THE HOSPITAL STRENGTH INDEX™ METHODOLOGY

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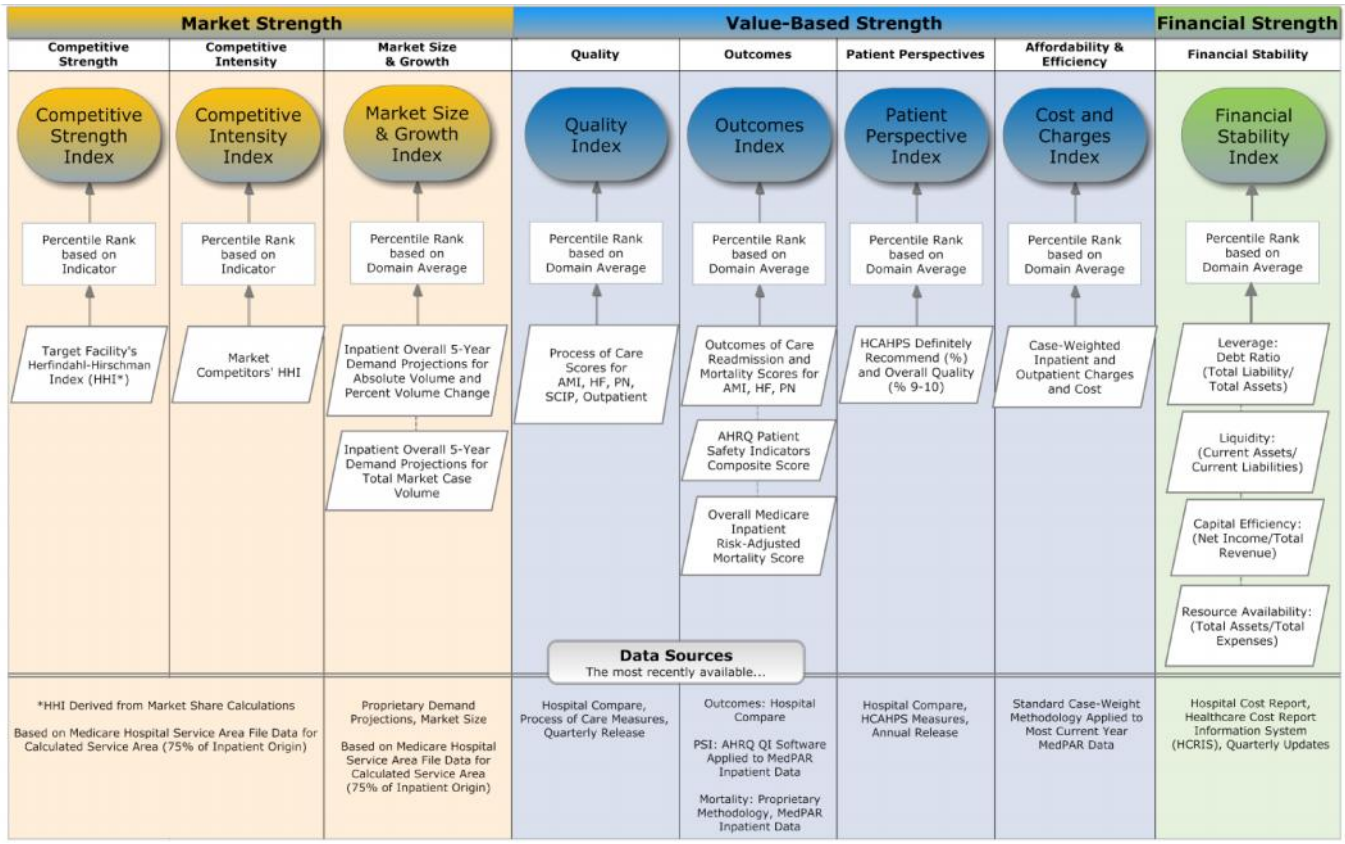
The Hospital Strength Index is designed to provide a comprehensive yet straightforward method for comparing hospital performance. The scoring model aggregates hospital-specific data for over 50 individual metrics and calculates percentile rankings based on performance in comparison to all hospitals in the study group. Eight primary index scores are derived based on the composite scores of their respective components, as outlined in the diagram below. Aggregate scores across the eight indices serve as the basis for a single overall rating – the Hospital Strength Index.

Figure 1 - The Hospital Strength Index™ Methodology Diagram



Data Summary

Unless otherwise noted, data used to produce the Hospital Strength Index are available from public sources, primarily the federal government. All available data are included; no statistical sampling or data projection methodologies are employed, except as noted.

Each release of the Index will be based on the most recently available data for each indicator source. All information included in the 2011 release represents the most recently available data as of August 15, 2011. A summary of data sources is presented below.

Pillar	Data Source	Hospital Strength Index™ 1v5
Quality	Hospital Compare	7/17/2012 Download Date - Process of Care, Patient Safety Indicators ("PSI") from MedPAR 2010
Outcomes	Hospital Compare, MedPAR	7/17/2012 Download Date - Readmission/Mortality, PSI from MedPAR 2010, MedPAR 2011(Mortality)
Patient Perspective	HCAHPS	7/17/2012 Download Date - HCAHPS
Cost and Charges Index	MedPAR, SAF_OP	MedPAR 2011, Standard Analytical File O/P 2010
Financial	HCRIS	2012 Q1
Competitive Strength	ESRI, CMS	2011-2016 Update, CMS Area File 2011
Competitive Intensity	ESRI, CMS	2011-2016 Update, CMS Area File 2011
Market Size and Growth	ESRI, CMS	2011-2016 Update, CMS Area File 2011

Methodology Summary

Calculation of the Hospital Strength Index is based on a composite measure of eight indices of hospital strength: Competitive Strength, Competitive Intensity, Market Size and Growth, Quality, Outcomes, Patient Perspectives, Cost & Charge, and Financial Stability. A series of calculations are performed on each indicator set to produce a final index score, as outlined below:

1) Source information comprised of "raw" hospital-specific data is compiled; in some instances, such as calculation of Medicare market share, calculations are performed on raw data to create standardized hospital-specific data;

2) For components with multiple measure sets, mean averages are calculated across all available indicators to derive a composite average;

3) National percentile rankings are calculated for each composite average;

4) For domains with multiple composite percentile scores, mean averages are calculated across all percentile scores to derive an index average;

5) National percentile rankings are calculated for each index average to derive a final index score for each area.

Indicators that cannot be ranked due to missing or excluded data are disregarded in index level calculations.

Hospitals in the Study Group

The Index strives to include all eligible U.S. active, short-term, acute care, non-specialty, non-federal hospitals in the study group. The most recently available CMS Hospital Provider of Services (POS) file is used to determine the initial universe of eligible hospitals. The file contains an individual record for each Medicare-approved provider and is updated quarterly. This dataset is cross checked against other available sources of record, including the AHA Hospital Directory, to confirm hospital identity and status and further determine appropriateness for inclusion.

Hospital inclusion is based on the following criteria:

1) Specialty Hospitals:
   a. Hospitals designated as specialty hospitals in the CMS Hospital Provider of Services file are excluded; these include psychiatric, rehab, long-term care, surgical specialty and other specialty facilities;

   b. Governmental facilities including Veterans Administration, Indian Health Service hospitals and related Federal facilities are excluded;

   c. Hospitals with 80 percent of their MS-DRG inpatient case mix concentrated in three or fewer Major Diagnostic Categories (MDCs) are excluded; and

   d. Hospitals designated as cancer centers are excluded.

2) Geography: Hospitals in U.S. Territories are excluded.

3) Data Exclusions:
   a. Hospitals missing critical financial indicators, including revenue and balance sheet data, in their Medicare Hospital Cost Report Information System filings are excluded; and

   b. Hospitals missing scores in more than three of the eight primary indices due to lack of supporting data are excluded.

4) New or Changed Hospitals: New hospitals and facilities that began participating in the Medicare program in 2010, including facilities that changed classification (such as conversion to a Critical Access Hospital), are excluded.

This process identified a total of 4,455 hospitals that were included in the final study. Of that total, 1,268 facilities are designated as Critical Access hospitals.

Index Methodology and Data Source Details

Descriptions of the specific data sources and methodologies employed in the calculation of the Hospital Strength Index™ and its primary components are detailed below.

Hospital Strength Index Components
The Hospital Strength Index is comprised of one overall hospital performance rating, three category composite scores and eight domain index scores, as outlined below:

- **Overall Strength:**
  - **Hospital Strength Index:** A rating of overall hospital performance based on the percentile rank of the aggregate total scores of the eight domain indices.

- **Category Composites:**
  - **Market Strength Index:** An overall rating of market factors – including market position (share), competition, and size and growth – based on the percentile rank of the aggregate total score of the three Market Strength domain indices.

  - **Value-Based Strength Index:** An overall rating of value factors – including quality, outcomes, patient perception, and cost & charge– based on the percentile rank of the aggregate total score of the five Value-Based Strength domain indices.

  - **Financial Strength Index:** An overall rating of financial factors – including leverage, liquidity, capital efficiency and resource availability – based on the percentile rank of the Financial Stability domain index.

- **Domain Indices:**
  - **Competitive Strength Index:** A rating of market position (share) based on the percentile rank of the target facility's Herfindahl-Hirschman Index score (defined in detail below).

  - **Competitive Intensity Index:** A rating of the concentration of market power based on the percentile rank of the aggregate Herfindahl-Hirschman Index score for all competing hospitals in the target facility's market.

  - **Market Size & Growth Index:** A rating of market potential based on the percentile rank of the five-year projected growth in healthcare demand and five-year projected total Inpatient case volume for the target facility's market.

  - **Quality Index:** A rating of hospital performance based on the percentile rank of a composite average across the five categories of Hospital Compare Process of Care measures.

  - **Outcomes Index:** A rating of hospital performance based on the percentile rank of a composite average across the six categories of Hospital Compare Outcomes of Care measures, the percentile rank of the AHRQ Patient Safety Indicators Composite Score, and the percentile rank of a proprietary overall Medicare Inpatient mortality score.

  - **Patient Perspective Index:** A rating of hospital performance based on the percentile rank of a composite average of two Hospital Compare HCAHPS measures (Overall Rating and Recommend).

  - **Costs and Charges Index:** A rating of hospital performance based on the percentile rank of the Medicare Inpatient and Outpatient average overall costs and charges.

  - **Financial Stability Index:** A rating of hospital performance based on the percentile rank of a select set of balance sheet and income statement financial ratios.

Market Strength Components

A primary service area is calculated for each hospital in the study group to serve as a basis for all market indicators. A hospital's market is defined as lowest number of zips from which the facility draws 75 percent of its Medicare Inpatients. Four categories of market indicators are then calculated as defined below. The market definition and all Index calculations are based on the most currently available year of Medicare Service Area File data.

Index	Competitive Strength Index
Category	**Market Strength**
Indicator	Target Facility's Herfindahl-Hirschman Index (HHI) score
Data	**Medicare Service Area File**
Methodology	Each hospital's overall market share percentage is first calculated based on the 75 percent service area defined above. The target hospital's Herfindahl-Hirschman Index (HHI) score is then derived as the square of the market share percentage, expressed on a scale from zero to 10,000. (The scale is based on a maximum share of 100 percent, where 100^2 = 10,000.)
Scoring	**Percentile rankings are calculated based on the HHI scores. Higher scores receive higher rankings. Domain and index scores are then calculated as applicable per the methodology detailed above.**
Notes	The Herfindahl-Hirschman Index is a commonly accepted measure of market concentration. The U.S. Department of Justice uses the HHI for evaluating mergers. For more information see http://www.justice.gov/atr/public/testimony/hhi.htm, http://en.wikipedia.org/wiki/Herfindahl_index.

Index	Competitive Intensity Index
Category	**Market Strength**
Indicator	Market Competitors' Herfindahl-Hirschman Index (HHI) score
Data	**Medicare Service Area File**
Methodology	Each hospital's overall market HHI score is first calculated based on the 75 percent service area defined above. The overall market HHI score is calculated as the square of the market share percentage for each hospital that maintains a one (1) percent or greater share in that market (in order to better focus competition at the market level and reduce the data "noise" influenced by factors like emergent Inpatient admissions from relatively distant zip codes). The sum of the square of market shares equals the overall market HHI score, expressed on a scale from zero to 10,000. To determine the true level of competition that exists in a hospital's market relative to that hospital, the target hospital's HHI score is removed from the overall market HHI score to calculate the "Net" Market – or Market Competitors' – HHI score (Net Market HHI = Gross Market HHI Score – Target Facility's HHI Score).
Scoring	**Percentile rankings are calculated based on the HHI scores. Lower scores receive higher rankings. Domain and index scores are then calculated as applicable per the methodology detailed above.**
Notes	The power of the HHI calculation is derived from its exponential function. In service areas where market power is shared more equally among dominant competitors, both competitors contribute significantly to the overall market HHI score. When the target hospital's impact on the overall score is removed, the impact of the secondary competitor still drives a relatively high net market HHI score (see Market 1 example below). Whereas in markets with a single dominant hospital and more numerous, smaller competitors – i.e., where residual market power is more diffusely concentrated – removing the dominant hospital's impact dramatically decreases net HHI scores (see Market 2 example below). The Index considers more diffusely concentrated markets with lower "Net" Market – or Market Competitors' – HHI scores to represent a less direct competitive threat to the target hospital. Thus lower Net Market HHI scores are given higher rankings. **Examples:** ***Market 1 has two dominant hospitals: Facility A ("Target" hospital) maintains 40% market share, Facility B maintains 35%. Ten other hospitals each get 2.5% market share.*** ▪ ***Overall Market HHI: $40^2 + 35^2 + (2.5^2 * 10) = 1,600 + 1,225 + 62.5 = 2,887.5$*** ▪ ***Net Market HHI: 2,887.5 - 1,600 = 1,287.5*** ***Market 2 has one dominant hospital: Facility C ("Target" hospital) maintains 70% market share, Facility D maintains 10%. Ten other hospitals each get 2% market share.*** ▪ ***Overall Market HHI: $70^2 + 10^2 + (2^2 * 10) = 4,900 + 100 + 40 = 5,040.0$***

Index	Market Size and Growth Index
Category	**Market Strength**
Indicators	▪ Five-Year Inpatient Demand Projections - Total Market Inpatient Discharge Volume ▪ Five-Year Inpatient Demand Projections - Absolute Volume Growth and Percent Volume Growth
Data	**Medicare Service Area File**
Methodology	Demand projections use proprietary use rates methodologies based on 18 distinct cohorts combining age, gender and DRG-specific rates derived for each state
Scoring	**Percentile rankings are calculated based on the indicators above. Higher scores receive higher rankings. Domain and index scores are then calculated as applicable per the methodology detailed above.**
Notes	The Index's Inpatient Demand Projections utilize proprietary models to forecast healthcare utilization for specific services in a market. The demand methodology is based on utilization rate models specific to each state. Use rates are computed based on state-specific utilization patterns derived from public and private discharge data sources. Use rates are calculated at the MS-DRG level for 18 age categories for each gender, with specific adjustments for newborns and neonates. Use rates are then applied to a facility's local market demographics and growth projections to derive demand forecasts.

Value-Based Strength Components

The primary source of the Hospital Strength Index Value-Based components is the U.S. Department of Health & Human Services Hospital Compare web site (HospitalCompare.hhs.gov). The database is obtained using the "Downloadable Database" option presented on the site.

All data incorporated in the Index rating system are used as reported in the database without modifications. For more information regarding Hospital Compare data collection and reporting, including technical specifications and data collection periods, reference the links below.

- http://www.hospitalcompare.hhs.gov/staticpages/for-professionals/poc/data-collection.aspx
- http://www.hospitalcompare.hhs.gov/staticpages/help/hospital-resources.aspx

Index	Quality Index
Category Indicator	**Value-Based Strength** Hospital Compare Process of Care Measures
Data	**Process of Care Measures (# of Measures):** ▪ **Heart Attack (7)** ▪ **Heart Failure (4)** ▪ **Pneumonia (6)** ▪ **Surgical Care Improvement Program (SCIP) (9)** ▪ **Outpatient (7)**
Methodology	Mean averages of raw indicator measures (percentages) are calculated to produce domain composite scores. All available data is used in the calculation of mean averages. Missing data within measure sets are ignored.
Scoring	**Percentile rankings are calculated based on the domain composite scores. Higher scores receive higher rankings. Domain and index scores are then calculated as applicable per the methodology detailed above**.
Notes	The initial Quality indicators incorporated in the Index represent the most generally established and accepted public measure sets in the industry. Newer, more controversial measures and measures that are not broadly representative have been purposefully omitted. The incorporation of additional measures in future methodology will be considered based on industry consensus and acceptance.

Index	Outcomes Index
Category	**Value-Based Strength**
Indicator	Hospital Compare Outcomes of Care Measures
Data	**Outcomes of Care Measures (# of Measures):** ▪ **30-Day Hospital Readmission Rates for Heart Attack, Heart Failure, Pneumonia (3)** ▪ **30-Day All-Cause Mortality Rates for Heart Attack, Heart Failure, Pneumonia (3)**
Methodology	Mean averages of raw indicator measures (percentages) are calculated to produce domain composite scores. All available data is used in the calculation of mean averages. Missing data within measure sets are ignored.
Scoring	**Percentile rankings are calculated based on the domain composite scores. Lower scores receive higher rankings. Domain and index scores are then calculated as applicable per the methodology detailed above.**
Notes	The initial Outcomes indicators incorporated in the Index represent the most generally established and accepted public measure sets in the industry. Newer, more controversial measures and measures that are not broadly representative have been purposefully omitted. The incorporation of additional measures in future methodology will be considered based on industry consensus and acceptance.

Index	Outcomes Index
Category	**Value-Based Strength**
Indicator	Agency for Healthcare Research and Quality Patient Safety Indicators Composite Score
Data	**2010 CMS MedPAR Data**
Methodology	The AHRQ QI SAS® v 4.2 software is applied to 2010 MedPAR data to generate the PSI Composite Score for each hospital
Scoring	**Percentile rankings are calculated based on the PSI Composite scores. Lower scores receive higher rankings. Domain and index scores are then calculated as applicable per the methodology detailed above.**
Notes	For more information, see http://www.qualityindicators.ahrq.gov/Modules/psi_overview.aspx.

Index	Outcomes Index
Category	**Value-Based Strength**
Indicator	Proprietary Overall Inpatient Risk-Adjusted Mortality Rates
Data	**Medicare Provider Analysis and Review (MedPAR)**
Methodology	Exclusions: To identify qualifying patients, an initial exclusion of MedPAR records is performed based on the age, admission source and discharge status of patients. Patients 65 years of age or older that were transferred from another hospital, home health agency or SNF or were discharged to another short-term hospital were excluded. Patients with an MS-DRG code of 998 or 999 were also excluded. After exclusions, the data were stratified into 75,000 distinct cohorts based on the MS-DRG (severity-adjusted), age, gender, race, presence of obesity diagnosis codes, and whether or not the admission source was the emergency department. The mortality rates for each cohort were determined for the entire sample based on patient mortality for any cause within thirty days of admission. These rates are then applied to each hospital's patient base by matching patient characteristics to the appropriate cohorts. An overall expected rate of mortality was derived for the hospital and compared to the actual number of deaths reported for that hospital in the MedPAR dataset. Finally, the number of positive or negative standard deviations from the expected rate is calculated for each hospital.
Scoring	**Percentile rankings are calculated based on the number of standard deviations from the expected rate. A higher number of positive standard deviations receives a higher ranking; a higher number of negative standard deviations receives a lower ranking. Domain and index scores are then calculated as applicable per the methodology detailed above.**
Notes	

Index	Patient Perspectives Index
Category	**Value-Based Strength**
Indicators	Hospital Compare Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) Measures
Data	**HCAHPS Measures (# of Measures):** ▪ **Percent of Respondents Who Would Definitely Recommend the Hospital (1)** ▪ **Percent of Respondents Who Give Hospital Overall Rating of 9-10 (1)**
Methodology	Mean averages of raw indicator measures are calculated to produce a composite score. All available data is used in the calculation of mean averages. Missing scores results in a zero for the pillar.
Scoring	**Percentile rankings are calculated based on the domain composite scores. Higher scores receive higher rankings. Domain and index scores are then calculated as applicable per the methodology detailed above.**
Notes	

Index	Cost and Charges Index
Category	Value-Based Strength
Indicators	▪ Medicare Case-Mix Adjusted Average Inpatient Costs and Charges ▪ Medicare Case-Mix Adjusted Average Outpatient Costs and Charges
Data	Medicare Provider Analysis and Review (MedPAR), Medicare Outpatient Standard Analytical File
Methodology	An overall average cost-to-charge ratio is computed for each hospital based on total charges and costs as reported in the Medicare Hospital Cost Report Information System. To calculate Inpatient average costs and charges, a hospital's cost-to-charge ratio is applied to MedPAR Inpatient charge data at the claim/patient level and adjusted based on the CMS-assigned case weight for that claim's MS-DRG code. A hospital's costs and charges are aggregated for all Inpatients to derive overall averages. To calculate Outpatient average costs and charges, a hospital's cost-to-charge ratio is applied to Medicare Outpatient Standard Analytical File charge data at the claim/HCPCS level and adjusted based on the CMS-assigned case weight for that claim's APC (Ambulatory Payment Classification) code. A hospital's costs and charges are aggregated for all Outpatients to derive overall averages.
Scoring	Percentile rankings are calculated based on the each cost and charge indicator. Lower scores receive higher rankings. Domain and index scores are then calculated as applicable per the methodology detailed above.
Notes	

Financial Strength Components

Index	Financial Stability Index
Category	**Financial Strength**
Indicators	▪ Leverage: Total Liability/Total Assets ▪ Liquidity: Current Assets/Current Liabilities ▪ Capital Efficiency: Net Income/Total Revenue ▪ Resource Availability: Total Assets/Total Expenses
Data	**Medicare Hospital Cost Report Information System (HCRIS), SEC Edgar filings, Merritt Research Services, LLC audited financial states**
Methodology	The above ratios are calculated for each hospital based on the most recently available HCRIS Hospital Cost Report data, except for large national hospital systems as noted below. The capital efficiency ratio is weighted at 50% of the Financial Stability Index. The other three indicators are equally weighted to calculate the remaining 50%. This weighting adjusts for a number of factors, most notably that the capital efficiency ratio is the single best predictor of hospital solvency per the research study cited below. It also balances the use of a single income statement to multiple balance sheet ratios For large national investor-owned and not-for-profit healthcare systems, the systems' consolidated ratios for leverage, liquidity and resource availability are used for all facilities in a system in place of HCRIS data. This data is sourced from SEC Edgar filings and audited cost reports from Merritt Research Services, LLC. The capital efficiency indicator is based on HCRIS Hospital Cost Report data for all hospitals included in the study.
Scoring	**Percentile rankings are calculated based on each financial indicator. Higher scores receive higher rankings for all indicators except leverage, where lower scores receive higher rankings. Domain and index scores are then calculated as applicable per the methodology detailed above.**
Notes	The use of consolidated ratios for large systems is necessary in order to produce comparable metrics across the broadest hospital sample, as the accounting and cash flow management practices of these systems impacts HCRIS balance sheet reporting. The Financial Stability Index is adapted from academic research that identified the financial ratios most correlated to long-term fiscal viability. See: Lynn, M., & Wertheim, P. (1993). *Key Financial Ratios Can Foretell Hospital Closures*. HFMA Journal, 47(11), 66-70.