score, which is obtained as a statistical estimate of the latent variable. (The term "estimate" is used to represent the realized value of the latent variable.) In Step 4, a weight is applied to each group score, and all available groups are averaged to calculate a hospital summary score. In Step 5, the minimum public reporting thresholds for receiving a star rating are applied to determine inclusion or exclusion of hospitals from the Star Rating calculation. Finally, in Step 6, a clustering algorithm is used to assign each hospital to one of five Star Rating categories based on hospitals' summary scores.

Of note, CMS also reports hospital performance at the measure group level, separately categorizing each of a hospital's available group scores into one of three group performance categories (above, same as, or below the national average). These performance categories provide additional detail to patients and consumers using *Hospital Compare* (see Section 4.2).

3.3. Step 1: Selection and Standardization of Measures for Inclusion in the Star Rating

Criteria for Selecting Measures

CMS determined and vetted measure selection criteria with stakeholders through the Technical Expert Panel (TEP), work groups, and public input periods to ensure that the Star Rating captures the diverse aspects of quality represented by the measures on *Hospital Compare*.

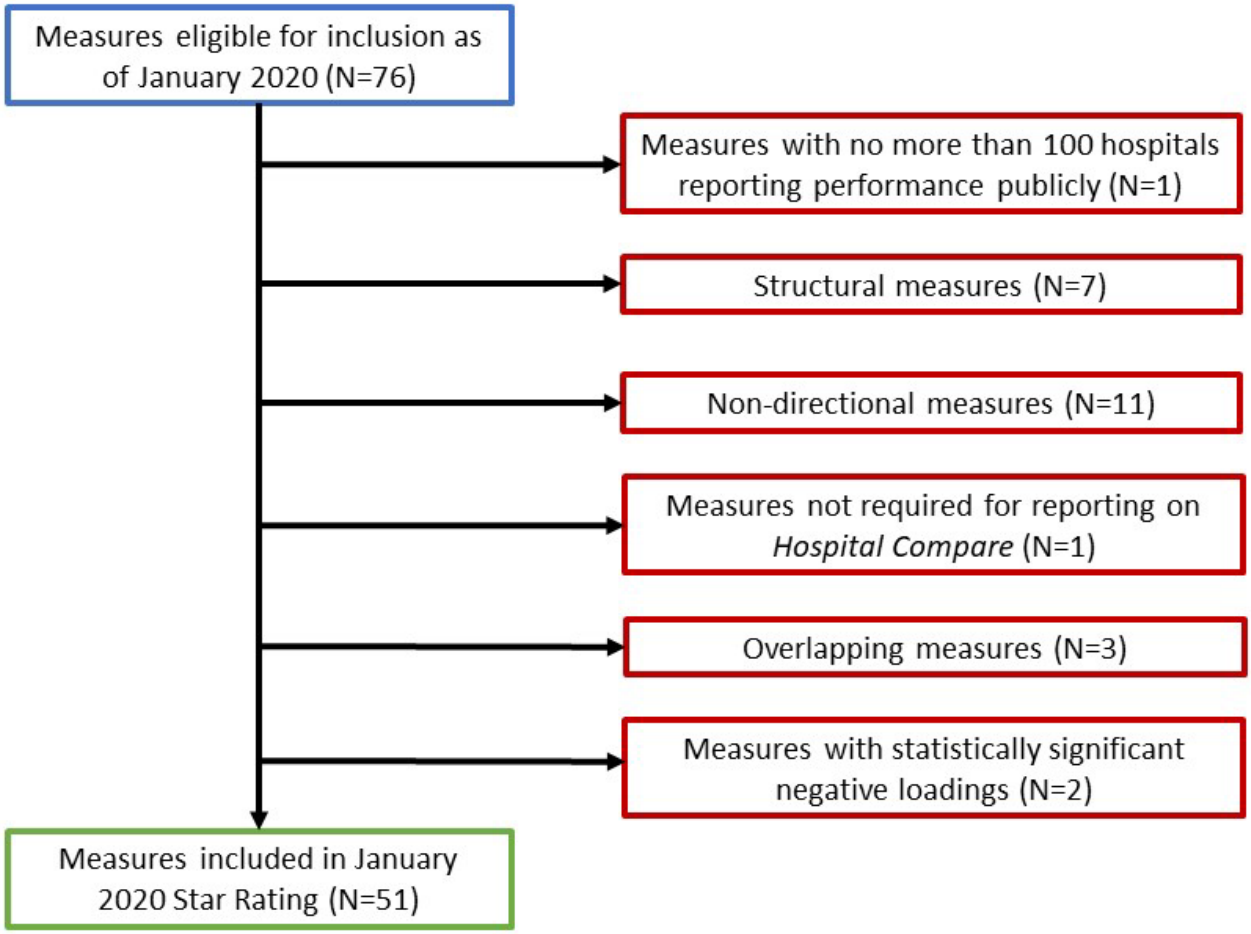
CMS began by compiling all measures available in the October 2019 *Hospital Compare* dataset. Because the Star Rating is intended for acute care hospitals, CMS first excluded all measures on *Hospital Compare* specific to specialty hospitals (such as cancer hospitals or inpatient psychiatric facilities) or ambulatory surgical centers prior to any other measure selection criteria. Additionally, any measures that are retired, suspended, or otherwise not actively reported publicly on *Hospital Compare* are not eligible for inclusion. With these measures omitted, the total number of measures eligible for inclusion in the Star Rating for January 2020 is 76 measures. The Star Rating methodology further limited the number of measures for inclusion to maintain a sound methodology through measure selection criteria, which are presented in the subsequent text and in Figure 1.

Measure Selection Criteria

CMS uses the following criteria to exclude measures from the Star Rating calculation:

1. Measures with no more than 100 hospitals reporting performance publicly;
2. Structural measures without evidence of an association with changes in clinical practice or improved outcomes;
3. Non-directional measures (for which it is unclear whether a higher or lower score is better);
4. Measures not required for reporting on *Hospital Compare*;
5. Overlapping measures (for example, measures that are identical to another measure, measures with substantial overlap in cohort and/or outcome, and measures that are part of an already-included composite measure); and
6. Measures with statistically significant negative loadings estimated by the LVM (measure loadings are reviewed further in Section 3.5).

Figure 1. Measure Selection Flowchart (January 2020)



For a complete list of the measures excluded in January 2020, please refer to Appendix B.

Standardization of Measure Scores

For all included measures, CMS transforms the measures to a single, common scale to account for differences in measure score units and direction. A measure is standardized by subtracting the national mean measure score from each hospital's measure score and dividing by the standard deviation across hospitals. Measure direction is standardized by reversing the direction of the standardized scores for all measures for which "lower score is better," so that the "higher score is better" for all standardized measures.

3.4. Step 2: Assignment of Measures to Groups

Approach to Grouping Measures

CMS organizes measures into groups by measure type (that is, the dimension of quality represented). Groups were finalized with input from a Patient & Patient Advocate Work Group and previous CMS patient and consumer testing. The Star Rating groups are:

- Mortality
- Safety of Care
- Readmission
- Patient Experience
- Effectiveness of Care
- Timeliness of Care
- Efficient Use of Medical Imaging

Measures by Group for January 2020

CMS assigns each measure included in Star Rating to one of seven mutually exclusive measure groups: Mortality (N=7), Safety of Care (N=8), Readmission (N=7), Patient Experience (N=10), Effectiveness of Care (N=9), Timeliness of Care (N=5), and Efficient Use of Medical Imaging (N=5).

For a complete list of the measures in each group, please refer to Appendix C.

3.5. Step 3: Calculation of Latent Variable Model Group Scores

Overview of Latent Variable Model (LVM)

CMS employs LVM to estimate a group score for the dimension of quality represented by the measures in each group. LVM is a statistical modeling approach that has been used to summarize information in a variety of settings ranging from education to healthcare. In Star Rating, LVM assumes each measure reflects information about an underlying, unobserved dimension of quality. A separate LVM is constructed for each group so that a total of seven LVMs are used to calculate the Star Rating. The LVM accounts for the relationship, or correlation, between measures for a single hospital. Measures that are more consistent with each other, as well as measures with larger denominators, have a greater influence on the derived latent variable. Each model estimates, for each hospital, the value of a single latent variable representing the underlying, unobserved dimension of quality; this estimate is the hospital's group score.

Loadings of Measures within Each Measure Group

As noted above, measures that are more consistent (that is, more correlated) with other measures within the group have a greater influence on the hospital's measure group score. The influence of an individual measure on the group score is represented by the measure's "loading."

A loading is empirically derived for each measure in a group when calculating the LVM; these statistically estimated measure loadings are regression coefficients based on maximum likelihood methods using observed data and are not subjectively assigned. A loading reflects the degree of the measure's influence on the group score relative to the other measures included in the same group. A measure's loading is the same across all hospitals. Measures with higher loadings are more strongly associated with the group score than the other measures within that group. All measures included in the Star Rating have an effect on the group score; however, measures with higher loadings have a greater association (or impact) on the group score than measures with lower loadings.

CMS implemented an update beginning in the February 2019 release, whereby measures with statistically significant negative loadings are removed from the final LVM calculations. This decision was intended to improve face validity and model performance. LVM is first estimated using non-adaptive quadrature, then measures with a statistically significant negative loading ($p<0.05$) are removed, and finally, the LVM is re-estimated using non-adaptive and adaptive quadrature. The loadings for the January 2020 Star Rating are reported in Appendix D.

Please note, the loadings for an individual measure are re-estimated each time the Star Rating is updated and can change dynamically as the distribution of hospitals' performance on the measure and its correlation with other measures evolve.

Accounting for Measure Sampling Variation

Hospitals' reported measure scores may include different numbers of patients, depending on the measure. For each measure, some hospitals may report a score based on data from fewer cases while other hospitals report scores based on more cases, resulting in differing precision for each hospital's individual measure score. This variability in precision is usually known as "sampling variation."

CMS gives more weight to more precise measure scores using a weighted likelihood method. This method uses the hospital's measure denominator (for example, number of admissions) to weigh the observed value. A weighted likelihood ensures that a hospital with a larger denominator (that is, a more precise measure score) contributes more in calculating the loadings used to estimate the group score.

In previous reporting periods, for the Healthcare-Associated Infection (HAI) measures within the Safety of Care group, the denominator of predicted infections was used to account for sampling variation. However, CMS made an update beginning in February 2019 to use an alternate variable for HAI denominator weights, changing from predicted infections to one of total device days, number of procedures, or patient days depending on the measure specifications. This decision was based on prior stakeholder feedback and analyses indicating that the change would be more conceptually aligned with denominators within the Safety of Care group and across Star Ratings.

3.6. Step 4: Calculation of the Hospital Summary Score as a Weighted Average of Group Scores

Weighting Scheme

Each hospital's seven measure group scores are combined to create an overall hospital summary score. To calculate the hospital summary scores, CMS takes a weighted average of that hospital's available group scores, assigning each group a policy-based weight (Table 2). This weighting scheme was modified from that used for the Hospital Value-based Purchasing (VBP) program and was thoroughly vetted through the TEP, public input, the hospital dry run, and the Patient & Patient Advocate Work Group.

Table 2. Measure Group Weight for the Star Rating

Measure Group	Star Rating Weights
Mortality (N=7)	22%
Safety of Care (N=8)	22%
Readmission (N=7)	22%
Patient Experience (N=10)	22%
Effectiveness of Care (N=9)	4%
Timeliness of Care (N=5)	4%
Efficient Use of Medical Imaging (N=5)	4%

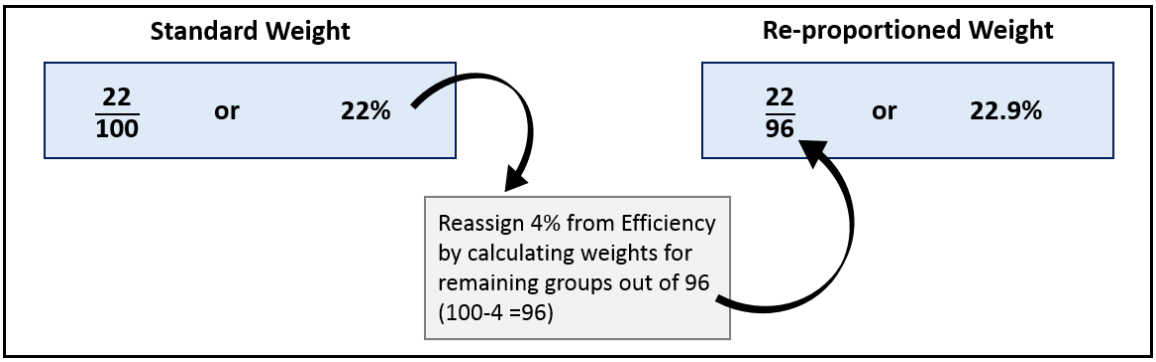
Method for Re-Weighting When Missing Group(s)

If a hospital reports no measures for a given measure group, that group is considered to be "missing." When a hospital is missing one or more groups, CMS applies the same approach as the Hospital VBP program: re-proportioning the weight of the missing group(s) across the groups for which the hospital does report measures. As an example, Table 3 and Figure 2 show how CMS would assign the weighting scheme for a hospital that is missing the Efficient Use of Medical Imaging group.

Table 3. Example Re-Weighting Scheme when Missing Efficient Use of Medical Imaging Group

Measure Group	Standard Weight	Re-proportioned Weight
Mortality	22%	22.9%
Safety of Care	22%	22.9%
Readmission	22%	22.9%
Patient Experience	22%	22.9%
Effectiveness of Care	4%	4.2%
Timeliness of Care	4%	4.2%
Efficient Use of Medical Imaging **(N=0)**	4%	---

Figure 2. Example Calculation for Re-Proportioning Group Weights



3.7. Step 5: Application of Minimum Thresholds for Receiving a Star Rating

Minimum Thresholds for Receiving a Star Rating

CMS evaluated and developed standards, with stakeholder input, regarding the minimum number of measures and groups a hospital must report in order to receive a publicly reported Star Rating on *Hospital Compare*. CMS sets these thresholds to allow for as many hospitals as possible to receive a star rating, without sacrificing the validity and reliability of the Star Rating methodology.

Please note results included in this report may differ from the results posted on *Hospital Compare* due to data suppressed by CMS for one or more quarters. CMS may suppress data for various reasons, such as data inaccuracies.

Minimum Threshold of Measures per Group

The minimum measure threshold for January 2020 is three measures per group.

Minimum Threshold of Groups in Summary Score

The minimum group threshold for January 2020 is three measure groups, with at least one outcome group (that is, Mortality, Safety of Care, or Readmission).

If a hospital meets the minimum threshold of having three groups (one of which must be an outcome group) with at least three measures in each group, any other measures reported by the hospital are also included in the hospital's star rating. That is, any additional measures are included, even if the hospital does not meet the minimum three measure threshold for a given group. This decision ensures that the star rating is inclusive of publicly reported measures and was vetted with the public through an opportunity for public input.

Reporting Thresholds for January 2020 Implementation

On average, hospitals reported five groups and 31 measures for January 2020. A total of 3,603 (78.6%) hospitals on *Hospital Compare* met the public reporting threshold for receiving a star rating in January 2020. The reporting threshold is applied before clustering hospitals into Star Rating categories so that a hospital's star rating is based on its performance relative only to other hospitals for which Star Rating is reported.

3.8. Step 6: Application of Clustering Algorithm to Obtain a Star Rating

Approach for Translating a Summary Score to a Star Rating

To translate each hospital's summary score to a rating between one and five stars, CMS applies *k*-means clustering.

Overview of k-Means Clustering

The *k*-means clustering analysis is a standard method for creating a pre-specified number of categories (or clusters) so that observations in each category are closer to their category mean than to any other category mean. CMS specifies five categories so that the *k*-means clustering analysis generates five clusters (or categories) based on hospital summary scores in a way that minimizes the distance between summary scores (observations) and the average value of their assigned cluster (category mean). K-means clustering organizes hospitals into one of five categories such that a hospital's summary score is "more like" that of the other hospitals in the same category and "less like" the summary scores of hospitals in the other categories. The Star Rating categories are structured such that the lowest group is one star and the highest group is five stars.

The Overall Star Rating methodology uses multiple iterations of clustering to achieve complete convergence (that is when hospitals no longer shift categories with additional iterations). This provides more reliable and stable Star Rating assignments.

3.9. Measure Updates

Several updates to individual measures included in Star Rating were made prior to October 2019 that were carried into the January 2020 refresh. These include:

- The removal of several measures due to the CMS Meaningful Measures Initiative:
    - From the Effectiveness of Care measure group:
        - Aspirin at Arrival (OP-4), and
        - Healthcare Personnel (HCP) Influenza Vaccination (OP-27), however, IMM-3 remains as it is inclusive of more reporting hospitals;
    - From the Timeliness of Care measure group:
        - Door to Diagnostic Evaluation by a Qualified Medical Professional (OP-20),
        - ED-Median Time to Pain Management for Long Bone Fracture (OP-21), and
        - Median Time to Fibrinolysis (OP-1), which historically has been reported by fewer than 100 hospitals and therefore been excluded from Star Ratings;
    - From the Readmission measure group:
        - 30-day stroke readmission (READ-30-STK).

4. Results for January 2020 Implementation of Star Ratings

4.1. Group Performance Category

In addition to a hospital's star rating, CMS reports a group performance category for each of a hospital's available (those meeting the minimum threshold) measure groups. To calculate a performance category, a hospital's group score is compared to the national average group score. The LVM for each group produces a point estimate and standard error that can be used to construct a 95% confidence interval for each hospital's group score for comparison to the national mean group score. The group performance categories are:

- "Above the national average," defined as a group score with a confidence interval that falls entirely *above* the national average;
- "Same as the national average," defined as a group score with a confidence interval that *includes* the national average; and
- "Below the national average," defined as a group score with a confidence interval that falls entirely *below* the national average.

4.2. Distribution of the Star Rating and Group Performance Categories

The Star Rating for January 2020 public reporting was calculated using October 2019 *Hospital Compare* data. The frequency of hospitals by each Star Rating category is shown in Table 4. Of note, the minimum and maximum score for each category will change with each reporting period based on the underlying distribution of hospital summary scores.

Table 4. Frequency of Hospitals by Star Category using *k*-Means

Rating	Number of Hospitals (Frequency)	Summary Score Range in Cluster	Mean (sd)
1 Star	228 (6.33%)	-2.218, -0.821	-1.134 (0.277)
2 Star	710 (19.71%)	-0.814, -0.293	-0.501 (0.143)
3 Star	1,120 (31.09%)	-0.291, 0.090	-0.085 (0.110)
4 Star	1,138 (31.59%)	0.091, 0.478	0.266 (0.110)
5 Star	407 (11.30%)	0.480, 1.713	0.695 (0.217)

Note: The total number of hospitals in the *Hospital Compare* dataset as of October 2019 is 4,586 hospitals. Results shown are for all hospitals meeting the reporting criteria (N=3,603).
Please note results included in this report may differ from the results posted on *Hospital Compare* due to data suppressed by CMS for one or more quarters. CMS may suppress data for various reasons, like data inaccuracies.

Table 5 displays the national average measure group score for each of the measure groups and Table 6 displays the frequency of hospitals in each performance category by group.

Table 5. National Average Measure Group Scores by Measure Group

Group	National Average Measure Group Score
Mortality (N=7)	-0.0018
Safety of Care (N=8)	-0.0288
Readmission (N=7)	-0.0784
Patient Experience (N=10)	0.0004
Effectiveness of Care (N=9)	0.0413
Timeliness of Care (N=5)	-0.0062
Efficient Use of Medical Imaging (N=5)	0.0187

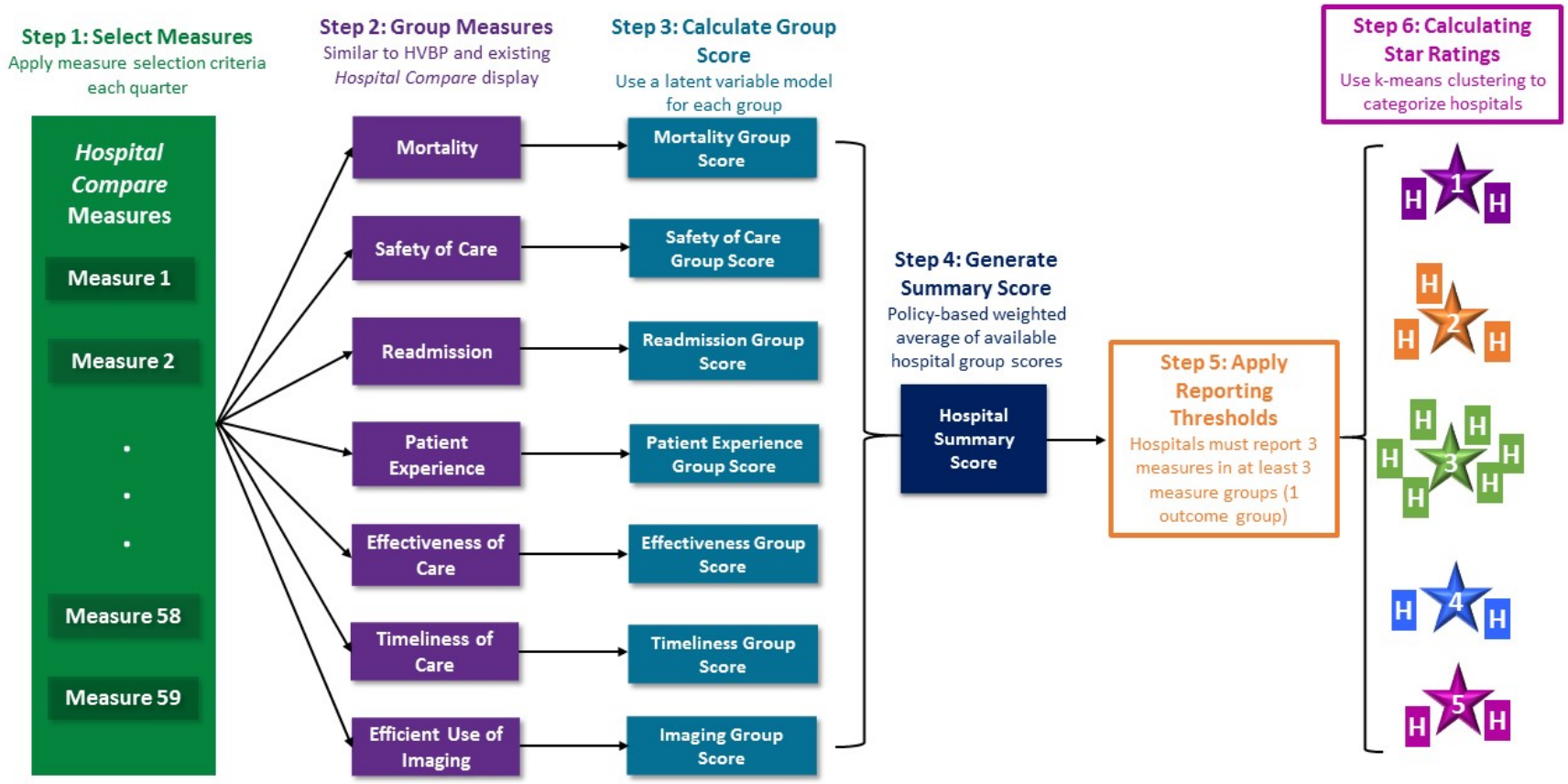
Table 6. Frequency of Hospitals by Group Performance Category

Group	Above the National Average	Same as the National Average	Below the National Average
Mortality (N=7)	382 (11.33%)	2,642 (78.37%)	347 (10.29%)
Safety of Care (N=8)	1,222 (46.48%)	545 (20.73%)	862 (32.79%)
Readmission (N=7)	1,456 (38.69%)	990 (26.31%)	1,317 (35.00%)
Patient Experience (N=10)	1,165 (34.43%)	1,134 (33.51%)	1,085 (32.06%)
Effectiveness of Care (N=9)	103 (3.11%)	2,938 (88.71%)	271 (8.18%)
Timeliness of Care (N=5)	1,305 (33.62%)	1,493 (38.46%)	1,084 (27.92%)
Efficient Use of Medical Imaging (N=5)	340 (11.02%)	2,354 (76.30%)	391 (12.67%)

Note: The total number of hospitals in the *Hospital Compare* dataset as of October 2019 is 4,586 hospitals. Results shown are for all hospitals meeting the reporting criteria (N=3,603).
Please note results included in this report may differ from the results posted on *Hospital Compare* due to data suppressed by CMS for one or more quarters. CMS may suppress data for various reasons, like data inaccuracies.

Appendix A: Flowchart of the Six-Step Overall Hospital Quality Star Rating Methodology

Figure A.1. The Six Steps of the Current Star Rating Methodology



Appendix B: Measures Excluded from January 2020 Star Rating (N=25) by Exclusion Criterion

Measures with no more than 100 hospitals reporting performance publicly

1. OP-2: Fibrinolytic Therapy Received Within 30 Minutes of Emergency Department Arrival

Structural measures without evidence of an association with changes in clinical practice or improved outcomes

1. ACS-REGISTRY Participation in a Multispecialty Surgical Registry
2. SM-5: Inpatient Safe Surgery Checklist
3. SM-6: Patient Safety Culture
4. OP-12: The Ability for Providers with HIT to Receive Laboratory Data Electronically Directly into their ONC-Certified EHR System as Discrete Searchable Data
5. OP-17: Tracking Clinical Results between Visits
6. OP-25: Safe Surgery Checklist Use
7. EDV-1: Emergency Department (ED) Volume

Non-directional measures

1. MSPB-1/SPP-1: Medicare Spending per Beneficiary (MSPB)
2. OP-9: Mammography Follow-up Rates
3. PAYM-30-AMI: Acute Myocardial Infarction (AMI) Payment per Episode of Care
4. PAYM-30-HF: Heart Failure (HF) Payment per Episode of Care
5. PAYM-30-PN: Pneumonia (PN) Payment per Episode of Care
6. PAYM-90-HIP-KNEE: Total Hip Arthroplasty and Total Knee Arthroplasty (THA/TKA) Hip/Knee Payment per Episode of Care
7. CEBP-Cellulitis: Cellulitis Payment
8. CEBP-Cholecystectomy and Common Duct Exploration Cholecystectomy and Common Duct Exploration Payment
9. CEBP-GI Hemorrhage Gastrointestinal Payment
10. CEBP-Kidney/UTI Kidney/Urinary Tract Infection (UTI) Payment
11. CEBP-Spinal Fusion Spinal Fusion Payment

Measures not required for reporting on *Hospital Compare*

1. OP-31 Cataracts: Improvement in Patient's Visual Function within 90 days Following Cataract Surgery

Overlapping measures already captured by another measure

1. READM-30-AMI: Acute Myocardial Infarction (AMI) 30 Day Readmission Rate

2. READM-30-HF: Heart Failure (HF) 30 Day Readmission Rate
3. READM-30-PN: Pneumonia (PN) 30-Day Readmission Rate

Measures with statistically significant negative loadings

1. OP-32: Facility 7-Day Risk Standardized Hospital Visit Rate after Outpatient Colonoscopy
2. IMM-3: Healthcare Personnel Influenza Vaccination

Appendix C: Measures Included in January 2020 Star Rating (N=51) by Group

Mortality

1. MORT-30-AMI: Acute Myocardial Infarction (AMI) 30-Day Mortality Rate
2. MORT-30-CABG: Coronary Artery Bypass Graft (CABG) 30-Day Mortality Rate
3. MORT-30-COPD: Chronic Obstructive Pulmonary Disease (COPD) 30-Day Mortality Rate
4. MORT-30-HF: Heart Failure (HF) 30-Day Mortality Rate
5. MORT-30-PN: Pneumonia (PN) 30-Day Mortality Rate
6. MORT-30-STK: Acute Ischemic Stroke (STK) 30-Day Mortality Rate
7. PSI-4-SURG-COMP: Death Among Surgical Patients with Serious Treatable Complications

Safety of Care

1. HAI-1: Central-Line Associated Bloodstream Infection (CLABSI)
2. HAI-2: Catheter-Associated Urinary Tract Infection (CAUTI)
3. HAI-3: Surgical Site Infection from colon surgery (SSI-colon)
4. HAI-4: Surgical Site Infection from abdominal hysterectomy (SSI-abdominal hysterectomy)
5. HAI-5: MRSA Bacteremia
6. HAI-6: Clostridium Difficile (C. difficile)
7. COMP-HIP-KNEE: Hospital-Level Risk-Standardized Complication Rate (RSCR) Following Elective Primary Total Hip Arthroplasty (THA) and Total Knee Arthroplasty (TKA)
8. PSI-90: Safety Complication/Patient Safety for Selected Indicators (PSI)

Readmission

1. EDAC-30-AMI: Excess Days in Acute Care (EDAC) after hospitalization for Acute Myocardial Infarction (AMI)
2. EDAC-30-HF: Excess Days in Acute Care (EDAC) after hospitalization for Heart Failure (HF)
3. EDAC-30-PN: Excess Days in Acute Care (EDAC) after hospitalization for Pneumonia (PN)
4. READM-30-HOSP-WIDE: Hospital-Wide All-Cause Unplanned Readmission (HWR)
5. READM-30-CABG: Coronary Artery Bypass Graft (CABG) 30-Day Readmission Rate
6. READM-30-COPD: Chronic Obstructive Pulmonary Disease (COPD) 30-Day Readmission Rate
7. READM-30-HIP-KNEE: Hospital-Level 30-Day All-Cause Risk-Standardized Readmission Rate (RSRR) Following Elective Total Hip Arthroplasty (THA)/Total Knee Arthroplasty (TKA)

Patient Experience

1. H-CLEAN-HSP: Cleanliness of Hospital Environment (Q8)
2. H-COMP-1: Nurse Communication (Q1, Q2, Q3)
3. H-COMP-2: Doctor Communication (Q5, Q6, Q7)
4. H-COMP-3: Responsiveness of Hospital Staff (Q4, Q11)
5. H-COMP-5: Communication About Medicines (Q16, Q17)
6. H-COMP-6: Discharge Information (Q19, Q20)
7. H-COMP-7: HCAHPS 3 Item Care Transition Measure (CTM-3)
8. H-HSP-RATING: Overall Rating of Hospital (Q21)
9. H-QUIET-HSP: Quietness of Hospital Environment (Q9)
10. H-RECMND: Willingness to Recommend Hospital (Q22)

Effectiveness of Care

1. IMM-2: Influenza Immunization
2. OP-22: Emergency Department (ED)-Patient Left Without Being Seen
3. OP-23: Emergency Department (ED)-Head Computed Tomography (CT) or Magnetic Resonance Imaging (MRI) Scan Results for Acute Ischemic Stroke or Hemorrhagic Stroke Who Received Head CT or MRI Scan Interpretation Within 45 Minutes of Arrival
4. OP-29: Endoscopy/Poly Surveillance-Appropriate Follow-up Interval for Normal Colonoscopy in Average Risk Patients
5. OP-30: Endoscopy/Poly Surveillance: Colonoscopy Interval for Patients with a History of Adenomatous Polyps – Avoidance of Inappropriate Use
6. OP-33: External Beam Radiotherapy for Bone Metastases
7. PC-01: Elective Delivery
8. SEP-1: Severe Sepsis and Septic Shock
9. VTE-6: Hospital Acquired Potentially-Preventable Venous Thromboembolism

Timeliness of Care

1. ED-1b: Median Time from Emergency Department (ED) Arrival to ED Departure for Admitted ED Patients
2. ED-2b: Admit Decision Time to Emergency Department (ED) Departure Time for Admitted Patients
3. OP-3b: Median Time to Transfer to Another Facility for Acute Coronary Intervention
4. OP-5: Median Time to Electrocardiography (ECG)
5. OP-18b: Median Time from Emergency Department (ED) Arrival to ED Departure for Discharged ED Patients

Efficient Use of Medical Imaging

1. OP-8: Magnetic Resonance Imaging (MRI) Lumbar Spine for Low Back Pain
2. OP-10: Abdomen Computed Tomography (CT) Use of Contrast Material
3. OP-11: Thorax Computed Tomography (CT) Use of Contrast Material
4. OP-13: Cardiac Imaging for Preoperative Risk Assessment for Non-Cardiac Low-Risk Surgery
5. OP-14: Simultaneous Use of Brain Computed Tomography (CT) and Sinus CT

Appendix D: Measure Loadings by Group for January 2020

Table D.1. Mortality Measures and Loading Coefficients

Measure Name	Loading Coefficient
MORT-30-AMI Acute Myocardial Infarction (AMI) 30-Day Mortality Rate	0.48
MORT-30-CABG Coronary Artery Bypass Graft (CABG) 30-Day Mortality Rate	0.30
MORT-30-COPD Chronic Obstructive Pulmonary Disease (COPD) 30-Day Mortality Rate	0.68
MORT-30-HF Heart Failure (HF) 30-Day Mortality Rate	0.72
MORT-30-PN Pneumonia (PN) 30-Day Mortality Rate	0.65
MORT-30-STK Acute Ischemic Stroke (STK) 30-Day Mortality Rate	0.49
PSI-4-SURG-COMP Death Among Surgical Patients with Serious Treatable Complications	0.34

Table D.2. Safety of Care Measures and Loading Coefficients

Measure Name	Loading Coefficient
COMP-HIP-KNEE Hospital-Level Risk-Standardized Complication Rate (RSCR) Following Elective Primary Total Hip Arthroplasty (THA) and Total Knee Arthroplasty (TKA)	0.21
HAI-1 Central-Line Associated Bloodstream Infection (CLABSI)	0.02
HAI-2 Catheter-Associated Urinary Tract Infection (CAUTI)	0.005
HAI-3 Surgical Site Infection from colon surgery (SSI-colon)	0.08
HAI-4 Surgical Site Infection from abdominal hysterectomy (SSI-abdominal hysterectomy)	0.08
HAI-5 MRSA Bacteremia	0.06
HAI-6 Clostridium Difficile (C. difficile)	0.05
PSI-90-Safety Complication/Patient Safety for Selected Indicators (PSI)	0.90

Table D.3. Readmission Measures and Loading Coefficients

Measure Name	Loading Coefficient
EDAC-30-AMI Excess Days in Acute Care (EDAC) after hospitalization for Acute Myocardial Infarction (AMI)	0.33
EDAC-30-HF Excess Days in Acute Care (EDAC) after hospitalization for Heart Failure (HF)	0.44
EDAC-30-PN Excess Days in Acute Care (EDAC) after hospitalization for Pneumonia (PN)	0.42
READM-30-CABG Coronary Artery Bypass Graft (CABG) 30-Day Readmission Rate	0.35
READM-30-COPD Chronic Obstructive Pulmonary Disease (COPD) 30-Day Readmission Rate	0.53
READM-30-HIP-KNEE Hospital-Level 30-Day All-Cause Risk-Standardized Readmission Rate (RSRR) Following Elective Total Hip Arthroplasty (THA)/Total Knee Arthroplasty (TKA)	0.42
READM-30-HOSP-WIDE Hospital-Wide All-Cause Unplanned Readmission (HWR)	0.99

Table D.4. Patient Experience Measures and Loading Coefficients

Measure Name	Loading Coefficient
H-CLEAN-HSP Cleanliness of Hospital Environment (Q8)	0.67
H-COMP-1 Nurse Communication (Q1, Q2, Q3)	0.81
H-COMP-2 Doctor Communication (Q5, Q6, Q7)	0.75
H-COMP-3 Responsiveness of Hospital Staff (Q4, Q11)	0.74
H-COMP-5 Communication About Medicines (Q16, Q17)	0.77
H-COMP-6 Discharge Information (Q19, Q20)	0.70
H-COMP-7 HCAHPS 3 Item Care Transition Measure (CTM-3)	0.89
H-HSP-RATING Overall Rating of Hospital (Q21)	0.92
H-QUIET-HSP Quietness of Hospital Environment (Q9)	0.70
H-RECMND Willingness to Recommend Hospital (Q22)	0.87

Table D.5. Effectiveness of Care Measures and Loading Coefficients

Measure Name	Loading Coefficient
IMM-2 Influenza Immunization	0.30
OP-22 Emergency Department (ED)-Patient Left Without Being Seen	0.50
OP-23 Emergency Department (ED)-Head Computed Tomography (CT) or Magnetic Resonance Imaging (MRI) Scan Results for Acute Ischemic Stroke or Hemorrhagic Stroke Who Received Head CT or MRI Scan Interpretation Within 45 Minutes of Arrival	0.41
OP-29 Endoscopy/Poly Surveillance-Appropriate Follow-up Interval for Normal Colonoscopy in Average Risk Patients	0.45
OP-30 Endoscopy/Poly Surveillance: Colonoscopy Interval for Patients with a History of Adenomatous Polyps – Avoidance of Inappropriate Use	0.60
OP-33 External Beam Radiotherapy for Bone Metastases	0.33
PC-01 Elective Delivery	0.13
SEP-1 Severe Sepsis and Septic Shock	0.44
VTE-6 Hospital Acquired Potentially-Preventable Venous Thromboembolism	0.19

Table D.6. Timeliness of Care Measures and Loading Coefficients

Measure Name	Loading Coefficient
ED-1b Median Time from Emergency Department (ED) Arrival to ED Departure for Admitted ED Patients	0.84
ED-2b Admit Decision Time to Emergency Department (ED) Departure Time for Admitted Patients	0.76
OP-3b Median Time to Transfer to Another Facility for Acute Coronary Intervention	0.16
OP-5 Median Time to Electrocardiography (ECG)	0.22
OP-18b Median Time from Emergency Department (ED) Arrival to ED Departure for Discharged ED Patients	0.80

Table D.7. Efficient Use of Medical Imaging Measures and Loading Coefficients

Measure Name	Loading Coefficient
OP-8 Magnetic Resonance Imaging (MRI) Lumbar Spine for Low Back Pain	0.06
OP-10 Abdomen Computed Tomography (CT) Use of Contrast Material	0.62
OP-11 Thorax Computed Tomography (CT) Use of Contrast Material	0.33
OP-13 Cardiac Imaging for Preoperative Risk Assessment for Non-Cardiac Low-Risk Surgery	-0.003
OP-14 Simultaneous Use of Brain Computed Tomography (CT) and Sinus CT	0.007