

50 TOP CARDIOVASCULAR HOSPITALS™

2024



STUDY OVERVIEW AND FINDINGS

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PINC AI™ 50 Top Cardiovascular Hospitals™ Study, 2024; 24th edition
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CONTENTS

EXECUTIVE SUMMARY	04
INTRODUCTION	05
STUDY METHODOLOGY	06
<i>DATASETS AND MEASURES</i>	06
<i>EXCLUSIONS</i>	07
<i>STRATIFICATION</i>	07
<i>SCORING METHOD</i>	08
THE 2024 PINC AI™ 50 TOP CARDIOVASCULAR HOSPITALS™	09
KEY FINDINGS	12
<i>IN-STUDY HOSPITALS</i>	12
<i>TEACHING HOSPITALS WITH CARDIOVASCULAR RESIDENCY PROGRAMS</i>	14
<i>TEACHING HOSPITALS WITHOUT CARDIOVASCULAR RESIDENCY PROGRAMS</i>	16
<i>COMMUNITY HOSPITALS</i>	18
<i>LEADING MEASURES</i>	20
<i>PERFORMANCE TRENDS</i>	20
REFERENCES	23

EXECUTIVE SUMMARY

The recent PINC AI™ 50 Top Cardiovascular Hospitals™ study offers significant insights into cardiovascular care within the U.S. health system. The study reports key findings relevant to clinicians and hospital executives from a quality and efficiency perspective and public health officials from a policy perspective. The study illustrates how the top hospitals outperformed peers in clinical care and operational efficiency. If all hospitals achieved performance levels of the benchmark facilities, over 7,600 lives could be saved, accompanied by a cost-saving exceeding \$1 billion. However, considerable disparities between top-performing hospitals and others remain, especially in terms of mortality rates and cost efficiencies.

Notably, benchmark hospitals exhibit lower mortality rates, reduced complications, and shorter hospital stays across cardiovascular disease groups. The cost efficiencies achieved by benchmark hospitals, ranging from \$2,500 to \$9,900 per case, further solidify their favorable standing in the study. Top performing hospitals also exhibit lower readmission rates and higher patient satisfaction scores, indicating a patient-centric approach to healthcare delivery. Patients treated at these top hospitals reported a better overall hospital experience compared to their peers, with fewer return visits to the acute care setting. The study emphasizes the efficient use of resources by benchmark hospitals without compromising clinical outcomes. They release patients sooner, maintain lower inpatient costs, and demonstrate stronger performance in Medicare claims payment measures, signifying prudent resource utilization.

The study's detailed breakdown based on hospital types—teaching hospitals with and without cardiovascular programs, as well as community hospitals—reveals nuanced differences in performance metrics. Teaching hospitals, particularly those with specialized programs, exhibited improved clinical outcomes and efficiency, while community hospitals showcase robust improvements in risk-adjusted complications and cost efficiencies.

In summary, the PINC AI™ 50 Top Cardiovascular Hospitals™ analysis provides a comprehensive view of healthcare excellence, offering tactical benchmarks for hospitals aiming to improve performance and patient care standards. The findings of this study hold significant implications for the healthcare industry. A wider adoption of the benchmark standards could lead to substantial savings and improved patient outcomes across hospitals nationwide.

More About the 100 Top Hospitals® Program

The 50 Top Cardiovascular Hospitals™ research is one of several studies of the PINC AI™ 100 Top Hospitals® program. Additional information regarding these studies, including lists of current winners, can be found by visiting 100tophospitals.com.

We Welcome Your Input

Since 1993, the 100 Top Hospitals® program has worked to ensure that the measures and methodologies used are fair, consistent and meaningful. We plan to continually test the validity of our performance measures and data sources.

In addition, as part of our internal performance improvement process, we welcome comments about our study from health systems, hospitals and physicians. To submit comments, visit the Contact Us section of 100tophospitals.com.

INTRODUCTION

Cardiovascular disease is a leading cause of mortality in the United States and is associated with considerably higher healthcare costs.¹⁻³ According to the 2023 annual American Heart Association (AHA) report, 127.9 million American adults had some form of cardiovascular disease between 2017 and 2020, and as of 2020, coronary heart disease remains the number one cause of death in the U.S.³ Furthermore, in 2018 and 2019, combined direct and indirect costs related to cardiovascular disease totaled \$407.3 billion.³ This includes the cost of healthcare services, medicines, and lost productivity due to death. Based on 2020 U.S. Census Bureau data, projected rates of cardiovascular risk factors and disease will increase considerably by the year 2060.⁴

Given the significant impact that the cardiovascular disease epidemic has on both health outcomes and cost of care, an annual 50 Top Cardiovascular Hospitals™ study is conducted as part of the PINC AI™ 100 Top Hospitals® program to identify outstanding cardiovascular service lines nationwide. The primary aim is to provide an unbiased evaluation of hospitals to aid healthcare organizations in their improvement efforts towards optimal care. A list of high-performing hospitals recognized through the study is published annually by Premier, Inc. and *Fortune*.^{5,6}

Since 1998, publicly available data has been statistically analyzed to compile the annual 50 Top Cardiovascular Hospitals™ report. Similar to the broader 100 Top Hospitals® study, this cardiovascular assessment uses a balanced set of metrics to highlight high-performing cardiovascular healthcare providers in the United States. The recognized cardiovascular institutions have demonstrated a balance of clinical and operational excellence in a complex healthcare landscape, and their success stories may help guide other healthcare entities in achieving similar success. In addition to the published list of high-performing hospitals, the study more broadly serves as a tool for comparing outcomes, with the larger goal of improving quality, efficiency, and patient experience across all hospitals. As such, a report referred to as the “Current Profile,” is produced for all hospitals, which serves as a reference point of their performance relative to a meaningful set of peer facilities.

In addition to current-state performance, the study produces a “Trend Profile” report designed to show an institution’s rate of improvement relative to a peer group comprised of similar hospitals. Measuring improvement across current and trended performance helps enable clinical leadership and service line management to assess their real-world progress toward top performance within and across the profiled cardiovascular patient groups.

Organizations are included in the 50 Top Cardiovascular Hospitals™ study based solely on availability of data from Medicare and meeting the study’s inclusion criteria. Participation in the study is not solicited and there are no fees for winners to promote their achievements. Hospitals can receive their individual report at no cost, upon request. Further, it is the policy to revoke a 100 Top Hospitals® award if hospital data is found to be inaccurate or misleading for any of the 100 Top Hospitals® data sources. At the sole discretion of PINC AI™, the circumstances under which a 100 Top Hospitals® award could be revoked include, but are not limited to inaccurate data, agency investigations or sanctions.

STUDY METHODOLOGY

Datasets and Measures

The cardiovascular study relies solely on publicly available data sources, including the Centers for Medicare and Medicaid Services (CMS) Care Compare,⁷ the Medicare Provider Analysis and Review (MEDPAR),⁸ and Healthcare Provider Cost Reporting Information System (HCRIS)⁹ cost report datasets. Limiting the study to publicly available data sources ensures a representative and objective evaluation of hospital performance across cardiovascular disease cohorts. While the Care Compare and HCRIS cost report datasets include facility-aggregated data, the MEDPAR dataset includes all Medicare claims and serves as the base dataset for the study-specific inpatient risk-adjusted measures within the program.

The cardiovascular disease cohorts evaluated in the study are based on the International Classification of Diseases Version-10 (ICD-10) coding and include acute myocardial infarction (AMI), heart failure (HF), coronary artery bypass graft (CABG) and percutaneous coronary interventions (PCI). Each patient group is designed to be mutually exclusive, and therefore, AMI and HF groups explicitly exclude patients who also had a PCI or CABG procedure. Disease groups are based on ICD-10 definitions.

Each cardiovascular disease group is evaluated using a set of balancing measures that encompass hospital clinical outcomes, cost and process efficiency, and patient experience. Within the outcome domain, the risk-adjusted inpatient mortality and complications, as well as risk-adjusted 30-day mortality and readmissions are evaluated.¹⁰⁻¹² Process measures include severity adjusted length of stay (LOS). The efficiency measure group includes wage- and severity-adjusted cost per case and 30-day episodic payment,^{13,14} and the patient experience group is based on the overall Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) score.¹⁵ Due to data availability, not all measures will be evaluated for each cardiovascular disease group.

Table 1 lists all measures included in the 2024 cardiovascular study by measure domain and disease group, along with the respective data sources and time periods used to compute the measure results.

Table 1. Summary of Measure Data Sources and Data Periods

	Ranked Performance Metric	Current Profile Data Sources	Trend Profile Data Sources
Clinical outcomes	Risk-adjusted inpatient mortality (AMI, HF, CABG, PCI)	MEDPAR Federal Fiscal Year (FFY) 2021 and 2022	MEDPAR Federal Fiscal Year (FFY) 2017 – 2022 ^a
	Risk-adjusted complications (CABG, PCI)	MEDPAR FFY 2021 and 2022	Same data periods as inpatient mortality
Extended outcomes	30-day mortality rates (AMI, HF, CABG)	CMS Care Compare July 1, 2019 – June 30, 2022	CMS Care Compare 3-yr datasets ending Jun 30 of the following years: 2018, 2019 ^b , 2021, 2022
	30-day readmission rates (AMI, HF, CABG)	CMS Care Compare July 1, 2019 – June 30, 2022	Same data periods as 30-day mortality
Efficiency	Severity-adjusted average LOS (AMI, HF, CABG, PCI)	MEDPAR FFY 2022	MEDPAR FFY 2018 - 2022
	Wage- and severity-adjusted average cost per case (AMI, HF, CABG, PCI)	MEDPAR FFY 2022	MEDPAR FFY 2018 - 2022
Extended efficiency	30-day episode payment (AMI, HF)	CMS Care Compare July 1, 2019 – June 30, 2022	CMS Care Compare 3-yr datasets ending Jun 30 of the following years: 2018, 2019 ^b , 2021, 2022
Patient Experience	HCAHPS	CMS Care Compare Calendar year (CY) 2022	N/A ^c

a. Two years of MEDPAR data are combined for each study year, as follows: 2017-2018, 2018-2019, 2019-2020, 2020-2021, 2021-2022
b. Two data points end in 2019 due to CMS removal of Q1 and Q2 2020 data from measure datasets, 2 ½ years of data in 2020 data point
c. HCAHPS measure not in trend profile this study year

Exclusions

The study focuses on hospitals that offer both medical and surgical treatment options for four of the most common cardiovascular conditions. Specifically, these groups include non-surgical AMI, non-surgical HF, CABG and PCI (excluding open chest coronary artery angioplasty). As such, the MEDPAR dataset is limited to hospitals that had at least 30 unique cases in each of the four disease groups across the two most recent years of data. In addition, the following exclusions are applied to patient- and hospital-level data:

- Patients younger than 65 years old.
- Patients transferred to another short-term facility (to prevent double counting encounter).
- Specialty hospitals: critical access, children's, women's, psychiatric, substance abuse, rehabilitation, long-term acute care.
- Federally owned hospitals.
- Non-continental U.S. hospitals (e.g., those residing in Puerto Rico, Guam, and the Virgin Islands).
- Hospitals with Medicare average lengths of stay longer than 30 days.
- Hospitals with no recorded deaths.
- Hospitals with no Medicare claims for the two most recent years.
- Hospitals missing data for calculating one or more performance measures.
- Hospitals for which a Medicare Cost Report was not available for the two most recent years.
- Hospitals with missing POA indicators in the two most recent years of MEDPAR data.

Stratification

Bed size, teaching status and involvement in a residency or fellowship program can affect a hospital's case mix and the resulting services that it provides. When analyzing the performance of an individual hospital, it is important to do so against a set of comparable facilities, even when using risk-standardized outcome measures.¹⁶ To mitigate bias due to hospital factors, each hospital is assigned to 1 of 3 classes. These classes include:

- Teaching hospitals with cardiovascular residency programs.
- Teaching hospitals without cardiovascular residency programs.
- Community hospitals.

Teaching hospitals with cardiovascular residency programs stratum must meet the definition of a teaching hospital (see below) and be involved in a cardiovascular residency program accredited by the Accreditation Council for Graduate Medical Education (ACGME).⁶ Participation in a fellowship program was identified and confirmed based on American Medical Association (AMA) and American Osteopathic Association (AOA) participation from ACGME files, and Fellowship and Residency Electronic Interactive Database Access (FREIDA) database.¹⁷

Teaching hospitals without cardiovascular residency programs must not be involved in a cardiovascular residency program and must additionally satisfy two of the following criteria:

- 200 or more acute care beds in service.
- An intern/resident-per-bed ratio of at least 0.03.
- Involvement in at least 3 accredited GME programs overall.

OR

- Resident-to-Bed ratio >0.25, regardless of beds or GME programs.

The community hospital comparison group is defined as not meeting the criteria for a teaching facility.

Scoring Method

Measure results are normalized and ranked within each hospital comparison group. The ranked measures are further weighted and summed up at the hospital level to form the hospital level total score. The hospitals with the best overall score in each comparison group are selected as the *PINC AI™ 50 Top Cardiovascular Hospitals™*.

The final count of evaluated facilities after exclusions and the count of award winners are listed below.

Table 2. Cardiovascular Hospital Comparison Groups

Comparison Group	In-Study Hospitals	Award Winners
Teaching hospitals with cardiovascular residency programs	288	20
Teaching hospitals without cardiovascular residency programs	345	20
Community hospitals	307	10
Total	940	50

Full details regarding the 50 Top Cardiovascular Study methodology can be found in the *50 Top Cardiovascular Study Methodology Guide*.

THE 2024 PINC AI™ 50 TOP CARDIOVASCULAR HOSPITALS™

PINC AI™ 100 Top Hospitals® program is pleased to present the 2024 50 Top Cardiovascular Hospitals™.

Please note that the order of hospitals in the following tables does not reflect performance ratings. Hospitals are ordered alphabetically and within their comparison group.

Teaching Hospitals With Cardiovascular Residency Programs

Hospital ⁱ	Location	CCN
Atrium Health Wake Forest Baptist	Winston-Salem, NC	340047
Baylor Scott & White Medical Center - Temple	Temple, TX	450054
Baylor Scott & White The Heart Hospital - Plano	Plano, TX	670025
Corpus Christi Medical Center	Corpus Christi, TX	450788
Froedtert Hospital	Milwaukee, WI	520177
HCA Florida Bayonet Point Hospital	Hudson, FL	100256
Intermountain Medical Center	Murray, UT	460010
Lancaster General Hospital	Lancaster, PA	390100
Mayo Clinic - Florida	Jacksonville, FL	100151
Mayo Clinic - Rochester	Rochester, MN	240010
Medical City Dallas	Dallas, TX	450647
MercyOne Des Moines Medical Center	Des Moines, IA	160083
Methodist Hospital	San Antonio, TX	450388
Morristown Medical Center	Morristown, NJ	310015
Northwestern Medicine Central DuPage Hospital	Winfield, IL	140242
OhioHealth Riverside Methodist Hospital	Columbus, OH	360006
Penn Presbyterian Medical Center	Philadelphia, PA	390223
RUSH University Medical Center	Chicago, IL	140119
The Christ Hospital Health Network	Cincinnati, OH	360163
UNC REX Hospital	Raleigh, NC	340114

ⁱ Order of hospitals does not reflect performance rating. Hospitals are ordered alphabetically.

Teaching Hospitals Without Cardiovascular Residency Programs

Hospital ⁱ	Location	CCN
AdventHealth Redmond	Rome, GA	110168
Ascension Sacred Heart Pensacola	Pensacola, FL	100025
Bronson Methodist Hospital	Kalamazoo, MI	230017
Chester County Hospital	West Chester, PA	390179
CHI Memorial Hospital Chattanooga	Chattanooga, TN	440091
Chippenham Hospital	Richmond, VA	490112
Eastern Idaho Regional Medical Center	Idaho Falls, ID	130018
Grand Strand Medical Center	Myrtle Beach, SC	420085
HCA Florida Ocala Hospital	Ocala, FL	100212
Lee Memorial Hospital/ Healthpark Medical Center	Fort Myers, FL	100012
McKay-Dee Hospital	Ogden, UT	460004
Methodist Hospital Stone Oak	San Antonio, TX	670055
Mission Hospital	Asheville, NC	340002
Parkridge Medical Center	Chattanooga, TN	440156
Piedmont Athens Regional Medical Center	Athens, GA	110074
St. Anthony Hospital	Lakewood, CO	060015
Swedish Medical Center	Englewood, CO	060034
The Medical Center of Aurora	Aurora, CO	060100
Trident Medical Center	Charleston, SC	420079
TriStar Centennial Medical Center	Nashville, TN	440161

ⁱ Order of hospitals does not reflect performance rating. Hospitals are ordered alphabetically.

Community Hospitals

Hospital ⁱ	Location	CCN
Advocate Good Shepherd Hospital	Barrington, IL	140291
Ascension St. Vincent Hospital - Indianapolis	Indianapolis, IN	150153
Genesis Hospital	Zanesville, OH	360039
Henrico Doctors' Hospital	Richmond, VA	490118
Mercy Health - Lourdes Hospital	Paducah, KY	180102
Ogden Regional Medical Center	Ogden, UT	460005
Parkview Regional Medical Center	Fort Wayne, IN	150021
St. David's Medical Center	Austin, TX	450431
St. David's Round Rock Medical Center	Round Rock, TX	450718
Thibodaux Regional Health System	Thibodaux, LA	190004

ⁱ Order of hospitals does not reflect performance rating. Hospitals are ordered alphabetically.

KEY FINDINGS

The 50 Top Cardiovascular Hospitals™ study identifies U.S. hospitals that have achieved the highest performance on a balanced scorecard of performance measures. The 2024 PINC AI™ 50 Top Cardiovascular Hospitals™ provided higher quality clinical care and were more efficient than their peers. If all United States hospitals' cardiovascular service lines performed at the level of these study winners, more than 7,600 additional lives and over \$1 billion could be saved, and over 6,700 additional bypass and angioplasty patients could be complication-free.

One of the goals of the PINC AI™ 100 Top Hospitals® program is to provide realistic benchmarks that can help all hospitals improve their performance. This section highlights some notable differences between benchmark facilities (winners) and peer facilities (non-winners). Comparisons between this year's 50 Top Cardiovascular Hospitals™ and their peers showed that room for improvement still exists (see Table 3 for measure details).

Differences between benchmark and peer facilities in each of the hospital comparison groups (teaching with CV residency programs, teaching without CV residency programs and community hospitals) can be found in Tables 4-6.

All In-Study Hospitals

Clinical Outcomes

- Benchmark facilities had significantly higher inpatient survival rates across all patient groups – AMI, HF, CABG, PCI (28% to 50% higher).
- Fewer patients had complications in the surgical groups, CABG and PCI, at benchmark facilities (32% to 39% fewer).
- Better 30-day survival rates were found at winning hospitals for AMI, HF and CABG patients (0.3 to 0.7 percentage points higher).
- Benchmark facilities showed lower 30-day readmission rates for AMI, HF, and CABG patients (0.4 to 0.8 percentage points lower).

Process and Cost Efficiency

- Shorter average lengths of stay (ALOS) varied between patient groups from 0.3 for AMI, 0.6 for HF, 0.3 for PCI, to one full day for CABG patients, at benchmark facilities.
- Winning hospitals showed better cost efficiency in average costs per patient case in all patient groups. The smallest dollar amount difference was found with HF patients (\$2,503) and the largest with CABG patients with close to a \$10,000 difference between nonwinning hospitals (\$9,931).

Patient Experience

- Patients had a better experience at benchmark hospitals compared to peer hospitals, with a top-box HCAHPS score of 71% versus 67%.

Table 3: National Performance Comparisons (All In-Study Hospitals)

	Performance Measure		Benchmark Median	Peer Median	Benchmark Compared With Peer Group		
					Difference	Percent Difference	Comments
Clinical outcome measures ^a	Risk-adjusted inpatient mortality index	AMI mortality	0.73	1.01	-0.28	-27.7	Lower mortality
		HF mortality	0.66	0.99	-0.33	-33.3	Lower mortality
		CABG mortality	0.51	1.02	-0.51	-50.0	Lower mortality
		PCI mortality	0.65	1.01	-0.36	-35.6	Lower mortality
	Risk-adjusted complications index	CABG complications	0.67	0.98	-0.31	-31.6	Fewer complications
		PCI complications	0.62	1.01	-0.39	-38.6	Fewer complications
Extended outcome measures ^{b,d}	AMI 30-day mortality (%)		11.9	12.6	-0.7	n/a	Lower 30-day mortality
	HF 30-day mortality (%)		10.9	11.5	-0.7	n/a	Lower 30-day mortality
	CABG 30-day mortality (%)		2.6	2.9	-0.3	n/a	Lower 30-day mortality
	AMI 30-day readmission (%)		13.5	14.0	-0.5	n/a	Fewer 30-day readmissions
	HF 30-day readmission (%)		19.3	20.2	-0.8	n/a	Fewer 30-day readmissions
	CABG 30-day readmission (%)		10.7	11.0	-0.4	n/a	Fewer 30-day readmissions
Process efficiency	AMI severity-adjusted average length of stay (ALOS)		3.7	4.0	-0.3	-6.5	Shorter ALOS
	HF severity-adjusted ALOS		4.7	5.3	-0.6	-10.8	Shorter ALOS
	CABG severity-adjusted ALOS		8.3	9.2	-1.0	-10.3	Shorter ALOS
	PCI severity-adjusted ALOS		3.3	3.7	-0.3	-9.0	Shorter ALOS
Cost Efficiency	AMI wage- and severity-adjusted average cost per case		\$9,217	\$11,774	-\$2,556.51	-21.7	Lower cost per case
	HF wage- and severity-adjusted average cost per case		\$9,755	\$12,259	-\$2,503.21	-20.4	Lower cost per case
	CABG wage- and severity-adjusted average cost per case		\$40,127	\$50,059	-\$9,931.66	-19.8	Lower cost per case
	PCI wage- and severity-adjusted average cost per case		\$18,111	\$20,904	-\$2,793.08	-13.4	Lower cost per case
Extended Efficiency Measures ^b	AMI 30-day episode payment		\$27,146	\$28,013	-\$867.50	-3.1	Lower 30-day payment
	HF 30-day episode payment		\$18,604	\$19,154	-\$550.00	-2.9	Lower 30-day payment
Patient experience ^{c,d}	HCAHPS score(%)		71	67	4.0	n/a	Better patient experience

a. Medicare Provider Analysis and Review (MEDPAR) FFY 2021 and 2022, combined

b. CMS Care Compare July 1, 2019 – June 30, 2022

c. CMS Care Compare CY 2022

d. Percentage difference for measures already expressed as a percent are not calculated



Teaching Hospitals With Cardiovascular Residency Programs

Teaching hospitals with specialized cardiovascular residency and fellowship programs are generally believed to treat more complex patients, have a more complex staffing mix and incur higher costs than community hospitals and those without specific cardiovascular teaching programs.^{18,19} Evaluating performance among teaching hospitals with cardiovascular programs as a unique group helps to produce valid quantitative comparisons. Our findings show that benchmark facilities in this comparison group outperformed their peers in every measure (Table 4 on the next page).

Table 4: Performance Comparisons for Teaching Hospitals With Cardiovascular Residency Programs

	Performance Measure		Benchmark Median	Peer Median	Benchmark Compared With Peer Group		
					Difference	Percent Difference	Comments
Clinical outcome measures ^a	Risk-adjusted inpatient mortality index	AMI mortality	0.77	0.99	-0.22	-22.2	Lower mortality
		HF mortality	0.68	0.98	-0.30	-30.6	Lower mortality
		CABG mortality	0.49	0.98	-0.49	-50.0	Lower mortality
		PCI mortality	0.73	0.97	-0.24	-24.7	Lower mortality
	Risk-adjusted complications index	CABG complications	0.80	0.97	-0.17	-17.5	Fewer complications
		PCI complications	0.88	1.02	-0.14	-13.7	Fewer complications
Extended outcome measures ^{b,d}	AMI 30-day mortality (%)		11.9	12.4	-0.5	n/a	Lower 30-day mortality
	HF 30-day mortality (%)		9.9	10.6	-0.7	n/a	Lower 30-day mortality
	CABG 30-day mortality (%)		2.3	2.7	-0.4	n/a	Lower 30-day mortality
	AMI 30-day readmission (%)		13.4	14.3	-0.9	n/a	Fewer 30-day readmissions
	HF 30-day readmission (%)		19.4	20.2	-0.8	n/a	Fewer 30-day readmissions
	CABG 30-day readmission (%)		10.7	11.0	-0.3	n/a	Fewer 30-day readmissions
Process efficiency	AMI severity-adjusted average length of stay (ALOS)		3.7	4.0	-0.3	-7.5	Shorter ALOS
	HF severity-adjusted ALOS		4.6	5.3	-0.7	-13.2	Shorter ALOS
	CABG severity-adjusted ALOS		9.0	9.2	-0.2	-1.6	Shorter ALOS
	PCI severity-adjusted ALOS		3.6	3.7	-0.1	-3.2	Shorter ALOS
Cost Efficiency	AMI wage- and severity-adjusted average cost per case		\$9,753	\$11,623	-\$1,869.64	-16.1	Lower cost per case
	HF wage- and severity-adjusted average cost per case		\$10,126	\$12,250	-\$2,124.38	-17.3	Lower cost per case
	CABG wage- and severity-adjusted average cost per case		\$42,465	\$50,249	-\$7,784.23	-15.5	Lower cost per case
	PCI wage- and severity-adjusted average cost per case		\$18,977	\$21,847	-\$2,870.67	-13.1	Lower cost per case
Extended Efficiency Measures ^b	AMI 30-day episode payment		\$27,492	\$28,029	-\$537	-1.9	Lower 30-day payment
	HF 30-day episode payment		\$18,783	\$19,317	-\$534	-2.8	Lower 30-day payment
Patient experience ^{c,d}	HCAHPS score (%)		75	68	7	n/a	Better patient experience

a. Medicare Provider Analysis and Review (MEDPAR) FFY 2021 and 2022, combined

b. CMS Care Compare July 1, 2019 – June 30, 2022

c. CMS Care Compare CY 2022

d. Percentage difference for measures already expressed as a percent are not calculated



Teaching Hospitals Without Cardiovascular Residency Programs

As with winning hospitals with CV teaching programs, those benchmark hospitals without cardiovascular specialty programs were also much more efficient than their peers, with large differences found in several measures, most notably in PCI complications, CABG inpatient mortality and ALOS (Table 5 on the next page).

Table 5: Performance Comparisons, Teaching Hospitals Without Cardiovascular Residency Programs

	Performance Measure		Benchmark Median	Peer Median	Benchmark Compared With Peer Group		
					Difference	Percent Difference	Comments
Clinical outcome measures ^a	Risk-adjusted inpatient mortality index	AMI mortality	0.69	1.03	-0.34	-33.0	Lower mortality
		HF mortality	0.61	0.98	-0.37	-37.8	Lower mortality
		CABG mortality	0.52	1.05	-0.53	-50.5	Lower mortality
		PCI mortality	0.62	1.00	-0.38	-38.0	Lower mortality
	Risk-adjusted complications index	CABG complications	0.63	1.02	-0.39	-38.2	Fewer complications
		PCI complications	0.35	1.04	-0.69	-66.3	Fewer complications
Extended outcome measures ^{b,d}	AMI 30-day mortality (%)		11.6	12.7	-1.1	n/a	Lower 30-day mortality
	HF 30-day mortality (%)		11.0	11.7	-0.7	n/a	Lower 30-day mortality
	CABG 30-day mortality (%)		2.7	3.0	-0.3	n/a	Lower 30-day mortality
	AMI 30-day readmission (%)		13.7	13.9	-0.2	n/a	Fewer 30-day readmissions
	HF 30-day readmission (%)		19.5	20.1	-0.7	n/a	Fewer 30-day readmissions
	CABG 30-day readmission (%)		10.5	11.0	-0.5	n/a	Fewer 30-day readmissions
Process efficiency	AMI severity-adjusted average length of stay (ALOS)		3.8	4.1	-0.28	-6.8	Shorter ALOS
	HF severity-adjusted ALOS		4.7	5.4	-0.66	-12.2	Shorter ALOS
	CABG severity-adjusted ALOS		8.3	9.4	-1.02	-10.9	Shorter ALOS
	PCI severity-adjusted ALOS		3.3	3.7	-0.38	-10.3	Shorter ALOS
Cost Efficiency	AMI wage- and severity-adjusted average cost per case		\$9,376	\$11,957	-\$2,581	-21.6	Lower cost per case
	HF wage- and severity-adjusted average cost per case		\$9,561	\$12,574	-\$3,013	-24.0	Lower cost per case
	CABG wage- and severity-adjusted average cost per case		\$39,965	\$49,503	-\$9,538	-19.3	Lower cost per case
	PCI wage- and severity-adjusted average cost per case		\$16,601	\$20,126	-\$3,525	-17.5	Lower cost per case
Extended Efficiency Measures ^b	AMI 30-day episode payment		\$26,143	\$28,058	-\$1,915	-6.8	Lower 30-day payment
	HF 30-day episode payment		\$18,178	\$19,097	-\$919	-4.8	Lower 30-day payment
Patient experience ^{c,d}	HCAHPS score (%)		70	67	3	n/a	Better patient experience

a. Medicare Provider Analysis and Review (MEDPAR) FFY 2021 and 2022, combined

b. CMS Care Compare July 1, 2019 – June 30, 2022

c. CMS Care Compare CY 2022

d. Percentage difference for measures already expressed as a percent are not calculated



Community Hospitals

Benchmark community hospitals outperformed their peers in the inpatient risk-adjusted mortality measure in all four patient groups. The most observable performance difference was in PCI inpatient mortality, where winning community hospitals had a median risk-adjusted mortality index value of 0.54, compared to the median index value of 1.01 at peer hospitals (a 46.5% gap). Another large difference between winning and nonwinning facilities was in cost efficiency, where CABG average cost per case was more than \$13,000 dollars less (Table 6 on the next page).

Table 6: Performance Comparisons for Community Hospitals

	Performance Measure		Benchmark Median	Peer Median	Benchmark Compared With Peer Group		
					Difference	Percent Difference	Comments
Clinical outcome measures ^a	Risk-adjusted inpatient mortality index	AMI mortality	0.75	0.99	-0.24	-24.2	Lower mortality
		HF mortality	0.68	0.95	-0.27	-28.4	Lower mortality
		CABG mortality	0.54	0.95	-0.41	-43.2	Lower mortality
		PCI mortality	0.54	1.01	-0.47	-46.5	Lower mortality
	Risk-adjusted complications index	CABG complications	0.71	1.01	-0.30	-29.7	Fewer complications
		PCI complications	0.60	0.99	-0.39	-39.4	Fewer complications
Extended outcome measures ^{b,d}	AMI 30-day mortality (%)		12.3	12.7	-0.45	n/a	Lower 30-day mortality
	HF 30-day mortality (%)		11.8	12.1	-0.35	n/a	Lower 30-day mortality
	CABG 30-day mortality (%)		2.9	3.0	-0.15	n/a	Lower 30-day mortality
	AMI 30-day readmission (%)		13.4	14.0	-0.65	n/a	Fewer 30-day readmissions
	HF 30-day readmission (%)		19.3	20.1	-0.85	n/a	Fewer 30-day readmissions
	CABG 30-day readmission (%)		11.1	11.1	0	n/a	Same 30-day readmissions
Process efficiency	AMI severity-adjusted average length of stay (ALOS)		3.4	4.0	-0.6	-15.6	Shorter ALOS
	HF severity-adjusted ALOS		4.9	5.3	-0.4	-7.8	Shorter ALOS
	CABG severity-adjusted ALOS		8.3	9.3	-1.0	-10.8	Shorter ALOS
	PCI severity-adjusted ALOS		3.2	3.7	-0.5	-13.2	Shorter ALOS
Cost Efficiency	AMI wage- and severity-adjusted average cost per case		\$8,576	\$11,776	-\$3,200	-27.2	Lower cost per case
	HF wage- and severity-adjusted average cost per case		\$9,718	\$12,311	-\$2,593	-21.1	Lower cost per case
	CABG wage- and severity-adjusted average cost per case		\$37,518	\$50,806	-\$13,288	-26.2	Lower cost per case
	PCI wage- and severity-adjusted average cost per case		\$16,817	\$21,090	-\$4,273	-20.3	Lower cost per case
Extended Efficiency Measures ^b	AMI 30-day episode payment		\$27,028	\$27,958	-\$930	-3.3	Lower 30-day payment
	HF 30-day episode payment		\$18,882	\$19,114	-\$233	-1.2	Lower 30-day payment
Patient experience ^{c,d}	HCAHPS score (%)		71	68	3	n/a	Better patient experience

a. Medicare Provider Analysis and Review (MEDPAR) FFY 2021 and 2022, combined

b. CMS Care Compare July 1, 2019 – June 30, 2022

c. CMS Care Compare CY 2022

d. Percentage difference for measures already expressed as a percent are not calculated

Leading Measures

Every year, in addition to the ranked study measures, a set of non-ranked or leading measures that may be of interest to leaders of hospitals and health systems is published. This year, the published leading measures include 30-day excess days in acute care (EDAC) measures for AMI and HF patients. These performance measures, along with the existing ranked extended care measures, 30-day mortality, readmission and episode of payment, offer healthcare leaders an additional insight into the performance of hospitals across the continuum of care.

As defined by CMS, the EDAC measures capture excess days that a hospital's patients spent in acute care within 30 days after discharge.²⁰ These measures summarize the number of risk-adjusted days patients spend in an emergency department (ED), a hospital observation unit or a hospital inpatient unit 30 days following a hospitalization for AMI or HF.

Comparing benchmark facilities and peers on this measure shows better performance with winners, at the national level, as shown in Table 7.

Table 7: National Performance Comparisons for 30-Day Excess Days in Acute Care (All Hospitals in Study)

	Performance Measure	Benchmark Median	Peer Median	Benchmark Compared With Peer Group		
				Difference	Percent Difference	Comments
Extended efficiency measures ^{a,b}	AMI 30-day excess days in acute care ^c	-1	8	-8	n/a	Fewer days in acute care
	HF 30-day excess days in acute care ^c	-3	10	-13	n/a	Fewer days in acute care

a. CMS Hospital Compare July 1, 2019 – June 30, 2022
b. Percentage difference for measures already expressed as a percent are not calculated
c. Reported as excess days per 100 discharges

Performance Trends

An evaluation of longitudinal performance change of all hospitals eligible for the study (winners and nonwinners) shows that U.S. hospitals have not been able to significantly improve performance across the entire 50 Top Cardiovascular Hospitals™ balanced scorecard: in the majority of measures (18 of 22), 70% or more of all in-study hospitals saw no statistically significant change in any of the scorecard measures.

However, over the evaluated study years, some facilities did accomplish statistically significant improvement at the 95% confidence level, especially among measures evaluating outcomes that extend beyond the acute inpatient stay. As shown in Table 8, a modest proportion of hospitals improved their CABG 30-day readmission rates with 34% of the hospitals showing significantly improved performance, followed by 30% of hospitals improving performance in AMI 30-day readmissions.

See Table 8 for details on how all in-study hospitals performed in the five-year rate of improvement.

Table 8: Direction of Performance Change for All Cardiovascular Hospitals in Study, 2018 – 2022

		Significantly improving performance (95% CI)		No statistically significant change in performance (95% CI)		Significantly declining performance (95% CI)	
		Count of hospitals ¹	Percent of hospitals ²	Count of hospitals ¹	Percent of hospitals ²	Count of hospitals ¹	Percent of hospitals ²
Risk-adjusted inpatient mortality index	AMI mortality	6	0.7%	879	96.4%	27	3.0%
	HF mortality	10	1.1%	877	96.2%	25	2.7%
	CABG mortality	81	8.9%	749	82.1%	82	9.0%
	PCI mortality	44	4.8%	788	86.4%	80	8.8%
Risk-adjusted complications index	CABG complications	166	18.2%	615	67.4%	131	14.4%
	PCI complications	108	11.8%	706	77.4%	98	10.7%
AMI 30-day mortality		121	13.3%	715	78.4%	76	8.3%
HF 30-day mortality		74	8.1%	726	79.6%	112	12.3%
CABG 30-day mortality		107	11.7%	726	79.6%	79	8.7%
AMI 30-day readmission		271	29.7%	635	69.6%	6	0.7%
HF 30-day readmission		178	19.5%	700	76.8%	34	3.7%
CABG 30-day readmission		311	34.1%	594	65.1%	7	0.8%
AMI severity-adjusted average length of stay (ALOS)		45	4.9%	850	93.2%	17	1.9%
HF severity-adjusted ALOS		37	4.1%	747	81.9%	128	14.0%
CABG severity-adjusted ALOS		77	8.4%	792	86.8%	43	4.7%
PCI severity-adjusted ALOS		49	5.4%	822	90.1%	41	4.5%
AMI wage- and severity-adjusted average cost per case		66	7.2%	819	89.9%	26	2.9%
HF wage- and severity-adjusted average cost per case		82	9.0%	735	80.7%	94	10.3%
CABG wage- and severity adjusted average cost per case		117	12.9%	730	80.2%	63	6.9%
PCI wage- and severity-adjusted average cost per case		157	17.3%	714	78.7%	36	4.0%
AMI 30-day episode of payment		2	0.2%	349	38.3%	561	61.5%
HF 30-day episode of payment		3	0.3%	499	54.7%	410	45.0%

1. Count refers to the number of in-study hospitals whose performance fell into the highlighted category for the measure.

2. Percent is calculated by dividing the count by the total in-study hospitals across all comparison groups

Note: Total number of hospitals included in the analysis can vary by measure due to exclusion of IQR outlier data points, causing some in-study hospitals to have too few remaining data points to calculate trend. This affects the Cost per Case measures.

About Premier, Inc.

Premier, Inc. (NASDAQ: PINC) is a leading healthcare improvement company, uniting an alliance of more than 4,350 U.S. hospitals and health systems and approximately 300,000 other providers and organizations to transform healthcare. With integrated data and analytics, collaboratives, supply chain solutions, and consulting and other services, Premier enables better care and outcomes at a lower cost. Premier plays a critical role in the rapidly evolving healthcare industry, collaborating with members to co-develop long-term innovations that reinvent and improve the way care is delivered to patients nationwide. Headquartered in Charlotte, N.C., Premier is passionate about transforming American healthcare. Please visit Premier's news and investor sites on www.premierinc.com; as well as Twitter, Facebook, LinkedIn, YouTube, Instagram, and Premier's blog for more information about the company.

About the PINC AI™ Platform

PINC AI™ is the technology and services platform of Premier, Inc. (NASDAQ: PINC). With more than 20 years' worth of cost, quality and operational data gleaned from 45 percent of U.S. hospital discharges, 2.7 billion hospital outpatient and clinic encounters and 177 million physician office visits, the PINC AI™ platform provides actionable intelligence to help improve outcomes, support improved financial performance and enable success in new, alternative payment models. PINC AI™ incorporates the 100 Top Hospitals® Program that inspires hospital and health system leaders to pursue higher performance and deliver added value to their patients and communities. PINC AI™ offerings rely on advanced analytics to identify improvement opportunities; support award-winning Strategic Collaboratives for value-based care, maternal and infant health, workforce innovation, and health equity; and consulting services for clinical and operational design, and workflow solutions to hardwire sustainable change. The PINC AI™ platform is also the data engine powering Premier's newest brands – Remitra® and Contigo Health®. With a leading network of provider organizations, the PINC AI™ platform accelerates ingenuity and serves as a large-scale innovation catalyst in healthcare. PINC AI™ offerings and capabilities can be followed on Twitter and LinkedIn.

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