2023 SimilarityIndex™ | Hospitals Methodology

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Developing 2023 Trilliant Health SimilarityIndex™ | Hospitals

Conventional hospital rankings have been utilized to benchmark hospitals against each other despite fundamental flaws in their methodology, relying on subjective measures such as "medical staff makeup" and academic medical center designations, regardless of performance. More importantly, these rankings do not attempt to control for inherent differences in hospital capacity, academic influence, geographic markets, patient acuity and service mix. Consequentially, the list of "top hospitals" leaves health economy stakeholders with no tangible rationale when, on rare occasions, the list changes.

2023 Trilliant Health Similarity Index™ | Hospitals offers insights unlike any other existing resource. Instead of ranking hospitals based on a mix of objective and subjective criteria, **SimilarityIndex™ | Hospitals** utilizes our **SimilarityEngine™** to identify a mathematically derived cohort of 50 peer hospitals based on quantitative metrics of a hospital's market, population demographics, licensed beds, patient acuity, academic involvement and services rendered. In turn, the **SimilarityEngine™** calculates 20 metrics across **Quality, Financial, Competitive and Price** indexes to evaluate a hospital's performance comprehensively. We calculate the cohort and national percentile ranks for each metric to provide users with context on overall performance and focus attention on areas where improvement will have the greatest impact. By learning what makes similar hospitals successful, healthcare executives can make better-informed strategic and operational decisions.

In the open access version of **2023 Trilliant Health SimilarityIndex™ | Hospitals**, we display each index (i.e., Quality) score, which is an average of the percentile ranking of each of the underlying metrics, to reveal where a hospital is overperforming and underperforming against its true peer group. Trilliant Health also offers a premium Portfolio Evaluation and Benchmarking report, which expands on the benchmarks by providing the raw value and percentile for each individual metric (e.g., all-cause readmissions, mortality) comprised within each index to identify specific areas for improvement. Report subscribers have the option to include additional metrics and adjust the relative weighting of a given measure in the benchmarking analysis.

Hospital Exclusion Criteria

Trilliant Health 2023 SimilarityIndex™ | Hospitals indexes 2,200+ U.S. short-term acute care hospitals located in one of the 900+ metropolitan and micropolitan CBSAs. CBSAs were defined as specified by the Office of Management and Budget. Hospitals in the following categories were omitted from the index to ensure comparisons between hospitals with similar operational structures:

- Critical access hospitals (CAH)

- PPS-Exempt Cancer Hospitals (PCHs)

- Children's hospitals

- Psychiatric hospitals

- Rehabilitation hospitals

- Long-term acute care hospitals (LTACH)

- Hospitals with less than $25M in annual net patient service revenue (NPSR)

- Hospitals located outside core-based statistical areas (CBSAs)

- Hospitals that have closed as of December 2022

- Hospitals whose most recently filed Medicare Cost Report is prior to 2020

- Hospitals with missing or incomplete information on their Medicare Cost Reports and Hospital Inpatient Quality Reporting Program (CMS)

The list of short-term acute care hospitals was originally sourced based upon institutional NPIs, CCNs, and EINs using Trilliant Health's national all-payer claims database and Provider Directory. We applied the criteria above, compared against the CMS Care Compare 2022 database and the hospital closures list maintained by CMS.

Certain short-term acute care hospitals consolidate into a single entity for reporting their Medicare Cost Report. SimilarityIndex™ presents hospitals as they appear on their Medicare Cost Report.

Differences From 2022 Trilliant Health SimilarityIndex™ | Hospitals

In introducing **SimilarityIndex™** in 2022, we focused on two foundational concepts: similarity of markets (i.e., CBSAs) and similarity of hospitals. In doing so, we confirmed our long-standing hypothesis: markets are the most important element in a hospital's performance and potential. Any analysis that compares hospitals without accounting for the markets in which they operate will be flawed.

In 2023, we have combined these two approaches to create a comprehensive, data-driven analysis of each hospital's "true" peers and the differences in performance among hospitals within each cohort. These cohorts, derived from 50,000+ measures, compare hospital performance across Quality, Financial, Competitive and Price indexes, making SimilarityIndex™ | Hospitals more accurate, relevant and actionable than any existing hospital ranking.

Overview of Existing Hospital Benchmarking Sources

Historically, traditional hospital benchmarking has not equipped health economy stakeholders with the ability to identify relevant hospital peers. The existing benchmarking resources, which rely primarily on quality measures coupled with subjective criteria, have received criticism from both clinicians and academics in past years, with one group of researchers citing prevalent issues across lists, including limited data, a lack of data audits and varying methods for compiling and weighting measures. SimilarityIndex™ | Hospitals includes certain shared quality metrics leveraged in other benchmarking sources but also includes financial, competitive and price metrics.

	BEST HOSPITALS U.S. News RANKINGS	LEAPFROG HOSPITAL SAFETY GRADE	AMERICA'S 250 Best HOSPITALS healthgrades	CMS Five-Star Quality Rated	TOP 100 SOCIAL RESPONSIBILITY LOWN INSTITUTE HOSPITALS INDEX	SIMILARITYINDEX HOSPITALS
MEASURE(S)	**Outcomes (45%)** Survival readmission prevention, infection prevention, revision surgery prevention, prolonged hospitalization prevention, discharging to home, stroke prevention and patient time at home **Process (15%)** Physician reputation survey **Structure measures (35%)** Inpatient and outpatient volumes, nurse staffing, ICU staffing, heart and cancer programs, hospital recognitions **Patient Experience (5%)**	**Leapfrog Hospital Safety Grades:** 27 national performance measures (12 Process and 15 Outcomes measures) to produce their composite safety grade (A, B, C, D, E, F) **Leapfrog Top Hospitals:** Must fully meet or achieve substantial progress on Computerized Physician Order Entry ICU physician staffing Reports at least 40-60% of Leapfrog standards measures Complies with NQF's list of serious reportable events Has an A Leapfrog Safety Grade Satisfies a qualitative hospital review	A hospital must be in the top 5% of all hospitals in the country for clinical excellence across 33 outcomes and conditions. **Mortality Cohorts** Bowel obstruction, COPD, etc. **In-Hospital Complication Cohorts** Appendectomy, Bariatric Surgery, etc.	Using a latent variable model, CMS scores US hospitals on a scale from 1 through 5, based on metrics in the following categories: **Mortality, Safety of Care, Readmission Patient, Experience Timely and Effective Care**	**Equity** Inclusivity, Pay Equity, Community Benefit **Value** Avoiding Overuse and Cost Efficiency **Outcomes** Clinical Outcomes, Patient Satisfaction and Patient Safety	**Peer Grouping** Intern FTEs, Licensed beds, Medicare Case Mix Index, market demographics, hospital service mix **Quality** 30-day readmission percentage, 30-day pneumonia and heart failure mortality percentage, average length of stay, CMS Hospital Acquired Condition Reduction Program Score **Financial** Net patient service revenue and operating expenses per adjusted discharge, percent occupancy, return on capital **Competitive** Inpatient and outpatient market share, third party payer mix, hospital share of care, health system share of care **Price** MS-DRG 470 commercial negotiated rate
DATA SOURCES	Publicly available indicators (i.e., CMS Hospital Compare and credentialing entities) Medicare Beneficiary Summary Files Medicare Inpatient and SNF Limited Data Set Standard Analytical Files American Hospital Association (AHA) Annual Survey Hospital Consumer Assessment of Healthcare Providers and Systems Board Certification Data Total Volume Data from the American Hospital Directory Reputation survey of 32,000 physicians	Internally conducted survey, contingent on hospital responsiveness CMS Hospital Compare	Inpatient data 2018-2020 from the Medicare Provider Analysis and Review, which is purchased from CMS Inpatient all-payer data for the appendectomy and bariatric surgery cohorts in 16 states	Hospital-reported data Home Health CAHPS Survey	IRS 990 Forms SEC Filings Healthcare Cost Report Information System State employee salary database Bureau of Labor Statistics Census Data CMS Virtual Research Data Center (VRDC) CMS Patient Safety Indicators Hospital Consumer Assessment of Healthcare Providers and Systems	CMS Hospital Compare CMS Recalibrated Patient Safety Indicators CDC National Healthcare Safety Network Trilliant Health national all-payer claims database Trilliant Health national consumer database Trilliant Health Health Plan Price Transparency Dataset Healthcare Cost Report Information System

SimilarityIndex™ | Hospital Components

Hospital Cohort Criteria

SimilarityIndex™ | Hospitals allows health economy stakeholders to index a user-selected benchmark hospital against a group of empirically similar hospitals generated by the SimilarityEngine™. The SimilarityEngine™ compares hospitals using objective metrics, enabling users to analyze hospitals that are their "true" peers. The metrics used to generate each unique hospital peer group reflect a hospital's market demographics and operational/clinical characteristics. Specifically, the Hospital Cohort Criteria incorporates intern residents per bed and licensed beds sourced from HCRIS for the most recent fiscal year, Medicare Case Mix Index (CMI) sourced from CMS, market population size, market age distribution, market discretionary income and market household debt sourced from Trilliant Health's national consumer database and service mix sourced from Trilliant Health's national all-payer claims database.

Quality Index

The **Quality Index** incorporates 30-day heart failure and pneumonia mortality percentages and 30-day readmission percentages sourced from CMS. The Hospital-Acquired Condition Reduction Program scores are sourced from the CMS hospital data. The CMS data factors in a single claims-based composite measure of patient safety (CMS PSI 90) together with five chart-abstracted measures of healthcare-associated infections submitted to the CDC's National Healthcare Safety Network. Inpatient length of stay is sourced from HCRIS for the most recent fiscal year. Index results are displayed as a percentile score (an average of each underlying metrics percentile ranking) to inform where hospitals are overperforming and underperforming against their true peer group.

Financial Index

The **Financial Index** incorporates net patient service revenue (NPSR) per adjusted discharge, operating expenses per adjusted discharge, percent occupancy and return on capital sourced from HCRIS for the most recent fiscal year. Index results are displayed as a percentile score (an average of each underlying metric's percentile ranking) to inform where hospitals are overperforming and underperforming against their true peer group.

Competitive Index

The **Competitive Index** incorporates inpatient market share, outpatient market share, third party payer mix percentage, hospital share of care and health system share of care sourced from Trilliant Health's national all-payer claims database and HCRIS for the most recent fiscal year. Index results are displayed as a percentile score (an average of each underlying metric's percentile ranking) to inform where hospitals are overperforming and underperforming against their true peer group.

Price Index

The **Price Index** leverages Trilliant Health's national all-payer claims database, Provider Directory and Health Plan Price Transparency dataset to identify UnitedHealthcare institutional, facility-level negotiated rates for MS-DRG 470 (i.e., Major Hip and Knee Joint Replacement or Reattachment of Lower Extremity Without Major Complication or Comorbidity). For hospitals with both HIOS and EIN rates, the values are first compared to average Medicare reimbursement. Any rate below the average Medicare rate is excluded. If both a HOIS and an EIN rate greater than the average Medicare reimbursement amount exist, the higher of the two is used.

Table 1. Primary and Secondary Sources Associated with SimilarityIndex™ | Hospitals

CATEGORY	FEATURE	DESCRIPTION	YEAR	SOURCE
HOSPITAL COHORT	Intern FTEs per Bed	Intern FTEs / Total Beds	Most recently filed	HCRIS
	Licensed Beds	The number of available beds in the hospital	Most recently filed	HCRIS
	Medicare Case Mix Index (CMI)	Non-transfer adjusted case mix index (CMI) based on the MS-DRGs billed on the claim in the year the claim was incurred	2022	CMS
	Market Population Size	Total population size for the CBSA where the facility is located	2022	Trilliant Health national consumer database
	Market Age Distribution	Age distribution for the CBSA where the facility is located	2022	Trilliant Health national consumer database
	Market Discretionary Income	Discretionary income percentage for the CBSA where the facility is located	2023	Trilliant Health national consumer database
	Market Household Debt	Household debt for the CBSA where the facility is located (calculated as number of people within a given debt range)	2023	Trilliant Health national consumer database
	Service Mix	Total volume count of every procedure performed at the hospital	2021-22	Trilliant Health national all-payer claims database

CATEGORY	FEATURE	DESCRIPTION	YEAR	SOURCE
QUALITY INDEX	30-Day Readmission %	Rate of readmission after discharge from hospital within 30-days (hospital-wide)	2023	CMS
	30-Day Pneumonia Mortality %	Rate reflecting how often pneumonia patients die within 30-days of admission to a hospital	2023	CMS
	30-Day Heart Failure Mortality %	Rate reflecting how often heart failure patients die within 30-days of admission to a hospital	2023	CMS
	Hospital Acquired Condition Reduction Program Score	On an annual basis, CMS evaluates overall hospital performance by calculating Total Hospital Acquired Condition scores as the equally weighted average of scores on measures included in the program: one claims-based composite measure (CMS PSI 90) and five chart-abstracted measures of healthcare-associated infections, submitted to the CDC (central line-associated bloodstream infection, catheter-associated urinary tract infection, surgical site infection for abdominal hysterectomy and colon procedures, Methicillin-resistant *Staphylococcus aureus* bacteremia, and *Clostridium difficile* Infection)	2022[1]	CMS
	Inpatient Length of Stay	Total Patient Days / Total Discharges	Most recently filed	HCRIS

CATEGORY	FEATURE	DESCRIPTION	YEAR	SOURCE
FINANCIAL INDEX	Net Patient Service Revenue per Adjusted Discharge	Net revenue for relative volume for users to compare ability to negotiate favorable rates and care for more acute patients	Most recently filed	HCRIS
	Operating Expenses per Adjusted Discharge	Operating expenses for relative volume for users to compare effectiveness of cost containment	Most recently filed	HCRIS
	Percent Occupancy	Total Patient Days / Total Available Bed Days	Most recently filed	HCRIS
	Return on Capital	The net income generated by equity investment (net assets) to understand effectiveness of investments and operations	Most recently filed	HCRIS

CATEGORY	FEATURE	DESCRIPTION	YEAR	SOURCE
COMPETITIVE INDEX	Inpatient Market Share	The hospital's share of all inpatient discharges in the CBSA in which the hospital is located	Most recently filed	HCRIS
	Outpatient Market Share	The hospital's share of all outpatient volume in the CBSA in which the hospital is located. Outpatient volume is limited to hospital licensed space.	Most recently filed	HCRIS
	Third Party Payer Mix Percentage	A hospital's third party payer mix calculated using gross charges (includes MA and Managed Medicaid)	Most recently filed	HCRIS
	Hospital Share of Care	For patients that have had at least two encounters at any short-term acute care hospital between Q4'20 and Q3'22, the percentage of total visits that occur at an individual hospital	Q4'20 - Q3'22	Trilliant Health national all-payer claims database
	System Share of Care	For patients that have had at least two encounters at any short-term acute care hospital between Q4'20 and Q3'22, the percentage of visits that occur at a hospital within the same system	Q4'20 - Q3'22	Trilliant Health national all-payer claims database

CATEGORY	FEATURE	DESCRIPTION	YEAR	SOURCE
PRICE INDEX	MS-DRG 470 third party negotiated rate	The facility-level value of the UnitedHealthcare negotiated rate for MS-DRG 470 (Major Hip and Knee Joint Replacement or Reattachment of Lower Extremity Without Major Complication or Comorbidity)	2023	Trilliant Health Health Plan Price Transparency dataset

Commonly Used Acronyms

- **CBSA:** Core-Based Statistical Area
- **CDC:** Centers for Disease Control and Prevention
- **CMS:** Centers for Medicare and Medicaid Services
- **HAC:** Hospital-Acquired Condition
- **HCRIS:** Healthcare Cost Report Information System
- **MA:** Medicare Advantage
- **MS-DRG:** Medicare Severity Diagnosis Related Groups
- **PSI-90:** Patient Safety Indicators #90
- **CCN:** CMS Certification Number
- **EIN:** Employer Identification Number
- **NPI:** National Provider Identifier

Endnotes

[1] The HAC scores are associated after FY 2022 and reflect a payment adjustment applied to all Medicare FFS discharges from October 1, 2021, to September 30, 2022, for hospital claims covered and paid for by CMS.

The performance period of the CMS PSI 90 measure is July 1, 2018, to December 31, 2019. The performance period of the CDC NHSN HAI measures is January 1, 2019, to December 31, 2019. These performance periods are shorter than the previously finalized two-year performance periods for the same measures. In response to the COVID-19 public health emergency, CMS will exclude all calendar year (CY) 2020 data from future HAC Reduction Program calculations.