



The Hospital Strength Index™ Study Overview, Findings and Methodology

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Introduction

The Patient Protection and Affordable Care Act (PPACA) has been called the largest piece of social legislation in our lifetime. Regardless of one's perspective on whether this Act will rectify the solvency concerns of the Medicare Program as we know it today, one cannot ignore the potential impact that this legislation may have on the U.S. Hospital Industry. Twice before in our lifetimes, we have seen significant legislation that impacted the U.S. Hospital Industry in ways that are comparable. The Tax Equity and Fiscal Responsibility Act (TEFRA) of 1982 imposed the implementation of a DRG-based reimbursement system for hospitals in 1983. The Balanced Budget Act (BBA) of 1997 and the Balance Budget Refinement Act (BBRA) created the greatest financial instability that hospitals have experienced since the creation of Medicare in 1965.

The Congressional Budget Office's estimate of Medicare spending reductions at the time of the BBA enactment was \$103 billion. In those years, the BBA was projected to reduce Medicare spending by \$227 billion between 1998 and 2002. The PPACA in today's dollars is expected to decrease Medicare spending by \$500 billion, more than twice to five times that of the BBA.

The results of the implementation of TEFRA and BBA had significant, negative impact on the U.S. hospital industry, which led to the closure and consolidation of hospitals throughout the country. The impact of PPACA on the U.S. hospital industry could be equally as transformational, given the state of the U.S. economy, the rate of medical inflation, and the real dollar reductions coming from the Medicare and Medicaid programs throughout the country.

The Hospital Strength Index™ has been designed to deliver to each U.S. Hospital a balanced scorecard and comparable rating of their performance pursuant to the enactment of the Affordable Care Act. This index is a balanced scorecard to be used by hospital trustees and boards of directors to understand their relative performance and comprehend the 56 different performance metrics which address the critical aspects of sustainability: Market, Value-Based and Financial measures of comparative performance.

Now is not the time to be complacent about market share, size or growth. Now is not the time to believe that price increases can solve operational inefficiencies. Now is not the time to believe that endowments will grow to solve the income and balance sheet weaknesses that are required to sustain hospital care in a community.

The Affordable Care Act has introduced so many new rules, that the old rules no longer apply. The new rules are equally complex, and living in the transition requires one to operate with one foot in each world. Progressive organizations will take charge of their current situation and stay focused on measuring the right things, while still measuring all things. It won't be easy. But the Hospital Strength Index is one important tool for bringing all of the measures together in one place, one number, for one purpose – to sustain care for your community.

Study Overview

The study of Hospital Strength seeks to provide benchmark performance across a variety of hospital peer groups, including:

- Among Urban, Rural and Critical Access Hospitals,
- Between Investor-Owned and Not-for-Profit hospitals,
- Between System-Affiliated and Free-Standing hospitals,
- Among five bed size cohorts, and
- Among four major Census Regions: Northeast, Midwest, South, and West.

For the first time, smaller and rural hospital cohorts are included in a nationwide performance assessment, including the majority of Critical Access Hospitals (CAHs) that represent over 1,300 institutions. By definition CAHs are typically located in rural areas (35 miles from the next hospital), often sole community providers, and limited in length of stay (less than 96 hours) as determined by their exemption from the Prospective Payment System.

A seminal factor for the industry and the Hospital Strength Index is the inclusion of market factors, a feature commonly found in public company analysts' reports of businesses and product lines in other industries. The presence of new market-based factors, as directed by the Patient Protection and Affordable Care Act (PPACA), dictates a new and renewed focus on population and market dynamics, including but not limited to health services demand, patient migration, and market diffusion – the latter a critical factor in the analysis of anti-competitive oversight by the Department of Justice.

Hospital Strength Index performance comparisons and monitoring comes at a time when there is significant concern by hospital executives about the amount of new regulation, compliance and oversight being placed upon them by the PPACA. In a July 2011 U.S. News & World Report Survey of Hospital Executives, 59.1% of key executives responded that they were “Extremely concerned” about the impact of increased regulatory mandates and oversight. Furthermore, 64.0% were “Extremely concerned” about aligning their hospital’s operating costs with post-reform reimbursement in the next three years. And, while approximately one-third of respondents said that it is likely they will participate in an ACO over the next three years, only 6.8% thought it was “Extremely likely” that ACOs will significantly improve the quality and efficient delivery of healthcare.¹

Hospital strength is synonymous with sustainability at levels that allow continuous provision of care in a market with high levels of quality and safety that are affordable, efficient and satisfactory to the community. It is a tall order to be able to do everything well in managing a hospital or health system. A

¹ U.S. News & World Report Survey of 1,852 hospital executives, July 2011

bad economy matched with high unemployment rates, shortages of qualified nursing professionals and limits in the number of employed primary care physicians make it difficult to staff what is already a high-demand service. Adding to the already difficult management challenges are the increased oversight and compliance requirements. In total, all these hurdles and more make maintaining a strong hospital a very difficult task.

Likewise, hospital boards of directors and trustees are challenged to gain independent and objective validations that ensure their hospital is positioned to provide sustainable benefit to the community. The Hospital Strength Index encapsulates the essence of the complexity of running a hospital by incorporating the measures on which the industry has worked hard to gain consensus and standardize. In our collective experience with operating and advising hospitals, rating and monitoring hospital performance, and integrating information into strategy and market development, we know well the axiom that you cannot change what you do not measure. We also know that there is no silver bullet that allows one organization to be more sustainable than another. Rather, there is a broad report card of metrics that all matter. Our presentation of the Hospital Strength Index is the synthesis of performance measures that will help to drive strategy and development under the New Healthcare.

Overall Strength

We have taken guidance from published rules from the Centers for Medicare and Medicaid Services (CMS) on Value Based Purchasing (VBP) in our identification of hospitals that are strongest by studying the marked performance at the 75th percentile or higher. While there is no magic point of performance for an industry as large and complex as the hospital industry, we see a fairly normal distribution of hospital performance across the 4,455 hospitals that qualified for ratings in this study. The good news is that the industry is robust with high levels of acceptable performance centered on the median. Yet, we see a fairly specific level of strong performance in the top quartile, and we see it in institutions underrepresented by big brands or academic medical centers. We see strong hospitals in communities all across America — a sign that strength is both achievable and not endemic to any one class of organization.

We also see clusters of strong hospital care as evidenced in the analysis of Strength Index scores in the Top 12 Strongest U.S. Healthcare Markets in the country. And here once again, the strength is not manifested in the usual major urban centers that reputation has led many to believe are the best. The Strongest Markets reveal aggregate mean performance in the top quartile of performance when compared nationally. This is noteworthy and worth further exploration in that it suggests there may be something about location and geography — competition, collaboration, or other unknown factors — that drives higher market, value-based and financial performance.

The Top 12 Strongest U.S. Healthcare Markets

The Top 12 Best U.S. Healthcare Markets have average Hospital Strength Index scores in the top quartile of performance. The markets are located in 11 states and represent a combined population of over 15.5 million residents who benefit from the presence of strong hospitals.

The Top 12 Strongest U.S. Healthcare Markets

Based on the 2011 Hospital Strength Index Ratings

CBSA* Code	Market / CBSA Name	2010 Population	Number of Hospitals	Average Hospital Strength Index Score
16740	Charlotte-Gastonia-Rock Hill, NC-SC	1,793,478	11	88.77
16700	Charleston-N. Charleston-Summerville, SC	671,833	5	87.52
36260	Ogden-Clearfield, UT	555,595	4	85.43
28940	Knoxville, TN	702,744	7	82.66
14860	Bridgeport-Stamford-Norwalk, CT	906,634	6	79.87
19740	Denver-Aurora-Broomfield, CO	2,601,114	16	78.30
38860	Portland-South Portland-Biddeford, ME	524,531	8	77.31
27260	Jacksonville, FL	1,389,042	10	77.27
41740	San Diego-Carlsbad-San Marcos, CA	3,120,279	15	76.45
19660	Deltona-Daytona Beach-Ormond Beach, FL	508,913	5	75.69
37340	Palm Bay-Melbourne-Titusville, FL	558,359	5	75.50
38900	Portland-Vancouver-Hillsboro, OR-WA	2,255,276	16	75.34

*Core Based Statistical Area

The Strongest U.S. Healthcare Markets were designated based on the highest average Hospital Strength Index scores for all hospitals located in the CBSA. The Top 12 markets represent the strongest of 104 CBSAs with a population equal to or greater than 500,000 people that were eligible for designation.

When comparing Hospital Strength Index category performance in the Top 12 Strongest Markets to the bottom 12 markets in the 104 CBSAs, the clear differentiator is performance of the Top 12 in the Value-Based Strength category, which measures clinical quality and outcomes, patient experience, and efficiency and affordability. The Top 12 markets also score decidedly higher in Market Strength, which rates hospitals' market dominance, as well as the competitive intensity and size and growth potential of the healthcare market.

Top and Bottom Strongest U.S. Healthcare Market Comparison

Average Hospital Strength Index Scores by Category

	Total Number of Hospitals	Hospital Strength Index Score	Market Strength	Value-Based Strength	Financial Strength
Top 12 Markets	108	80.01	69.09	80.36	57.81
Bottom 12 Markets	126	43.17	39.90	49.41	41.16

National Findings

Included below is a review of Hospital Strength Index peer group comparisons at the 75th percentile.

- **Urban vs. Rural Hospitals** – Urban hospitals dominate the peer groups on differentiation of hospital strength. Urban hospitals when viewed at the 75th percentile outperformed all hospitals by 4.4% inclusively and outperform rural hospitals by 41.1% when compared exclusively. Further to their dominance, at lesser levels of performance such as the 50th percentile, urban hospitals performed 54.6% better than rural hospitals. At the 25th (lowest) quartile, urban hospitals outperformed rural hospitals by 64.5%, revealing that as performance improves from the 25th to 75th percentile, the performance gap between these significant peers narrows by more than one-third.
- **Rural vs. Critical Access Hospitals** – Rural hospitals present with only a nominal overall Strength Index score outperforming CAHs by 6.28% when scored at the 75th percentile. As the quartile performance changes, the peers maintain a consistent differentiation as performance increases from the bottom quartile to the top quartile, representing less than a 10% swing from the lowest to highest quartile of strength performance. Critical Access Hospitals, which are exempt from the Prospective Payment System and not required to participate in VBP or to participate in other public pay-for-reporting initiatives, perform more like rural hospitals that do comply with those regulatory oversight and public reporting compliance requirements.
- **Investor-owned vs. Not-for-profit Hospitals** – Not-for-profit hospitals outperform investor-owned hospitals nominally by 2.98% when measured at the 75th percentile benchmark and perform worse than investor-owned by 3.3% when viewed at the median benchmark. At the lowest benchmark, or 25th percentile, investor-owned hospitals' Strength Index scores were 12.6% lower than those of not-for profit hospitals. As overall Strength Index performance increases, the gap between the performance of investor-owned and not-for-profit markedly narrows.
- **System-affiliated vs. Freestanding Hospitals** – This peer group reflects one of the characteristics that can be managed by any hospital operator. Whereas few management teams can physically move their geographic location from rural to urban or change their ownership status, they can determine whether to deploy the benefits of affiliation in a system or network of hospitals. When studied at the 75th percentile benchmark, system-affiliated hospitals outperformed freestanding by 8.57%. At the 50th percentile the benefit was 18%, and at the 25th percentile the benefit was by nearly 33%. Although the system affiliation cohort realizes a decreasing advantage as overall performance increases, it starts and ends at an overall advantage on a hospital trait that is quite manageable.
- **Large vs. Median vs. Small Hospitals** – Hospital bed size (as determined by the hospital-reported total beds in service) has a linear and favorable influence on overall hospital strength as the number of beds increases. We find a 40% favor in performance in the largest cohort of hospitals (400+ Beds)

compared to the smallest (fewer than 100 beds) when measured at the 75th percentile benchmark and see a linear progression of Strength Index performance as the number of beds increases from one bed cohort to the next largest. All sizes of hospitals are represented in the 75th percentile of benchmark performance, including twenty-one (21) Critical Access Hospitals reaching above the PPS threshold for VBP rewards.

- **Regional Variation in Hospital Strength Performance** – Geography as divided by the major categories of Northeast, Midwest, South and West provided little discernable explanation or contribution toward Strength Index performance. The highest scoring region at the 75th percentile is the West region and that region outperforms the lowest performing Midwest region by only 4.9%. The West region was less than 1% better in overall Strength Index score when compared to the Northeast. And while the West had better aggregate scores at the 50th and 25th percentiles than the Midwest, the large regions seemed to play no major factor in determination of Hospital Strength.
- **Market Strength** – Of the three factors that are measured and integrated into the Market Strength Index component score, the most influential measures that contribute to hospital strength are the Market Size and Growth measures. The aspects of Competitive Strength and Competitive Intensity are critical to determining how one approaches a sizeable or growing market, but less opportunity to enhance strength exists in flat and contracting markets. The cohorts that are most advantaged at the 75th percentile on Market Strength include: Large, Urban, System-affiliated hospital in the West and Northeast.
 - **Competitive Strength** – Hospitals that are advantaged at the 75th percentile are smaller, free-standing non-profit hospital in the Northeast.
 - **Competitive Intensity** – Hospitals that are advantaged at the 75th percentile are mid-sized to large, free-standing, non-profit hospitals, in the Northeast and West.
 - **Market Size & Growth** – Hospitals that are advantaged at the 75th percentile are urban, investor-owned, system affiliated, with more than 100 beds in the West.
- **Value-based Strength** – The complexity of managing process measures, safety, outcomes, and patient experience will have an impact on future Medicare reimbursement. Managing the inter-relationships among these often times unrelated and uncorrelated measures can result in future rewards or penalties for the PPS hospitals. Combining the management of reimbursement regulations along with cost and efficiency metrics is the only way to navigate through to providing care at or above Medicare break-even points. Transparency and public reporting has enfranchised hospitals to collaborate, yet the better the outcomes, the earlier performance measures top out and the sooner new measures come into the mix. The following measures each contribute equally toward to formation of a Value-Based Index score:
 - **Quality Index**
 - **Outcomes Index**
 - **Patient Perspectives**
 - **Costs and Charges**

- The Value-Based Index score results from diverse contribution to strength. No single measure of these performance measures is especially distinguishing. Hospitals performing in aggregate at the 75th percentile benchmark of performance are generally characterized as Urban, System-affiliated, 250+ beds and located in New England and the West. CAHs and Midwest hospitals are noted for having a slightly higher Patient Perspectives score than all other cohorts.

- **Financial Strength** – Hospitals in the top quartile of Strength Index performance have financial performance that is 26.2% greater than the median hospital and 76.5% greater than bottom quartile hospitals. Additional findings include:
 - Urban hospitals at the 75th percentile have a 5% better score than rural and CAHs, and CAHs have a nominal performance preference over urban hospitals of 1.25% when measured at the 75th percentile.
 - The CAH advantage over rural hospitals is seen consistently also at the 25th and 50th percentile.
 - Not-for-profit hospitals at the 75th percentile perform at an amount of 10.1% better than investor owned facilities when viewed as a distinct cohort.
 - System-affiliated hospitals outperform free-standing hospitals by 3.3% at the same benchmarks.
 - The largest hospital bed-size cohort of 400+ beds outperforms the smallest cohort of less than 99 beds by 6.7%.
 - Hospitals in the Midwest outperform hospitals in the Northeast by 25.9%

The Hospital Strength Index™ – Tracking Performance and Improvement

The Index has been established to measure, track and monitor a broad range of performance measures that are closely tied to hospital sustainability under the Affordable Care Act. The intent of iVantage Health Analytics™ is to continuously monitor and update Index scores as new data become available and as new measures become endorsed by the National Quality Forum. Our efforts are being performed to help simplify the aggregation of disparate information across a variety of performance categories and help inform the industry about the relative and peer performance across benchmark groups.

Our intent is to remain completely transparent in our methods and models so that all can understand how information is collected, processed, enhanced, normalized and made comparable. The process is not always easy, and difficult decisions are made by our team of analysts to make for the most comparative ratings in this industry. iVantage Health has no bias about hospital performance; we are independent and objective about how information is presented to the industry. As evidenced in this study summary, we make every effort to report as objectively and as fairly as possible.

To that end, the company welcomes commentary and feedback from the industry as a constructive means toward making the best methods and comparisons as possible. The company meets quarterly to review all aspects of the Hospital Strength Index to seek improvements, review constructive criticism and address new methods that come to our market. If at any time observers would like to make a comment, information can be forwarded to inquiry@iVantageHealth.com or addressed to the Head of Research, iVantage Health Analytics, Inc., 509 Forest Avenue, Suite 250, Portland, Maine 04101.

iVantage Health Analytics would like to recognize the contributions of health services and public policy researchers across the U.S. who have contributed to the methods that make this Index a success. The collaboration of the industry's best practices along with the countless contributions of advisors and staff has led to the success of this effort.

Hospital Strength Index Sponsors

The research gleaned from this study and subsequent reports and findings from the Hospital Strength Index have been made possible by generous underwriting from the following Sponsors:



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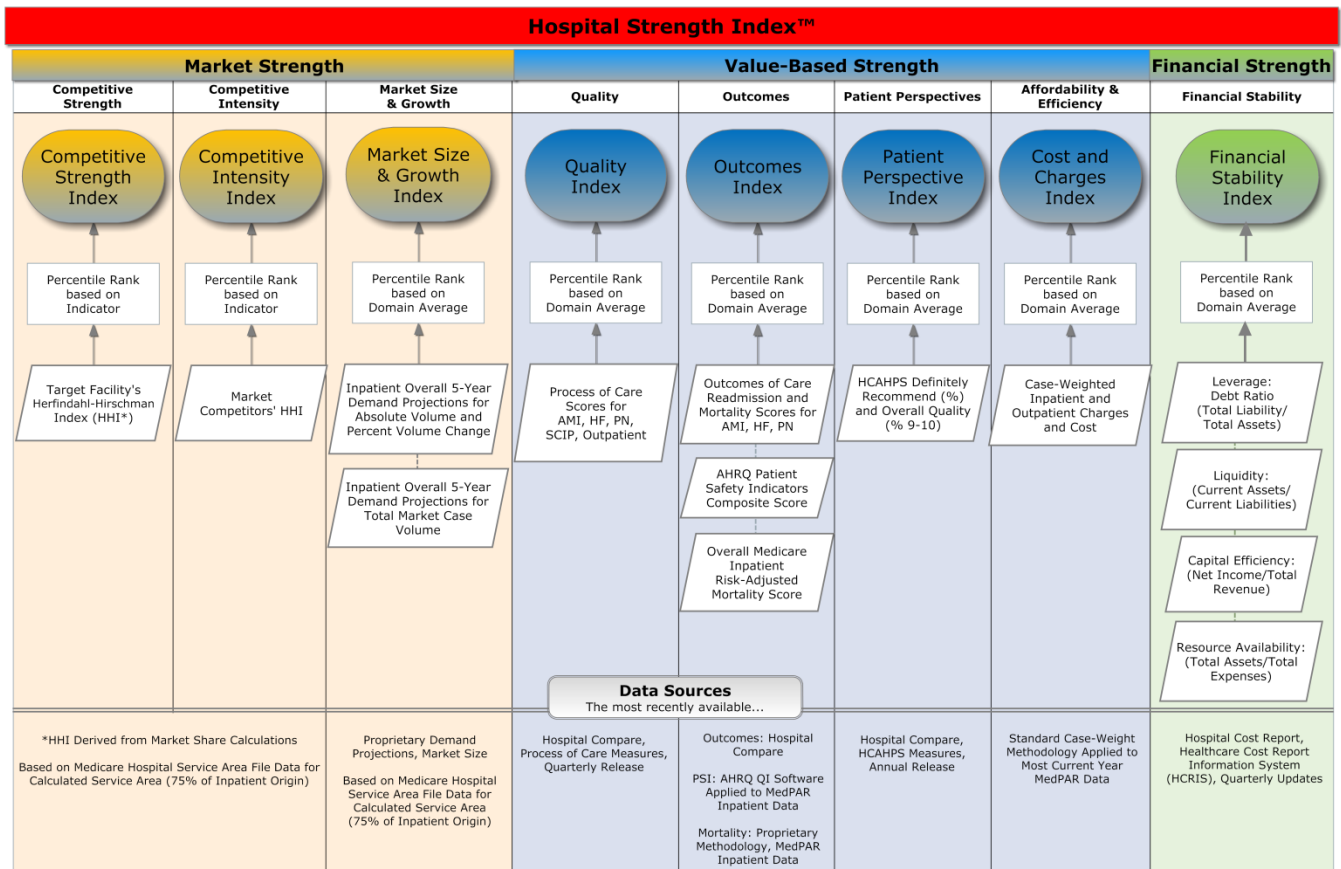
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Hospital Strength Index Overview

The Hospital Strength Index™ is a comprehensive rating system which compares U.S. general acute-care hospitals across a continuum of financial, value-based and market-driven performance indicators. Ratings are based on publicly available data sources, including Medicare Cost Reports, Medicare claims data, Hospital Compare reporting and related sources.

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 represent the most recently available data as of August 15, 2011. A summary of data sources is presented below.

Category	Data	Source	Release/Notes
Market	Medicare Hospital Service Area File	CMS	CY 2010
Market	Esri® Demographics	Esri®	2010/2015
Quality/Outcomes	Process of Care, Outcomes, HCAHPS	HospitalCompare.hhs.gov	August 2011 file download
Patient Safety Indicators (PSI)	PSI Composite Score	Agency for Healthcare Research and Quality	AHRQ QI SAS® v 4.2 (applied to 2010 MedPAR data)
Cost and Charges, Overall Mortality	Medicare Provider Analysis and Review (MedPAR)	CMS	FFY 2010
Cost and Charges	Medicare Outpatient Standard Analytical File	CMS	CY 2009
Financial	Medicare Hospital Cost Report Information System	CMS	Most recently available data as of June 30, 2011
Financial	SEC Edgar filings; Merritt Research Services, LLC	SEC.gov/edgar.shtml, MerrittExpress.com	FY 2010 or most recently available data for large national hospital systems

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, Affordability & Efficiency, 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 affordability and efficiency – 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	<p>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.</p> <p>Examples:</p> <p><i><u>Market 1 has two dominant hospitals:</u> Facility A ("Target" hospital) maintains 40% market share, Facility B maintains 35%. Ten other hospitals each get 2.5% market share.</i></p> <ul style="list-style-type: none"> • Overall Market HHI: $40^2 + 35^2 + (2.5^2 * 10) = 1,600 + 1,225 + 62.5 = \underline{2,887.5}$ • Net Market HHI: $2,887.5 - 1,600 = \underline{1,287.5}$ <p><i><u>Market 2 has one dominant hospital:</u> Facility C ("Target" hospital) maintains 70% market share, Facility D maintains 10%. Ten other hospitals each get 2% market share.</i></p> <ul style="list-style-type: none"> • Overall Market HHI: $70^2 + 10^2 + (2^2 * 10) = 4,900 + 100 + 40 = \underline{5,040.0}$ • Net Market HHI: $5,040 - 4,900 = \underline{140.0}$

Index	Market Size and Growth Index
Category	Market Strength
Indicators	<ul style="list-style-type: none"> • 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	Value-Based Strength
Indicator	Hospital Compare Process of Care Measures
Data	Process of Care Measures (# of Measures): <ul style="list-style-type: none"> • 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): <ul style="list-style-type: none"> • 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

Index	Outcomes Index
	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	<p>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.</p> <p>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.</p>
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): <ul style="list-style-type: none"> • 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 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	

Index	Cost and Charges Index
Category	Value-Based Strength
Indicators	<ul style="list-style-type: none"> • 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	<p>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.</p> <p>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.</p>
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	<ul style="list-style-type: none"> • 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	<p>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</p> <p>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.</p>
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	<p>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.</p> <p>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). <i>Key Financial Ratios Can Foretell Hospital Closures</i>. HFMA Journal, 47(11), 66-70.</p>