



100 TOP HOSPITALS

100 Top Hospitals: Study Overview

21st Edition
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Introduction

100 Top Hospitals: The Objective Path to Evidence-Based Management

The annual Truven Health 100 Top Hospitals® study is independent, quantitative research that identifies the U.S. hospitals with the best facility-wide performance. To maintain the study's high level of integrity, only public data sources are used for calculating study metrics. This eliminates bias, ensures inclusion of all hospitals, and facilitates consistency of definitions and data. Hospitals do not apply, and winners do not pay to market this honor.

At the heart of our research is the 100 Top Hospitals National Balanced Scorecard, which is comprised of equally weighted measures of key organizational functions and outcomes — financial stability, operational efficiency, patient safety, quality inpatient and outpatient care, and customer perception of care.

Winners of the 100 Top Hospitals studies demonstrate what can be accomplished and set the industry benchmarks for excellence on critical performance measures like 30-day readmissions, mortality rates, and profit margins.

A Unique Method for Measuring Leadership Excellence and Its Effect on Organizational Performance

For more than 20 years, Truven Health Analytics™ has collaborated with academics on a wide range of topics to dig deeper into the leadership practices of the nation's top healthcare organizations. Those studies have found that leadership excellence is essential for superior organizational performance and the delivery of high value to community stakeholders. In addition, the studies have also revealed that the measurement of performance across multiple dimensions is both unique and useful for leaders as they seek to understand the relative performance of their hospitals. Most importantly, leaders must set long-term goals and be able to clearly track progress.

In previous years, the 100 Top Hospitals program responded by integrating long-term rates of improvement with the resultant national performance rank.

In the past year, we have also introduced another important leadership measure — the degree of performance alignment across functional areas in hospitals. This measure is essential to defining highly effective leaders versus simply good or ineffective leaders.

As such, the 100 Top Hospitals study not only provides a unique approach to measuring the performance of hospitals, but also delivers objective insights into the effectiveness of hospital leadership. Higher composite scores on our National Balanced Scorecard reflect more effective leadership and more reliable delivery of high value to communities.

No “Perfect” Type of Hospital

The 100 Top Hospitals study divides the nation’s hospitals into five categories (teaching, major teaching, small community, medium community, and large community) to ensure the benchmarks are actionable. The analysis has confirmed that hospitals in each of the five categories perform at different levels, depending on the metric.

Results show that, in general, there is no “perfect” type of hospital by category. Rather, each type of hospital has its own inherent set of specific challenges and opportunities, and each category requires a different level of risk tolerance.

However, our studies demonstrate year after year that leaders at the nation’s best-performing hospitals work to address and avoid the known difficulties of their industry category. They use evidence-based management, driven by objective data and analytics, to help prevent the acceptance of performance patterns that, while traditional, have proven to be unnecessary or detrimental to progress. They evaluate all resources to drive new practice patterns in their category and set targets for performance improvement initiatives.

This has become increasingly important in today’s healthcare environment. Under the Affordable Care Act (ACA) and the demand for expanded transparency, health systems, accountable care organizations (ACOs), and insurance networks will all expect consistent outcomes, regardless of hospital type.

Key Differences Between Award Winners and Their Peers

Using our National Balanced Scorecard’s equally weighted measures, this year’s 100 Top Hospitals study reveals significant differences between award winners and their nonwinning peers.

The nation’s best hospitals:

- Have a lower mortality index considering patient severity
- Have fewer patient complications
- Avoid adverse patient safety events
- Follow accepted care protocols
- Have lower 30-day readmission and mortality rates
- Keep expenses low
- Send patients home sooner
- Score better on patient satisfaction surveys

Concentration of High Performers by Geographic Region

Through the past two decades, the 100 Top Hospital study has found that benchmark performance tends to shift slowly across the country by region. These shifts are likely due to changing regional priorities and unique events, as well as the regional exchange of CEO ideas and priorities.

In this year's study, the largest concentration of award winners was located in the Midwest and South census regions. For the past two years, the Midwest was the clear frontrunner in performance versus peers. (See pages 23–26.)

U.S. Still Striving for Long-Term Healthcare Performance Improvement

By studying the direction of performance change of all hospitals in the study (winners and nonwinners), 100 Top Hospitals research shows that in recent years, U.S. hospitals have not been able to significantly improve overall performance across the entire balanced scorecard.

While hospital leaders have made some great strides in electronic medical records, new processes for delivering care more effectively, and being held accountable for many of the Centers for Medicare & Medicaid Services Hospital Compare measures, the overall improvement of the industry is still advancing slowly.

Truven Health experts expect, however, that the rate of change will increase significantly over the next five years as more of the ACA takes effect.

Our Award Winners Set the Standard

Despite slow overall progress toward industry improvement, the accomplishments of this year's 100 Top Hospitals winners set an exceptional example for peers to follow.

In fact, study projections indicate that if the new national benchmarks of high performance were achieved by all hospitals in the U.S.:

- Nearly 165,000 additional lives could be saved
- More than 90,000 additional patients could be complication-free
- \$5.4 billion could be saved
- The typical patient could be released from the hospital a half a day sooner

This analysis, conducted by comparing study winners with a peer group of nonwinners, is based only on Medicare patients included in this study. If the same standards were applied to all inpatients, the impact would be even greater.

This year, as in every other since 1993, Truven Health 100 Top Hospitals award winners prove that better care and operational efficiency can be achieved simultaneously — regardless of ever-changing factors such as the state of the economy and efforts in healthcare reform.

The Multi-Faceted 100 Top Hospitals Program

To increase understanding of trends in specific areas of the industry, the 100 Top Hospitals program includes a range of studies and reports:

- 100 Top Hospitals and Everest Award studies, highly anticipated research that annually recognizes the best hospitals in the nation based on overall organizational performance, as well as long-term rates of improvement
- 50 Top Cardiovascular Hospitals, an annual study identifying hospitals that demonstrate the highest performance in hospital cardiovascular services
- 15 Top Health Systems, a groundbreaking study introduced in 2009 that provides an objective measure of health system performance as a sum of its parts
- The 100 Top Hospitals Performance Matrix, a two-dimensional analysis — available for nearly all U.S. hospitals — that provides a clear view of how long-term improvement and current performance overlap and compare with national peers
- A variety of custom benchmark reports designed to help executives understand how their performance compares with their peers within health systems, states, and markets

You can read more about these studies and see lists of all winners by visiting 100tophospitals.com.

About Truven Health Analytics

Truven Health Analytics delivers unbiased information, analytic tools, benchmarks, and services to the healthcare industry. Hospitals, government agencies, employers, health plans, clinicians, pharmaceutical, and medical device companies have relied on us for more than 30 years. We combine our deep clinical, financial, and healthcare management expertise with innovative technology platforms and information assets to make healthcare better by collaborating with our customers to uncover and realize opportunities for improving quality, efficiency, and outcomes. With more than 2,000 employees globally, we have major offices in Ann Arbor, Mich.; Chicago; and Denver. Advantage Suite, Micromedex, ActionOI, MarketScan, and 100 Top Hospitals are registered trademarks or trademarks of Truven Health Analytics.

Award Winners

Truven Health Analytics™ is proud to present the 2014 Truven Health 100 Top Hospitals® award winners. We stratify winners by five separate peer comparison groups: major teaching, teaching, large community, medium community, and small community hospitals.

To see a full list of *Winners Through the Years*, please visit www.100tophospitals.com/studies_and_winners/100_top_hospitals.

Major Teaching Hospitals*			
Hospital	Location	Medicare ID	Total Year(s) Won
Advocate Christ Medical Center	Oak Lawn, IL	140208	Six
Advocate Illinois Masonic Medical Center	Chicago, IL	140182	Five
Advocate Lutheran General Hospital	Park Ridge, IL	140223	Fifteen
Baystate Medical Center	Springfield, MA	220077	Seven
Doctors Hospital	Columbus, OH	360152	Four
Duke University Hospital	Durham, NC	340030	Two
Froedtert & the Medical College of Wisconsin	Milwaukee, WI	520177	Two
Lahey Hospital & Medical Center	Burlington, MA	220171	One
Ochsner Medical Center	New Orleans, LA	190036	Four
Penn Presbyterian Medical Center	Philadelphia, PA	390223	Three
Providence Hospital and Medical Center	Southfield, MI	230019	Six
Scott & White Hospital	Temple, TX	450054	Nine
St. Joseph Mercy Hospital	Ann Arbor, MI	230156	Six
University of Colorado Hospital	Aurora, CO	060024	Two
Vanderbilt University Medical Center	Nashville, TN	440039	Fourteen

* Everest Award winners are bolded.

Teaching Hospitals*

Hospital	Location	Medicare ID	Total Year(s) Won
Aspirus Wausau Hospital	Wausau, WI	520030	Two
Avera McKennan Hospital & University Health Center	Sioux Falls, SD	430016	Six
Berkshire Medical Center	Pittsfield, MA	220046	One
Bethesda North Hospital	Cincinnati, OH	360179	Five
Carolinas Medical Center-Mercy	Charlotte, NC	340098	Two
Grant Medical Center	Columbus, OH	360017	Five
Kettering Medical Center	Kettering, OH	360079	Ten
Lankenau Medical Center	Wynnewood, PA	390195	Three
MacNeal Hospital	Berwyn, IL	140054	Three
McKay-Dee Hospital Center	Ogden, UT	460004	Four
Memorial Hermann Hospital System	Houston, TX	450184	Five
Mercy Medical Center	Cedar Rapids, IA	160079	Two
Mission Hospital	Asheville, NC	340002	Six
North Colorado Medical Center	Greeley, CO	060001	Three
PIH Health Hospital	Whittier, CA	050169	Two
Riverside Medical Center	Kankakee, IL	140186	Five
Riverside Methodist Hospital	Columbus, OH	360006	Eleven
Rose Medical Center	Denver, CO	060032	Seven
Saint Thomas West Hospital	Nashville, TN	440082	Thirteen
Saint Vincent Hospital	Worcester, MA	220176	Five
Scripps Green Hospital	La Jolla, CA	050424	Seven
Sutter Medical Center, Sacramento	Sacramento, CA	050108	Four
United Regional Health Care System	Wichita Falls, TX	450010	Two
UnityPoint Health - Allen Hospital	Waterloo, IA	160110	Three
Virginia Hospital Center	Arlington, VA	490050	Two

* Everest Award winners are bolded.

Large Community Hospitals*

Hospital	Location	Medicare ID	Total Year(s) Won
Advocate Condell Medical Center	Libertyville, IL	140202	One
Advocate Good Samaritan Hospital	Downers Grove, IL	140288	Five
Asante Rogue Regional Medical Center	Medford, OR	380018	Two
Banner Boswell Medical Center	Sun City, AZ	030061	Four
Brandon Regional Hospital	Brandon, FL	100243	Six
Centinela Hospital Medical Center	Inglewood, CA	050739	Three
Central DuPage Hospital	Winfield, IL	140242	Seven
Memorial Hermann Memorial City Medical Center	Houston, TX	450610	Four
Memorial Hospital West	Pembroke Pines, FL	100281	Four
Mercy Hospital	Coon Rapids, MN	240115	Three
Mother Frances Hospital-Tyler	Tyler, TX	450102	Five
Northeast Georgia Medical Center	Gainesville, GA	110029	Three
Ocala Regional Medical Center	Ocala, FL	100212	Four
Paradise Valley Hospital	National City, CA	050024	One
Providence Little Company of Mary Medical Center	Torrance, CA	050353	Four
St. Clair Hospital	Pittsburgh, PA	390228	Three
St. David's Medical Center	Austin, TX	450431	Five
St. David's North Austin Medical Center	Austin, TX	450809	Three
St. Francis Downtown	Greenville, SC	420023	One
St. Mary Medical Center	Langhorne, PA	390258	Three

* Everest Award winners are bolded.

Medium Community Hospitals*

Hospital	Location	Medicare ID	Total Year(s) Won
Aurora Sheboygan Memorial Medical Center	Sheboygan, WI	520035	Six
Chino Valley Medical Center	Chino, CA	050586	Three
Cooley Dickinson Hospital	Northampton, MA	220015	One
Garden Grove Hospital Medical Center	Garden Grove, CA	050230	Three
Gulf Coast Regional Medical Center	Panama City, FL	100242	Five
Holland Hospital	Holland, MI	230072	Nine
Inova Fair Oaks Hospital	Fairfax, VA	490101	Three
La Palma Intercommunity Hospital	La Palma, CA	050580	One
Lawrence Memorial Hospital	Lawrence, KS	170137	Two
Licking Memorial Hospital	Newark, OH	360218	Twelve
Logan Regional Hospital	Logan, UT	460015	Four
Memorial Hospital Miramar	Miramar, FL	100285	Two
Mercy Hospital Anderson	Cincinnati, OH	360001	Ten
Mercy Hospital Fairfield	Fairfield, OH	360056	Four
Providence St. Patrick Hospital	Missoula, MT	270014	One
Shasta Regional Medical Center	Redding, CA	050764	Two
SSM St. Joseph Hospital West	Lake Saint Louis, MO	260200	Three
St. Vincent Carmel Hospital	Carmel, IN	150157	Two
West Anaheim Medical Center	Anaheim, CA	050426	Five
West Valley Medical Center	Caldwell, ID	130014	One

* Everest Award winners are bolded.

Small Community Hospitals*

Hospital	Location	Medicare ID	Total Year(s) Won
Aurora Memorial Hospital of Burlington	Burlington, WI	520059	One
Bozeman Deaconess Hospital	Bozeman, MT	270057	One
Dublin Methodist Hospital	Dublin, OH	360348	Three
Hill Country Memorial Hospital	Fredericksburg, TX	450604	Four
Lakeview Hospital	Bountiful, UT	460042	Four
Maple Grove Hospital	Maple Grove, MN	240214	One
Memorial Hermann Sugar Land Hospital	Sugar Land, TX	450848	Three
Ministry Saint Clare's Hospital	Weston, WI	520202	Two
Parkview Huntington Hospital	Huntington, IN	150091	Two
Riverton Hospital	Riverton, UT	460058	One
Sacred Heart Hospital on the Emerald Coast	Miramar Beach, FL	100292	Four
San Dimas Community Hospital	San Dimas, CA	050588	Two
Scott & White Hospital - Round Rock	Round Rock, TX	670034	One
St. Joseph's Hospital Breese	Breese, IL	140145	One
Sutter Davis Hospital	Davis, CA	050537	Five
Tanner Medical Center-Villa Rica	Villa Rica, GA	110015	Three
Texas Health Presbyterian Hospital Rockwall	Rockwall, TX	670044	One
Trinity Bettendorf	Bettendorf, IA	160104	One
Valley View Hospital	Glenwood Springs, CO	060075	Two
Woodwinds Health Campus	Woodbury, MN	240213	Four

* Everest Award winners are bolded.

The Everest Award

The Truven Health 100 Top Hospitals®

Everest Award honors hospitals that have both the highest current performance and the fastest long-term improvement.

This award recognizes the boards, executives, and medical staff leaders who have developed and executed strategies that drove the highest rate of improvement, resulting in the highest performance in the country at the end of five years.

The Everest Award winners are a special group of the 100 Top Hospitals award winners that, in addition to achieving benchmark status for one year, have simultaneously set national benchmarks for the fastest long-term improvement on our national balanced scorecard. In 2014, only 14 organizations achieved this exceptional level of performance.

The 2014 Everest Award Winners

Truven Health Analytics™ is proud to present the winners of the Truven Health 100 Top Hospitals Everest Award.

2014 Everest Award Winners			
Hospital	Location	Medicare ID	Total Year(s) Won
Advocate Condell Medical Center	Libertyville, IL	140202	One
Advocate Lutheran General Hospital	Park Ridge, IL	140223	Three
Cooley Dickinson Hospital	Northampton, MA	220015	One
Grant Medical Center	Columbus, OH	360017	Two
MacNeal Hospital	Berwyn, IL	140054	One
Parkview Huntington Hospital	Huntington, IN	150091	One
Providence Hospital and Medical Center	Southfield, MI	230019	One
Riverside Methodist Hospital	Columbus, OH	360006	Two
St. Joseph's Hospital Breese	Breese, IL	140145	One
St. Mary Medical Center	Langhorne, PA	390258	One
Tanner Medical Center-Villa Rica	Villa Rica, GA	110015	One
United Regional Health Care System	Wichita Falls, TX	450010	Two
West Valley Medical Center	Caldwell, ID	130014	One
Woodwinds Health Campus	Woodbury, MN	240213	Two

Value to the Healthcare Industry

Leaders making critical decisions in an increasingly transparent environment must have more sophisticated intelligence that provides clearer insight into the complexity of changing organizational performance. They must also balance short- and long-term goals to drive continuous gains in performance and value. By comparing individual hospital performance with integrated national benchmarks for highest achievement and improvement, we provide unique, new insights for making smarter decisions that will help hospitals achieve their missions and consistently increase their value to the community.

Transparency presents hospital boards and CEOs with a very public challenge to increase the value of core services to their communities. Providing real value is not a one-time event — it is a continuous process of increasing worth over time.

Integrating national benchmarks for highest achievement with national benchmarks for fastest long-term improvement radically increases the value of objective business information available for strategy development and decision-making. Comparing hospital or health system performance to these integrated benchmarks allows leaders to review the effectiveness of long-term strategies that led to current performance. This integrated information enables boards and CEOs to better answer multi-dimensional questions, such as:

- Did our long-term strategies result in a stronger hospital across all performance areas?
- Did our strategies drive improvement in some areas but inadvertently cause deteriorating performance in others?
- What strategies will help us increase the rate of improvement in the right areas to come closer to national performance levels?
- What incentives do we need to implement for management to achieve the desired improvement more quickly?
- Will the investments we're considering help us achieve improvement goals?
- Can we quantify the long- and short-term increases in value our hospital has provided to our community?

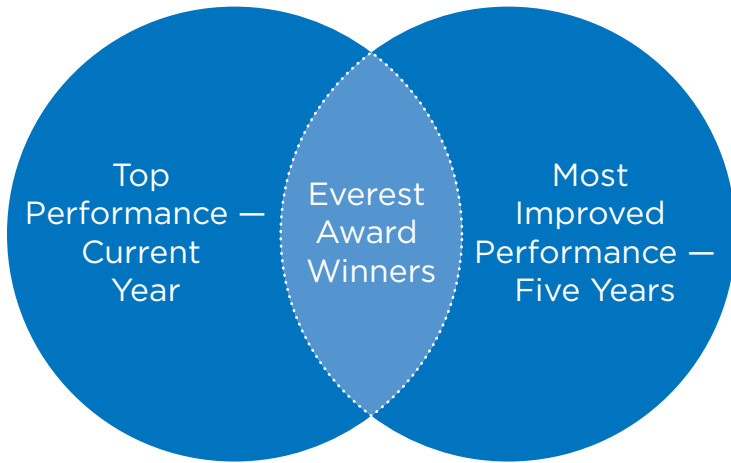
How We Select the Everest Award Winners

Winners of the 100 Top Hospitals Everest Award are setting national benchmarks for both long-term (three- to five-year) improvement and highest one-year performance on the study's balanced scorecard. Everest Award winners are selected from among the new 100 Top Hospitals award winners. The national award and the Everest Award are based on a set of measures that reflect highly effective performance across the whole organization.

Our methodology for selecting the Everest Award winners can be summarized in three main steps:

1. Selecting the annual 100 Top Hospitals award winners using our objective methodology* based on publicly available data and a balanced scorecard of performance measures

- Using our multi-year trending methodology to select the 100 hospitals that have shown the fastest, most consistent five-year (2008–2012) improvement rates on the same balanced scorecard of performance measures[†]
- Aligning these two lists of hospitals and looking for overlap; those that ranked in the top 100 of both lists are the Everest Award winners



Combining these two methodologies yields a very select group of Everest Award winners; the number of winners will vary every year, based solely on performance.

Data Sources

As with all of the 100 Top Hospitals awards, our methodology is objective and all data come from trusted public sources. We build a database of short-term, acute-care, nonfederal U.S. hospitals that treat a broad spectrum of patients. The primary data sources are the Medicare Provider Analysis and Review (MedPAR) dataset and the Medicare Cost Report. We use the most recent five years of Cost Report and three years of MedPAR data available.

Several other datasets are also used. Core measures and patient satisfaction (Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey) data are from the Centers for Medicare & Medicaid Services (CMS) Hospital Compare dataset. Residency program information, used in classifying teaching hospitals, is from the American Medical Association (Accreditation Council for Graduate Medical Education (ACGME)-accredited programs) and the American Osteopathic Association (AOA).

After excluding hospitals with data that would skew study results (e.g., specialty hospitals), we have a database study group of nearly 3,000 hospitals.

*For full details on how the 100 Top Hospitals winners are selected, please see the Methodology section of this document.

†For data availability reasons, in-hospital mortality, complications, patient safety, and length-of-stay are based on only four years of data (2009–2012). See the Performance Measures section for details.

Comparison Groups

Because bed size and teaching status have a profound effect on the types of patients a hospital treats and the scope of services it provides, we assigned each hospital in our study database to one of five comparison groups, or classes, according to its size and teaching status (for definitions of each group, see the Methodology section):

- Major Teaching Hospitals
- Teaching Hospitals
- Large Community Hospitals
- Medium Community Hospitals
- Small Community Hospitals

To judge hospitals fairly and compare them to like hospitals, we use these classes for all scoring and ranking of hospitals to determine winners. For more information on how we build the database, please see the Methodology section of this document.

Performance Measures

Both the 100 Top Hospitals award and the Everest Award are based on a set of measures that reflect highly effective performance across the whole organization, including board members, medical staff, management, and nursing. These measures include patient outcomes and safety, national treatment standards (core measures), patient satisfaction, operational efficiency, and financial stability.

The 10 measures used to select the 2014 winners are:

1. Risk-adjusted mortality index (in-hospital)
2. Risk-adjusted complications index
3. Risk-adjusted patient safety index
4. Core measures mean percent
5. 30-day risk-adjusted mortality rate for acute myocardial infarction (AMI), heart failure, and pneumonia
6. 30-day risk-adjusted readmission rate for AMI, heart failure, and pneumonia
7. Severity-adjusted average length-of-stay
8. Case mix- and wage-adjusted inpatient expense per discharge
9. Adjusted operating profit margin
10. HCAHPS score (patient rating of overall hospital performance)

For full details, including calculation and scoring methods, please see the Methodology section.

We use Present on Admission (POA) data in our proprietary risk models. Because POA coding did not become available until the 2009 MedPAR dataset, in-hospital mortality, complications, patient safety, and length-of-stay, are based on only four years of data (2009–2012). All other measures are based on five years of data.

For the in-hospital mortality, complications, and patient safety — clinical measures with low frequency of occurrence — we combine two years of data for each study year to stabilize results. This year, we combined as follows:

- Study year 2012 = 2012 and 2011 MedPAR datasets
- Study year 2011 = 2011 and 2010 MedPAR datasets
- Study year 2010 = 2010 and 2009 MedPAR datasets

For specific data years used for each measure, please see page 41 of the Methodology section.

Final Selection: Ranking and Five-Year Trending

To select the 100 Top Hospitals award winners, we rank hospitals on the basis of their current-year performance on each of the study measures relative to other hospitals in their comparison group. We then sum each hospital's performance-measure rankings and re-rank them, overall, to arrive at a final rank for the hospital. (The 30-day rates by patient condition each receive a weight of one-sixth. All other measures receive a weight of one.) The hospitals with the best final ranks in each comparison group are selected as the 100 Top Hospitals award winners.

Separately, for every hospital in the study, we calculate a t-statistic that measures five-year[‡] performance improvement on each of the 10 performance measures. This statistic measures both the direction and magnitude of change in performance, and the statistical significance of that change. Within the five comparison groups, we rank hospitals on the basis of their performance improvement t-statistic on each of the study measures relative to other hospitals in their group. We then sum each hospital's performance-measure rankings and re-rank them, overall, to arrive at a final rank for the hospital. The hospitals with the best final rank in each comparison group are selected as the performance improvement benchmark hospitals.

As our final step, we align the two groups of benchmark hospitals and look for overlap. Those that are identified as benchmarks on both lists are the Everest Award winners.

[‡]For data availability reasons, in-hospital mortality, complications, patient safety, and length-of-stay are based on only four years of data (2009–2012). See the Performance Measures section for details.

Findings

The Truven Health 100 Top Hospitals® study brings to light how the best hospitals in the country operate. These leaders in our industry have successfully balanced the fine line between running lean operations every day and being innovative and forward-thinking enough to grow their organizations. The study is more than a list of accomplishments — it's a method for hospital and system leaders to guide their own performance improvement initiatives. By highlighting what the high-performing leaders around the country are excelling at, we are creating aspirational benchmarks for the rest of the industry.

Through the years, the body of published research proving the validity and stability of the 100 Top Hospitals has grown wide.¹⁻²³ There's no better way to see how the nation's health and the industry's bottom lines could be improved than by aggregating the winner-versus-nonwinner data from this study. Based on comparisons between the 100 Top Hospitals study winners and a peer group of similar high-volume hospitals that were not winners, we found that if all hospitals performed at the level of this year's winners:

- Nearly 165,000 additional lives could be saved
- More than 90,000 additional patients could be complication-free
- \$5.4 billion could be saved
- The typical patient could be released from the hospital a half a day sooner

We based this analysis on the Medicare patients included in this study. If the same standards were applied to all inpatients, the impact would be even greater.

How the Winning Hospitals Compare to Their Peers

In this section, we show how the 100 Top Hospitals performed within their comparison groups, or classes (major teaching and teaching hospitals; and large, medium, and small community hospitals), compared with nonwinning peers. For performance measure details and definitions of each comparison group, please see the Methodology section.

Please note: in Tables 1-6, data for the 100 Top Hospitals award winners are labeled Benchmark, and data for all hospitals, excluding award winners, are labeled Peer Group. In columns labeled Benchmark Compared With Peer Group, we calculate the actual and percentage difference between the benchmark hospital scores and the peer group scores.

100 Top Hospitals Have Better Survival Rates

- The winners had 7 percent fewer deaths than expected, considering patient severity, while their nonwinning peers had as many deaths as would be expected (Table 1).
- Small community hospitals had the best survival rates and the most dramatic difference between winners and nonwinners. Small winning hospitals had 15 percent fewer deaths than expected, while their peers had as many as expected (Table 6).
- Medium-sized community hospitals also had a significantly lower mortality index than nonwinning peer hospitals, with a 7.3-percent lower index (Table 5).

100 Top Hospitals Have Fewer Patient Complications

- Patients at the winning hospitals had 8 percent fewer complications than expected, considering patient severity, while their nonwinning peers had only 1 percent fewer complications than expected (Table 1).
- Medium-sized community hospitals had the most dramatic difference between winners and nonwinners. Winning hospitals had 19 percent fewer patient complications than nonwinning hospitals (Table 5). This is also a significant improvement over last year's 10 percent fewer complications for this hospital category.
- Winning small community hospitals had 13 percent fewer complications than nonwinning hospitals (Table 6).

100 Top Hospitals Are Successfully Avoiding Adverse Patient Safety Events

- A patient safety index (PSI) of 0.86 tells us that the winning hospitals had 14 percent fewer adverse patient safety events than expected; their peers had only 6 percent fewer adverse events than expected (Table 1).
- Small and medium-sized community hospitals had the best patient safety scores (0.74 and 0.70, respectively) and the most dramatic differences between winners and nonwinners. Medium-sized winning hospitals had 28 percent fewer adverse patient safety events than nonwinning hospitals, and small-sized winning hospitals had 23 percent fewer (Tables 5 and 6).

100 Top Hospitals Follow Accepted Care Protocols

- The winning hospitals' higher core measures mean percentage of 98.7 tells us that they had better adherence to recommended core measures of care than their peers, who had a median of 97.2 percent (Table 1).
- Core measures scores were very consistent among the hospital teaching status and size comparison groups, with all four groups right around 98 (Tables 2, 3, 4, and 5).

100 Top Hospitals Have Lower 30-Day Readmission and Mortality Rates

- 30-day mortality and readmission rates are lower at the winning hospitals overall (Table 1).
- The difference between winning and nonwinning hospitals for 30-day readmissions was greatest for heart failure patients, with winners performing nearly 1 percentage point better than nonwinners (Table 1).
- For 30-day AMI, HF, and pneumonia mortality rates, winning hospitals were overall lower than nonwinning hospitals, most significantly for AMI, which was 14.3 for winning hospitals and 15.1 for nonwinning hospitals (Table 1).

100 Top Hospitals Have Lower Expenses

- The findings show that all winner groups had lower expenses than the peer groups. Overall, winners had 9.3-percent lower expenses than nonwinners (Table 1).
- Three groups in particular showed significantly lower expenses than the peer groups. Major teaching hospitals had 11.5-percent lower expenses (Table 2), medium-sized community hospitals had 15.2-percent lower expenses (Table 5), and small community hospitals had 14.8-percent lower expenses (Table 6).
- When compared to the previous year's study, both winning and nonwinning major teaching hospitals showed a decline in expense per discharge (Table 2).
- In teaching hospitals, peer median expense declined year over year while the benchmark increased slightly (Table 3). It appears that the teaching hospitals are reducing costs more successfully than other categories.

Patients Treated at 100 Top Hospitals Return Home Sooner

- Winning hospitals have a median average length-of-stay (ALOS) that's half a day shorter than their peers' median, which is an 11.2-percent shorter stay (Table 1).
- The winning medium-sized and small community hospitals had the shortest ALOS of all the groups (Tables 5 and 6). They both average approximately three-quarters of a day (16 percent) shorter ALOS than the peer groups.

Patients Rate 100 Top Hospitals Higher Than Peer Hospitals

- The winners' 3.5-percent higher median Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) score tells us that patients treated at the 100 Top Hospitals are reporting a better overall hospital experience than those treated in peer hospitals (Table 1).
- The winning small community hospitals had the highest HCAHPS scores at 273 versus 261 of the peer group (Table 6).

Table 1: National Performance Comparisons (All Classes)

Performance Measure	Medians		Benchmark Compared With Peer Group		
	Current Benchmark	Peer Group of U.S. Hospitals	Actual	Percent	Desired Direction
Mortality Index ¹	0.93	1.00	-0.07	-7.1%	lower index
Complications Index ¹	0.92	0.99	-0.07	-6.9%	lower index
Patient Safety Index ²	0.86	0.94	-0.08	-8.5%	lower index
Core Measures Mean Percent (%) ³	98.7	97.2	1.5	n/a ⁶	higher percent
30-Day AMI Mortality Rate (%) ⁴	14.3	15.1	-0.8	n/a ⁶	lower rate
30-Day HF Mortality Rate (%) ⁴	11.4	11.7	-0.3	n/a ⁶	lower rate
30-Day Pneumonia Mortality Rate (%) ⁴	11.3	11.8	-0.5	n/a ⁶	lower rate
30-Day AMI Readmission Rate (%) ⁴	17.9	18.3	-0.4	n/a ⁶	lower rate
30-Day HF Readmission Rate (%) ⁴	22.2	23.1	-0.9	n/a ⁶	lower rate
30-Day Pneumonia Readmission Rate (%) ⁴	17.3	17.6	-0.4	n/a ⁶	lower rate
Average Length-of-Stay (days) ¹	4.3	4.9	-0.5	-11.2%	shorter stay
Inpatient Expense per Discharge (\$)	5,648	6,229	-581	-9.3%	lower expenses
Operating Profit Margin (%)	13.5	4.1	9.4	n/a ⁶	higher profitability
HCAHPS Score ⁵	269.0	260.0	9.0	3.5%	higher rating

1. Mortality, complications, and average length-of-stay based on Present on Admission (POA)-enabled risk models applied to MedPAR 2011 and 2012 data.

2. PSI based on AHRQ POA-enabled risk models applied to MedPAR 2011 and 2012 data. Ten PSIs included; see Appendix C for list.

3. Core measures data from CMS Hospital Compare second quarter 2013 release: October 1, 2011–September 30, 2012 dataset. See Appendix C for included core measures.

4. 30-day rates from CMS Hospital Compare third quarter 2013 release: July 1, 2009–June 30, 2012 dataset.

5. HCAHPS data from CMS Hospital Compare third quarter 2013 release: January 1–December 31, 2012 dataset.

6. We do not calculate percent difference for this measure because it is already a percent value.

Table 2: Major Teaching Hospital Performance Comparisons

Performance Measure	Medians		Benchmark Compared With Peer Group		
	Current Benchmark	Peer Group of U.S. Hospitals	Actual	Percent	Desired Direction
Mortality Index ¹	0.95	1.00	-0.06	-5.6%	lower index
Complications Index ¹	0.98	1.00	-0.02	-2.1%	lower index
Patient Safety Index ²	0.95	1.00	-0.05	-5.0%	lower index
Core Measures Mean Percent (%) ³	98.6	97.2	1.4	n/a ⁶	higher percent
30-Day AMI Mortality Rate (%) ⁴	14.2	14.6	-0.4	n/a ⁶	lower rate
30-Day HF Mortality Rate (%) ⁴	10.7	10.6	0.1	n/a ⁶	lower rate
30-Day Pneumonia Mortality Rate (%) ⁴	10.8	11.3	-0.5	n/a ⁶	lower rate
30-Day AMI Readmission Rate (%) ⁴	19.0	18.9	0.1	n/a ⁶	lower rate
30-Day HF Readmission Rate (%) ⁴	23.5	24.1	-0.6	n/a ⁶	lower rate
30-Day Pneumonia Readmission Rate (%) ⁴	18.9	18.3	0.6	n/a ⁶	lower rate
Average Length-of-Stay (days) ¹	4.3	4.9	-0.6	-11.7%	shorter stay
Inpatient Expense per Discharge (\$)	6,150	6,950	-799	-11.5%	lower expenses
Operating Profit Margin (%)	8.5	2.9	5.7	n/a ⁶	higher profitability
HCAHPS Score ⁵	267.0	260.0	7.0	2.7%	higher rating

1. Mortality, complications, and average length-of-stay based on Present on Admission (POA)-enabled risk models applied to MedPAR 2011 and 2012 data.

2. PSI based on AHRQ POA-enabled risk models applied to MedPAR 2011 and 2012 data. Ten PSIs included; see Appendix C for list.

3. Core measures data from CMS Hospital Compare second quarter 2013 release: October 1, 2011–September 30, 2012 dataset. See Appendix C for included core measures.

4. 30-day rates from CMS Hospital Compare third quarter 2013 release: July 1, 2009–June 30, 2012 dataset.

5. HCAHPS data from CMS Hospital Compare third quarter 2013 release: January 1–December 31, 2012 dataset.

6. We do not calculate percent difference for this measure because it is already a percent value.

Table 3: Teaching Hospital Performance Comparisons

Performance Measure	Medians		Benchmark Compared With Peer Group		
	Current Benchmark	Peer Group of U.S. Hospitals	Actual	Percent	Desired Direction
Mortality Index ¹	0.95	1.00	-0.05	-4.8%	lower index
Complications Index ¹	0.95	1.00	-0.05	-5.0%	lower index
Patient Safety Index ²	0.91	0.99	-0.09	-8.7%	lower index
Core Measures Mean Percent (%) ³	98.7	97.5	1.2	n/a ⁶	higher percent
30-Day AMI Mortality Rate (%) ⁴	14.5	14.8	-0.3	n/a ⁶	lower rate
30-Day HF Mortality Rate (%) ⁴	11.4	11.4	0.0	n/a ⁶	lower rate
30-Day Pneumonia Mortality Rate (%) ⁴	11.2	11.6	-0.4	n/a ⁶	lower rate
30-Day AMI Readmission Rate (%) ⁴	17.8	18.3	-0.4	n/a ⁶	lower rate
30-Day HF Readmission Rate (%) ⁴	22.2	22.7	-0.5	n/a ⁶	lower rate
30-Day Pneumonia Readmission Rate (%) ⁴	17.2	17.8	-0.6	n/a ⁶	lower rate
Average Length-of-Stay (days) ¹	4.4	5.0	-0.5	-11.0%	shorter stay
Inpatient Expense per Discharge (\$)	5,760	5,993	-233	-3.9%	lower expenses
Operating Profit Margin (%)	13.4	4.5	8.8	n/a ⁶	higher profitability
HCAHPS Score ⁵	269.0	261.0	8.0	3.1%	higher rating

1. Mortality, complications, and average length-of-stay based on Present on Admission (POA)-enabled risk models applied to MedPAR 2011 and 2012 data.

2. PSI based on AHRQ POA-enabled risk models applied to MedPAR 2011 and 2012 data. Ten PSIs included; see Appendix C for list.

3. Core measures data from CMS Hospital Compare second quarter 2013 release: October 1, 2011–September 30, 2012 dataset. See Appendix C for included core measures.

4. 30-day rates from CMS Hospital Compare third quarter 2013 release: July 1, 2009–June 30, 2012 dataset.

5. HCAHPS data from CMS Hospital Compare third quarter 2013 release: January 1–December 31, 2012 dataset.

6. We do not calculate percent difference for this measure because it is already a percent value.

Table 4: Large Community Hospital Performance Comparisons

Performance Measure	Medians		Benchmark Compared With Peer Group		
	Current Benchmark	Peer Group of U.S. Hospitals	Actual	Percent	Desired Direction
Mortality Index ¹	0.95	1.00	-0.05	-5.0%	lower index
Complications Index ¹	0.92	1.00	-0.08	-8.0%	lower index
Patient Safety Index ²	0.89	1.00	-0.11	-10.9%	lower index
Core Measures Mean Percent (%) ³	98.9	97.6	1.3	n/a ⁶	higher percent
30-Day AMI Mortality Rate (%) ⁴	14.3	14.9	-0.7	n/a ⁶	lower rate
30-Day HF Mortality Rate (%) ⁴	11.2	11.5	-0.3	n/a ⁶	lower rate
30-Day Pneumonia Mortality Rate (%) ⁴	11.4	11.6	-0.2	n/a ⁶	lower rate
30-Day AMI Readmission Rate (%) ⁴	18.0	18.5	-0.5	n/a ⁶	lower rate
30-Day HF Readmission Rate (%) ⁴	21.6	23.1	-1.6	n/a ⁶	lower rate
30-Day Pneumonia Readmission Rate (%) ⁴	17.2	17.5	-0.3	n/a ⁶	lower rate
Average Length-of-Stay (days) ¹	4.6	5.0	-0.4	-8.8%	shorter stay
Inpatient Expense per Discharge (\$)	5,707	5,956	-249	-4.2%	lower expenses
Operating Profit Margin (%)	11.9	5.8	6.1	n/a ⁶	higher profitability
HCAHPS Score ⁵	267.5	261.0	6.5	2.5%	higher rating

1. Mortality, complications, and average length-of-stay based on Present on Admission (POA)-enabled risk models applied to MedPAR 2011 and 2012 data.

2. PSI based on AHRQ POA-enabled risk models applied to MedPAR 2011 and 2012 data. Ten PSIs included; see Appendix C for list.

3. Core measures data from CMS Hospital Compare second quarter 2013 release: October 1, 2011–September 30, 2012 dataset. See Appendix C for included core measures.

4. 30-day rates from CMS Hospital Compare third quarter 2013 release: July 1, 2009–June 30, 2012 dataset.

5. HCAHPS data from CMS Hospital Compare third quarter 2013 release: January 1–December 31, 2012 dataset.

6. We do not calculate percent difference for this measure because it is already a percent value.

Table 5: Medium-Sized Community Hospital Performance Comparisons

Performance Measure	Medians		Benchmark Compared With Peer Group		
	Current Benchmark	Peer Group of U.S. Hospitals	Actual	Percent	Desired Direction
Mortality Index ¹	0.92	0.99	-0.07	-7.3%	lower index
Complications Index ¹	0.81	0.99	-0.19	-19.0%	lower index
Patient Safety Index ²	0.70	0.97	-0.27	-28.0%	lower index
Core Measures Mean Percent (%) ³	98.8	97.4	1.4	n/a ⁶	higher percent
30-Day AMI Mortality Rate (%) ⁴	14.6	15.2	-0.6	n/a ⁶	lower rate
30-Day HF Mortality Rate (%) ⁴	11.3	11.7	-0.4	n/a ⁶	lower rate
30-Day Pneumonia Mortality Rate (%) ⁴	11.6	11.8	-0.3	n/a ⁶	lower rate
30-Day AMI Readmission Rate (%) ⁴	18.1	18.3	-0.2	n/a ⁶	lower rate
30-Day HF Readmission Rate (%) ⁴	22.3	23.2	-0.9	n/a ⁶	lower rate
30-Day Pneumonia Readmission Rate (%) ⁴	17.1	17.7	-0.6	n/a ⁶	lower rate
Average Length-of-Stay (days) ¹	4.2	5.0	-0.8	-16.2%	shorter stay
Inpatient Expense per Discharge (\$)	5,151	6,075	-925	-15.2%	lower expenses
Operating Profit Margin (%)	16.1	4.8	11.3	n/a ⁶	higher profitability
HCAHPS Score ⁵	264.0	259.0	5.0	1.9%	higher rating

1. Mortality, complications, and average length-of-stay based on Present on Admission (POA)-enabled risk models applied to MedPAR 2011 and 2012 data.

2. PSI based on AHRQ POA-enabled risk models applied to MedPAR 2011 and 2012 data. Ten PSIs included; see Appendix C for list.

3. Core measures data from CMS Hospital Compare second quarter 2013 release: October 1, 2011–September 30, 2012 dataset. See Appendix C for included core measures.

4. 30-day rates from CMS Hospital Compare third quarter 2013 release: July 1, 2009–June 30, 2012 dataset.

5. HCAHPS data from CMS Hospital Compare third quarter 2013 release: January 1–December 31, 2012 dataset.

6. We do not calculate percent difference for this measure because it is already a percent value.

Table 6: Small Community Hospital Performance Comparisons

Performance Measure	Medians		Benchmark Compared With Peer Group		
	Current Benchmark	Peer Group of U.S. Hospitals	Actual	Percent	Desired Direction
Mortality Index ¹	0.85	1.00	-0.15	-14.6%	lower index
Complications Index ¹	0.85	0.98	-0.13	-13.0%	lower index
Patient Safety Index ²	0.74	0.96	-0.22	-23.3%	lower index
Core Measures Mean Percent (%) ³	98.6	96.8	1.8	n/a ⁶	higher percent
30-Day AMI Mortality Rate (%) ⁴	14.5	15.4	-0.9	n/a ⁶	lower rate
30-Day HF Mortality Rate (%) ⁴	11.9	11.9	0.0	n/a ⁶	lower rate
30-Day Pneumonia Mortality Rate (%) ⁴	11.5	12.0	-0.5	n/a ⁶	lower rate
30-Day AMI Readmission Rate (%) ⁴	17.6	18.2	-0.6	n/a ⁶	lower rate
30-Day HF Readmission Rate (%) ⁴	21.4	22.9	-1.5	n/a ⁶	lower rate
30-Day Pneumonia Readmission Rate (%) ⁴	17.1	17.4	-0.3	n/a ⁶	lower rate
Average Length-of-Stay (days) ¹	4.1	5.0	-0.8	-16.8%	shorter stay
Inpatient Expense per Discharge (\$)	5,648	6,628	-980	-14.8%	lower expenses
Operating Profit Margin (%)	18.6	3.0	15.6	n/a ⁶	higher profitability
HCAHPS Score ⁵	273.0	261.0	12.0	4.6%	higher rating

1. Mortality, complications, and average length-of-stay based on Present on Admission (POA)-enabled risk models applied to MedPAR 2011 and 2012 data.

2. PSI based on AHRQ POA-enabled risk models applied to MedPAR 2011 and 2012 data. Ten PSIs included; see Appendix C for list.

3. Core measures data from CMS Hospital Compare second quarter 2013 release: October 1, 2011–September 30, 2012 dataset. See Appendix C for included core measures.

4. 30-day rates from CMS Hospital Compare third quarter 2013 release: July 1, 2009–June 30, 2012 dataset.

5. HCAHPS data from CMS Hospital Compare third quarter 2013 release: January 1–December 31, 2012 dataset.

6. We do not calculate percent difference for this measure because it is already a percent value.

Comparing Hospital Performance by Region

Hospital performance varies widely throughout the country. Differences in the age and health of an area's population and in payment protocols greatly affect hospitals' abilities to improve patient outcomes and build healthy business structures.

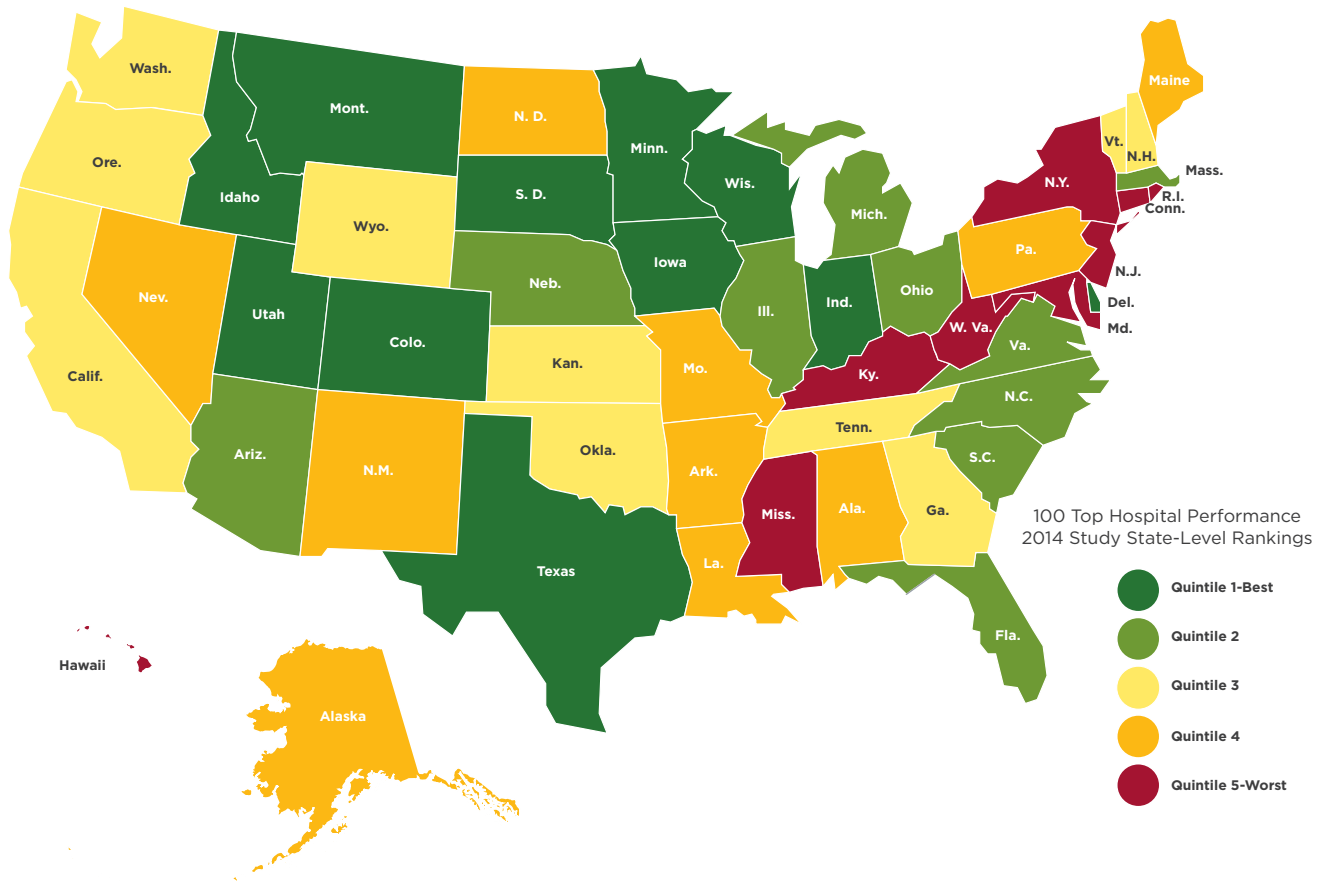
The methodology of the 100 Top Hospitals studies helps to level the playing field for some of the factors beyond a hospital's control by adjusting for patient severity, wage differences, and hospital size and teaching status. Still, regional variations in hospital performance are clear.

In this year's study, the largest concentration of award winners was in the Midwest and South census regions (37 and 28 out of 100, respectively). The West was close behind, with 26 of the 100 winners. The Northeast had far fewer winning hospitals — just nine of the 2014 winners were located in this region. This is a significant increase over the five winning hospitals in the Northeast last year.

This year's study also revealed California as the leading state in terms of sheer number of winning hospitals, with 13 winners. Next was Texas with 11 winning hospitals, and Illinois and Ohio, with nine winning hospitals each. (See Appendix A for a breakdown of all winners by state and census region, and Appendix B for a list of all states in each region.)

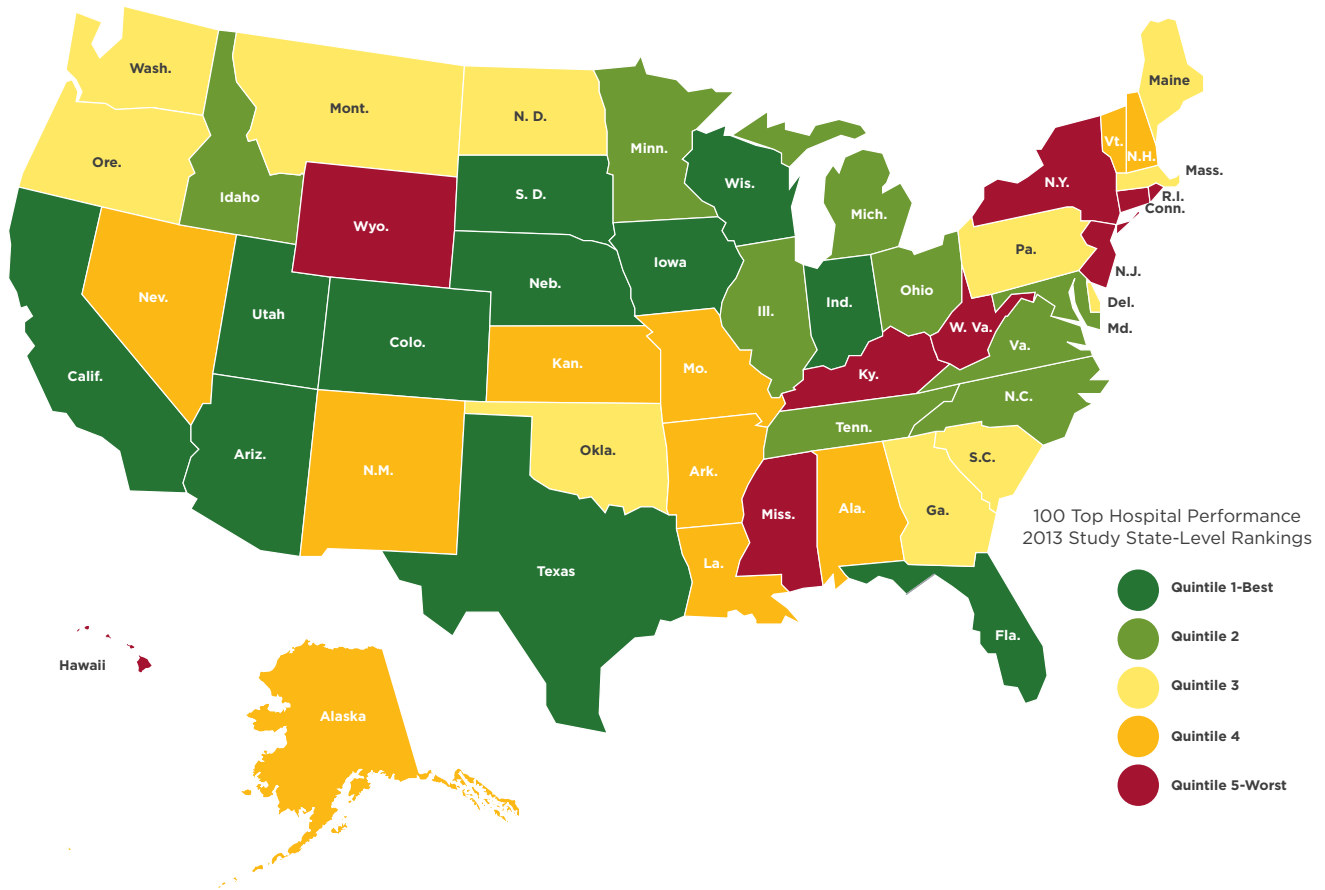
Because the regions do not have equal numbers of hospitals, evaluating hospital performance by looking at the number of winners by region can be deceiving. To further assess regional performance, we prepared analysis that demonstrates state-level performance over the last two years of the 100 Top Hospitals study. To show performance by state, we ranked states and aggregated them into five equal groups (quintiles) based on their performance in this year's study versus other states.

Figure 1: State-Level Performance Comparisons, 2014 Study



State Data Note: The 2014 state findings are based on the 100 Top Hospitals measure methodologies, using 2011 and 2012 MedPAR data (combined) for clinical measures and 2012 data for all other measures.

Figure 2: State-Level Performance Comparisons, 2013 Study



State Data Note: The 2013 state findings are based on the 100 Top Hospitals measure methodologies, using 2010 and 2011 MedPAR data (combined) for clinical measures and 2011 data for all other measures.

By assigning a color to each quintile, the maps (Figures 1 and 2) provide a visual representation of the variability in performance across the country for the current and previous studies (2014 and 2013). Additionally, Table 7 shows each state's rank, in quintiles, for the current and previous year studies. This analysis allows us to observe geographic patterns in performance. Among our observations:

- In both years, the Midwest was the clear frontrunner in performance versus peers.
- 75 percent of the states in the Midwest region were in the top-performing two quintiles both study years. Only two states in this region fell into one of the bottom two quintiles.
- Overall, 45 percent of all top-performing states (those in the best quintile) were located in the Midwest in this year's study. In addition, 67 percent of the hospitals in the Midwest were in the top two quintiles.
- The West had the greatest number and highest percentage of states that improved their performance (moved into a higher quintile) between the two study years.
- The Northeast showed the weakest performance overall, with 67 percent of the region's states in the lowest-performing two quintiles in the current and previous studies.
- In this year's study, the South and West had about equal percentages of hospitals in the highest and lowest two quintiles.

Table 7: 100 Top Hospitals Two-Year State-Level Performance Comparisons

Northeast		Midwest		South		West	
2014 Study	2013 Study	2014 Study	2013 Study	2014 Study	2013 Study	2014 Study	2013 Study
Connecticut	Connecticut	Illinois	Illinois	Alabama	Alabama	Alaska	Alaska
Maine	Maine	Indiana	Indiana	Arkansas	Arkansas	Arizona	Arizona
Massachusetts	Massachusetts	Iowa	Iowa	Delaware	Delaware	California	California
New Hampshire	New Hampshire	Kansas	Kansas	District of Columbia	District of Columbia	Colorado	Colorado
New Jersey	New Jersey	Michigan	Michigan	Florida	Florida	Hawaii	Hawaii
New York	New York	Minnesota	Minnesota	Georgia	Georgia	Idaho	Idaho
Pennsylvania	Pennsylvania	Missouri	Missouri	Kentucky	Kentucky	Montana	Montana
Rhode Island	Rhode Island	Nebraska	Nebraska	Louisiana	Louisiana	Nevada	Nevada
Vermont	Vermont	North Dakota	North Dakota	Maryland	Maryland	New Mexico	New Mexico
		Ohio	Ohio	Mississippi	Mississippi	Oregon	Oregon
		South Dakota	South Dakota	North Carolina	North Carolina	Utah	Utah
		Wisconsin	Wisconsin	Oklahoma	Oklahoma	Washington	Washington
				South Carolina	South Carolina	Wyoming	Wyoming
				Tennessee	Tennessee		
				Texas	Texas		
				Virginia	Virginia		
				West Virginia	West Virginia		



Performance Improvement Over Time: All Hospitals

By studying the direction of performance change of all hospitals in our study (winners and nonwinners), we can see that in recent years, U.S. hospitals have not been able to significantly improve overall performance across the entire balanced scorecard (Table 8). But, over the years we studied (2009 through 2012 for the mortality, complications, patient safety, and length-of-stay measures; 2008 though 2012 for the core measures, expenses, profit margin, and HCAHPS score measures), there were noteworthy performance improvements in adherence to core measures and overall patient satisfaction (see green column in Table 8):

- 70 percent of the hospitals studied improved their core measures score.
- Almost 30 percent improved their overall patient satisfaction score (HCAHPS).

For the remainder of the measures, the majority of hospitals in the study had no statistically significant change in performance (yellow column in Table 8). On the operating efficiency front, nearly 16 percent of the hospitals studied had a significant increase in expense per discharge.

Table 8: Direction of Performance Change for All Hospitals in Study, 2008–2012¹

Performance Measure	Significantly Improving Performance		No Statistically Significant Change In Performance		Significantly Declining Performance	
	Count of Hospitals ²	Percent of Hospitals ³	Count of Hospitals ²	Percent of Hospitals ³	Count of Hospitals ²	Percent of Hospitals ³
Risk-Adjusted Mortality Index	26	1.0%	2,649	97.0%	55	2.0%
Risk-Adjusted Complication Index	18	0.7%	2,678	98.1%	34	1.2%
Risk-Adjusted Patient Safety Index	7	0.3%	2,556	98.3%	37	1.4%
Core Measures Mean Percent	1,921	70.4%	808	29.6%	1	0.0%
Severity-Adjusted Average Length-of-Stay	61	2.2%	2,629	96.3%	40	1.5%
Adjusted Inpatient Expense per Discharge	91	3.3%	2,199	80.8%	430	15.8%
Operating Profit Margin	273	10.0%	2,309	84.9%	138	5.1%
HCAHPS Score	790	28.9%	1,893	69.3%	47	1.7%

1. Mortality, complications, patient safety, and average length-of-stay based on 2009–2012 MedPAR data.

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

Note: Total number of hospitals included in the analysis will vary by measure due to exclusion of IQR outlier data points. PSI, inpatient expense, and profit are affected. Some in-study hospitals had too few data points remaining to calculate trend.

3. Percent is of total in-study hospitals across all peer groups.

Potential New Metrics for 2015: Expanded Core Measures and Medicare Spending

The 100 Top Hospitals study is always evolving and growing to accurately keep in step with the times. Every year, we evaluate our measurements and analyze whether new measures would enhance the data. For the 2015 study, we are testing the following new performance measures to expand the balanced scorecard across the continuum of care, so that we can begin to provide national benchmarks that span different care settings. We believe these benchmarks would be beneficial for hospitals in preparing for accountable care organization payment arrangements. If you would like to provide feedback on these proposed measures, please email 100tophospitals@truvenhealth.com.

- **New Core Measures** — Core measures is one of the performance measures already included in the study because these widely accepted and nationally endorsed measures are the standard for process of care. At this time, our core measures score is based on heart attack, heart failure, pneumonia, and surgical care. For 2015, we are considering adding outpatient and emergency room measures from the expanded CMS core measures set.
- **Medicare Spend per Beneficiary** — This metric calculates the Medicare spend across settings from three days prior to admission, during admission, and post-discharge. We did some analysis to test the possibility of including this measure. The results at a high level show that most hospitals are clustered at the median. However the range (variation between highest and lowest Medicare spend per beneficiary) is widest for medium community hospitals and narrowest for the large community hospitals.

Methodology

The Truven Health 100 Top Hospitals® study is quantitative research that identifies 100 hospitals with the highest achievement on the 100 Top Hospitals Balanced Scorecard.

The scorecard, based on Norton and Kaplan's²⁴ concept, consists of 10 measures, distributed across four domains — quality, efficiency, finance, and consumer assessment of care — and uses only publicly available data. The hospitals with the highest achievement are those with the highest ranking on a composite score of the 10 measures. This study includes only short-term, acute-care, nonfederal U.S. hospitals that treat a broad spectrum of patients.

The main steps we take in selecting the 100 Top Hospitals are:

- Building the database of hospitals, including special selection and exclusion criteria
- Classifying hospitals into comparison groups by size and teaching status
- Scoring hospitals on a balanced scorecard of 10 performance measures across four domains
- Determining 100 Top Hospitals by ranking hospitals relative to their comparison group

The following section is intended to be an overview of these steps. To request more detailed information on any of the study methodologies outlined here, please email 100tophospitals@truvenhealth.com or call +1.800.366.7526.

Note: This section details the methods used to determine the 100 Top Hospitals award winners. For details on the methods used to find the Everest Award winners, please see the Everest Awards section of this document.

Building the Database of Hospitals

All of the 100 Top Hospitals studies use only publicly available data. The data for this study primarily come from:

- The Medicare Provider Analysis and Review (MedPAR) dataset
- The Medicare Cost Report
- The Centers for Medicare & Medicaid Services (CMS) Hospital Compare dataset

We use MedPAR patient-level medical record information to calculate mortality, complications, patient safety, and length-of-stay. The MedPAR dataset contains information on the approximately 15 million Medicare patients discharged annually from U.S. acute-care hospitals. In this study, we used the most recent two federal fiscal years of MedPAR data available — 2011 and 2012 — which include Medicare HMO encounters.²⁵

Note: To choose the Everest Award winners, we also reviewed the most recent five years of data, 2008 through 2012, to study the rate of change in performance through the years. For the mortality, complications, patient safety, and length-of-stay measures, four years of data were used (2009 through 2012). To read more about the Everest Award methodology, please see the special Everest Award section of this document. For specific data sources for each performance measure, please see the table on page 41.

We use Medicare Cost Reports to create our proprietary database, which contains hospital-specific demographic information and hospital-specific, all-payer revenue, and expense data. The Medicare Cost Report is filed annually by every U.S. hospital that participates in the Medicare program. Hospitals are required to submit cost reports to receive reimbursement from Medicare. It should be noted, however, that cost report data include services for all patients, not just Medicare beneficiaries.

The Medicare Cost Report promotes comparability and consistency among hospitals in reporting. We used hospital 2012 cost reports published in the federal Hospital Cost Report Information System (HCRIS) third quarter 2013 dataset for this study.

If we did not have a 2012 cost report that was complete, we excluded the hospital from the study. Hospitals that file cost reports jointly with other hospitals under one provider number are analyzed as one organization.

We, and many others in the healthcare industry, have used the MedPAR and Medicare Cost Report databases for many years. We believe them to be accurate and reliable sources for the types of analyses performed in this study. Performance based on Medicare data has been found to be highly representative of that of all-payer data.

We used the CMS Hospital Compare dataset published in the second quarter of 2013 for core measures. We used the CMS Hospital Compare dataset published in the third quarter of 2013 for 30-day mortality rates, 30-day readmission rates, and Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) patient perception of care data in this study.

We used residency program information to classify hospitals. This comes from the American Medical Association (for Accreditation Council for Graduate Medical Education-accredited programs)²⁶ and the American Osteopathic Association.²⁷

Severity-Adjustment Models and Present-on-Admission Data

Truven Health proprietary severity adjustment models for mortality, complications, and length-of-stay (LOS) have been recalibrated using three years of MedPAR data to take advantage of available present-on-admission (POA) data that was reported in the 2010, 2011, and 2012 MedPAR datasets. In addition, the hospital characteristics factors were dropped, as analysis indicated they did not contribute to improved model performance.

The improved severity-adjustment models were used in producing the risk-adjusted mortality and complications indexes, based on two years of MedPAR data (2011 and 2012); and the severity-adjusted LOS, based on MedPAR 2012.

In addition, the Agency for Healthcare Research and Quality (AHRQ) Patient Safety Indicator risk models also take into account POA. Under the Deficit Reduction Act of 2005, as of federal fiscal year 2008, hospitals receive reduced payment for cases with certain conditions — like falls, surgical site infections, and pressure ulcers — that were not present on the patient’s admission but occur during their hospitalization. As a result, CMS now requires all inpatient prospective payment system hospitals to document whether a patient has these conditions when admitted.

Hospital Exclusions

After building the database, we excluded a number of hospitals that would have skewed the study results. Excluded from the study were:

- Specialty hospitals (e.g., critical access, children’s, women’s, psychiatric, substance abuse, rehabilitation, cardiac, orthopedic, heart, cancer, and long-term acute-care)
- Federally owned hospitals
- Non-U.S. hospitals (such as those in Puerto Rico, Guam, and the U.S. Virgin Islands)
- Hospitals with fewer than 25 acute-care beds
- Hospitals with fewer than 100 Medicare patient discharges in federal fiscal year 2012
- Hospitals with Medicare average lengths-of-stay longer than 25 days in federal fiscal year 2012
- Hospitals with no reported Medicare patient deaths in federal fiscal year 2012
- Hospitals for which a 2012 Medicare Cost Report was not available
- Hospitals with a 2012 Medicare Cost Report that was not for a 12-month reporting period
- Hospitals that did not report POA information, because their data are not comparable to other hospitals’ (affects most Maryland hospitals in the Medicare waiver program*)
- Hospitals missing data required to calculate performance measures

*Maryland’s hospitals are not paid under Medicare’s inpatient prospective payment system. Instead, they have a Medicare waiver agreement that allows Medicare reimbursement according to rates set by the state’s Health Services Cost Review Commission. For more information, see mhcc.maryland.gov/consumerinfo/hospital-guide/patients/other_information/overview_of_maryland_regulatory_system_for_hospital_oversight.html.

In addition, specific patient records were also excluded, including:

- Patients who were discharged to another short-term facility (this is done to avoid double counting)
- Patients who were not at least 65 years old
- Rehabilitation, psychiatric, and substance-abuse patients
- Patients with stays shorter than one day

After all exclusions were applied, 2,803 hospitals were included in the study.

Classifying Hospitals Into Comparison Groups

Bed size, teaching status, and residency/fellowship program involvement have a profound effect on the types of patients a hospital treats and the scope of services it provides. When analyzing the performance of an individual hospital, it is important to evaluate it against other similar hospitals. To address this, we assigned each hospital to one of five comparison groups, or classes, according to its size and teaching status.

Our classification methodology draws a significant distinction between major teaching hospitals and teaching hospitals by measuring the magnitude and type of teaching programs and by accounting for their level of involvement in physician education and research. This methodology de-emphasizes the role of bed size and focuses more on teaching program involvement. Through it, we seek to measure both the depth and breadth of teaching involvement, and recognize teaching hospitals' tendencies to reduce beds and concentrate on true tertiary care.

Our formula for defining the teaching comparison groups includes each hospital's bed size, residents[†]-to-acute-care beds ratio, and involvement in graduate medical education programs accredited by either the ACGME²⁸ or the AOA.²⁹ The definition includes both the magnitude (number of programs) and type (sponsorship or participation) of graduate medical education (GME) program involvement. In this study, AOA residency program involvement was treated as being equivalent to ACGME program sponsorship.

The five comparison groups, and their parameters, are as follows:

Major Teaching Hospitals

There are three ways to qualify:

1. 400 or more acute-care beds in service plus an intern- and resident-per-bed ratio of at least 0.25, plus
 - Sponsorship of at least 10 GME programs or
 - Involvement in at least 20 programs overall
2. Involvement in at least 30 GME programs overall (regardless of bed size or intern- and resident-per-bed ratio)
3. An intern- and resident-per-bed ratio of at least 0.60 (regardless of bed size or GME program involvement)

[†]We include interns, residents, and fellows reported in full-time equivalents (FTEs) on the hospital cost report.

Teaching Hospitals

- 200 or more acute-care beds in service and
- Either an intern- and resident-per-bed ratio of at least 0.03 or involvement in at least three GME programs overall

Large Community Hospitals

- 250 or more acute-care beds in service and
- Not classified as a teaching hospital per definitions above

Medium Community Hospitals

- 100–249 acute-care beds in service and
- Not classified as a teaching hospital per definitions above

Small Community Hospitals

- 25–99 acute-care beds in service and
- Not classified as a teaching hospital per definitions above

Scoring Hospitals on Weighted Performance Measures

Evolution of Performance Measures

We use a balanced scorecard approach, based on public data, to select the measures most useful for boards and CEOs in the current hospital operating environment. Throughout the life of the study, we have worked hard to meet this vision. We gather feedback from industry leaders, hospital executives, academic leaders, and internal experts; review trends in the healthcare market; and survey hospitals in demanding marketplaces to learn what measures are valid and reflective of top performance. As the market has changed, our methods have evolved. Our current measures are centered on four main components of hospital performance: clinical quality, efficiency, financial health, and patient perception of care.

The measures for the 2014 study are:

1. Risk-adjusted mortality index (in-hospital)
2. Risk-adjusted complications index
3. Risk-adjusted patient safety index
4. Core measures mean percent
5. 30-day risk-adjusted mortality rates for acute myocardial infarction (AMI), heart failure, and pneumonia
6. 30-day risk-adjusted readmission rates for AMI, heart failure, and pneumonia
7. Severity-adjusted average length-of-stay
8. Case mix- and wage-adjusted inpatient expense per discharge
9. Adjusted operating profit margin
10. HCAHPS score (patient rating of overall hospital performance)

Following is the rationale for the selection of our balanced scorecard categories and the measures used for each.

Clinical Quality

Our measures of clinical quality are the risk-adjusted mortality index, risk-adjusted complications index, 30-day mortality rate, 30-day readmission rate, risk-adjusted patient safety index, and the core measures mean percent.

The mortality and complications measures show us how the hospital is performing on the most basic and essential care standards — survival and error-free care — while treating patients in the hospital. The extended outcomes measures — 30-day mortality and readmission rates for AMI, heart failure, and pneumonia patients — help us understand how the hospital's patients are faring over a longer period. These measures are part of CMS' value-based purchasing program and are watched closely in the industry. Hospitals with lower values appear to be providing care with better medium-term results for these conditions.

Patient safety is another important measure of hospital quality tracked closely in the industry. The risk-adjusted patient safety index is based on the AHRQ PSIs.²⁸ Patient safety measures reflect both clinical quality and the effectiveness of systems within the hospital. Because they use hospital administrative data and focus on surgical complications and other iatrogenic events, we feel that AHRQ's PSIs provide an unbiased look at many aspects of patient safety inside hospitals. Such objective analysis is central to the 100 Top Hospitals mission. The risk-adjusted patient safety index facilitates comparison of national and individual hospital performance using a group of 10 PSIs, which allows us to gauge the results of hospital-wide patient safety performance.

To be truly balanced, a scorecard must include various measures of quality. To this end, we also include an aggregate core measures score. Core measures were developed by the Joint Commission and CMS, and endorsed by the National Quality Forum, as minimum basic process-of-care standards. They are a widely accepted method for measuring patient care quality that includes specific guidelines for heart attack, heart failure, pneumonia, pregnancy and related conditions, and surgical care. Our core measures score is based on the heart attack, heart failure, pneumonia, and surgical care areas of this program, using Hospital Compare data reported on the CMS website.²⁹ In this study, we included only those core measures that CMS has sanctioned for use in 2012. See Appendix C for a list.

Efficiency and Financial Health

These categories include severity-adjusted average length-of-stay, adjusted inpatient expense per discharge, and adjusted operating profit margin. Severity-adjusted average length-of-stay serves as a proxy for clinical efficiency, while adjusted inpatient expense per discharge serves as a measure of operating efficiency. We previously used operating expense per adjusted discharge, which is the most commonly used measure of hospital operating efficiency.

This measure relies on adjusting discharges for outpatient volume based on the ratio of total inpatient revenue to acute inpatient revenue. This overstates the number of discharges allocated to outpatient volume because the markup on outpatient services is generally much higher than for inpatient services. By switching to a metric based on inpatient expense per inpatient discharge, we have a much stronger predictor of operating efficiency. The operating profit margin is a measure of management's ability to operate within its current financial constraints and provides an indicator of the hospital's financial health.

All three measures require adjustment to increase the validity of comparisons across the hospital industry. We use a Truven Health severity-adjustment model to determine expected length-of-stay at the patient level. This is used to calculate the hospital-level, severity-adjusted, average length-of-stay. We adjust inpatient expenses, as reported on the hospital cost report, for patient severity (Medicare case mix index) and area wage levels (area wage index). These adjustments allow us to more accurately compare hospitals with different levels of patient severity operating in varying cost-of-living environments. We adjust operating profit margin to reflect related organization expense, as reported on the Medicare cost report, to provide a more accurate measure of a hospital's profitability.

Previous studies used the cash-to-total-debt ratio to look at a hospital's liquidity. Such measures of liquidity are one way to measure the financial viability and health of an organization. However, measuring liquidity has become problematic as more and more hospitals join health systems. Health system accounting practices often recognize hospitals as units of the system, with no cash or investment assets of their own; a typical practice is to sweep cash up to the system accounts daily. Moreover, hospitals in health systems are now often reported as having no debt in their own name. Using public data, there is no effective way to accurately determine liquidity, so we have removed the cash-to-debt measure from the 100 Top Hospitals study.

Patient Perception of Care

We believe that a measure of patient perception of care is crucial to the balanced scorecard concept. Understanding how patients perceive the care a hospital provides, and how that perception compares and contrasts with perceptions of its peer hospitals, is an important step a hospital must take in pursuing performance improvement. As such, this study includes the HCAHPS score, based on patient perception of care data from the HCAHPS patient survey. In this study, the HCAHPS score is based on the HCAHPS overall hospital rating question only.

Through the combined measures described above, we hope to provide a balanced picture of overall quality of care and financial health, and reflect the probability of sustained high performance. Full details about each of these performance measures are included on the following pages.

Performance Measures

Risk-Adjusted Mortality Index (In-Hospital)			
Why We Include This Element	Calculation	Comment	Favorable Values Are
<p>Patient survival is a universally accepted measure of hospital quality. The lower the mortality index, the greater the survival of the patients in the hospital, considering what would be expected based on patient characteristics. While all hospitals have patient deaths, this measure can show where deaths did not occur but were expected, or the reverse, given the patient's condition.</p>	<p>We calculate an index value based on the number of actual in-hospital deaths in 2011 and 2012, divided by the number expected, given the risk of death for each patient. We normalize the index based on the observed and expected deaths for each comparison group. This measure is based on our proprietary, risk-adjusted mortality index model, which is designed to predict the likelihood of a patient's death based on patient-level characteristics (age, sex, presence of complicating diagnoses).</p> <p>Palliative care patients are included in the risk model. POA data are considered as part of the risk model. Post-discharge deaths are not included. For more details, see Appendix C. The reference value for this index is 1.00; a value of 1.15 indicates 15 percent more deaths occurred than were predicted, and a value of 0.85 indicates 15 percent fewer deaths than predicted.</p>	<p>We rank hospitals on the difference between observed and expected deaths, expressed in normalized standard deviation units (z-score).^{30, 31} Hospitals with the fewest deaths, relative to the number expected, after accounting for standard binomial variability, received the most favorable scores. We use two years of MedPAR data (2011 and 2012) to reduce the influence of chance fluctuation. Normalization was done by comparison group.</p> <p>Hospitals with observed values that were statistically worse than expected (95-percent confidence) were not eligible to be named as benchmarks.</p>	Lower

Risk-Adjusted Complications Index			
Why We Include This Element	Calculation	Comment	Favorable Values Are
<p>Keeping patients free from potentially avoidable complications is an important goal for all healthcare providers. A lower complications index indicates fewer patients with complications, considering what would be expected based on patient characteristics. Like the mortality index, this measure can show where complications did not occur but were expected, or the reverse, given the patient's condition.</p>	<p>We calculate an index value based on the number of cases with complications in 2011 and 2012, divided by the number expected, given the risk of complications for each patient. We normalize the index based on the observed and expected complications for each comparison group. This measure uses our proprietary, expected complications rate index models. These models account for patient-level characteristics (age, sex, principal diagnosis, comorbid conditions, and other characteristics). Complications rates are calculated from normative data for two patient risk groups: medical and surgical. POA data are considered as part of the risk model. For more details, see Appendix C.</p> <p>The reference value for this index is 1.00; a value of 1.15 indicates 15 percent more complications occurred than were predicted, and a value of 0.85 indicates 15 percent fewer complications than predicted.</p>	<p>We rank hospitals on the difference between the observed and expected number of patients with complications, expressed in normalized standard deviation units (z-score).^{30, 31} We use two years of MedPAR data (2011 and 2012) to reduce the influence of chance fluctuation. Normalization was done by comparison group. Hospitals with the fewest observed complications, relative to the number expected, after accounting for standard binomial variability, received the most favorable scores.</p> <p>Hospitals with observed values that were statistically worse than expected (95-percent confidence) were not eligible to be named as benchmarks.</p>	Lower

Risk-Adjusted Patient Safety Index

Why We Include This Element	Calculation	Comment	Favorable Values Are
<p>Patient safety has become an increasingly important measure of hospital quality. Patient safety measures are reflective of both clinical quality and the effectiveness of systems within the hospital. The AHRQ, a public health service agency within the federal government's Department of Health and Human Services, has developed a set of PSIs. These indicators are widely used as a means of measuring hospital safety. Because they use hospital administrative data and include surgical complications and other iatrogenic events, we feel that AHRQ's PSIs provide an unbiased look at the quality of care inside hospitals. Such objective analysis is central to the 100 Top Hospitals mission.</p>	<p>For each of the 10 included PSIs (see Appendix C for a list), we calculated an index value based on the number of actual PSI occurrences for 2011 and 2012, combined, divided by the number of normalized expected occurrences, given the risk of the PSI event for each patient. Values were normalized by comparison group. We applied the hospital-level PSI methodology from AHRQ to the 2011 and 2012 MedPAR acute-care data, using AHRQ program code to adjust for risk.³⁶ POA data are considered as part of the PSI model. For more information, see Appendix C.</p> <p>The reference value for this index is 1.00; a value of 1.15 indicates 15 percent more events than predicted, and a value of 0.85 indicates 15 percent fewer.</p> <p>We rank hospitals on the difference between the observed and expected number of patients with PSI events, for each of the 10 selected PSIs, expressed in standard deviation units (z-score).^{30, 31}</p>	<p>We used two years of MedPAR data (2011 and 2012) to reduce the influence of chance fluctuation. The AHRQ PSI risk models used POA coding in the MedPAR data. We normalized z-scores by hospital comparison group and developed a mean normalized z-score as an aggregate PSI score. Hospitals with the fewest observed PSIs, relative to the number expected, accounting for binomial variability, received the most favorable scores.</p> <p>Hospitals with extreme outlier values in this measure were not eligible to be named benchmarks (see "Eliminating Outliers" on page 41).</p>	<p>Lower</p>

Core Measures Mean Percent

Why We Include This Element	Calculation	Comment	Favorable Values Are
<p>To be truly balanced, a scorecard must include various measures of quality. Core measures were developed by the National Quality Forum as minimum basic standards. They are a widely accepted method for measuring patient care quality that includes specific guidelines for heart attack, heart failure, pneumonia, and surgical care.</p>	<p>For each hospital, we calculate the arithmetic mean of the included core measure percent values. The reported core measure percent values reflect the percentage of eligible patients who received the expected standard of patient care. We consider reported core measure percents with patient counts less than or equal to 25 or with relative standard error values greater than or equal to 0.30 statistically unreliable. In these cases, we substitute the comparison group-specific median percent value for the affected core measure.</p>	<p>Core measure values are from the CMS Hospital Compare database for the second quarter of 2013. This contains data from (October 1, 2011, through September 30, 2012). Because of low reporting, we excluded a number of core measures for small community hospitals.</p> <p>We ranked hospitals by comparison group, based on their mean core measure percent value for included core measures.</p> <p>For a list of the measures used and those excluded, please see Appendix C.</p>	<p>Higher</p>

30-Day Risk-Adjusted Mortality Rates for AMI, Heart Failure, and Pneumonia Patients

Why We Include This Element	Calculation	Comment	Favorable Values Are
<p>30-day mortality rates are a widely accepted measure of the effectiveness of hospital care. They allow us to look beyond immediate inpatient outcomes and understand how the care the hospital provided to inpatients with these particular conditions may have contributed to their longer-term survival. Because these measures are part of CMS' value-based purchasing program, they are now being watched closely in the industry. In addition, tracking these measures may help hospitals identify patients at risk for post-discharge problems and target improvements in discharge planning and in aftercare processes. Hospitals that score well may be better prepared for a pay-for-performance structure.</p>	<p>CMS calculates a 30-day mortality rate for each patient condition using three years of MedPAR data, combined. CMS does not calculate rates for hospitals where the number of cases is too small (less than 25). In these cases, we substitute the comparison group-specific median rate for the affected 30-day mortality measure.</p>	<p>Data are from the CMS Hospital Compare dataset for the third quarter of 2013. This contains data from July 1, 2009, through June 30, 2012. For more information about this data, see Appendix C.</p> <p>We rank hospitals independently on each of the three 30-day mortality rates (AMI, heart failure, and pneumonia), by hospital comparison group. Each patient condition receives one-sixth weight in overall hospital ranking, for a total 30-day mortality rate weight of one-half.</p>	<p>Lower</p>

30-Day Risk-Adjusted Readmission Rates for AMI, Heart Failure, and Pneumonia Patients

Why We Include This Element	Calculation	Comment	Favorable Values Are
<p>30-day readmission rates are a widely accepted measure of the effectiveness of hospital care. They allow us to understand how the care the hospital provided to inpatients with these particular conditions may have contributed to issues with their post-discharge medical stability and recovery.</p> <p>Because these measures are part of CMS' value-based purchasing program, they are now being watched closely in the industry. In addition, tracking these measures may help hospitals identify patients at risk for post-discharge problems if discharged too soon, as well as target improvements in discharge planning and in aftercare processes. Hospitals that score well may be better prepared for a pay-for-performance structure.</p>	<p>CMS calculates a 30-day readmission rate for each patient condition using three years of MedPAR data, combined. CMS does not calculate rates for hospitals where the number of cases is too small (less than 25). In these cases, we substitute the comparison group-specific median rate for the affected 30-day mortality measure.</p>	<p>Data are from the CMS Hospital Compare dataset for the third quarter of 2013. This contains data from July 1, 2009, through June 30, 2012. For more information about this data, see Appendix C.</p> <p>We rank hospitals independently on each of the three 30-day readmission rates (AMI, heart failure, and pneumonia), by hospital comparison group. Each patient condition receives one-sixth weight in overall hospital ranking, for a total 30-day readmission rate weight of one-half.</p>	<p>Lower</p>

Severity-Adjusted Average Length-of-Stay

Why We Include This Element	Calculation	Comment	Favorable Values Are
<p>A lower severity-adjusted average LOS generally indicates more efficient consumption of hospital resources and reduced risk to patients.</p>	<p>We calculate an LOS index value by dividing the actual LOS by the normalized expected LOS. Expected LOS adjusts for difference in severity of illness using a linear regression model. We normalize the expected values based on the observed and expected LOS of the hospitals in the comparison group. Each hospital LOS index is converted to an average LOS in days by multiplying by the in-study population grand mean LOS. See Appendix C for more information.</p>	<p>This measure uses MedPAR data for 2012. We adjusted average LOS to factor out differences attributable to the varying severity of illness of patients at each hospital using POA-enabled risk models. For more information on this model, see Appendix C.</p> <p>We rank hospitals on their severity-adjusted average LOS.</p>	<p>Lower</p>

Case Mix- and Wage-Adjusted Inpatient Expense per Discharge

Why We Include This Element	Calculation	Comment	Favorable Values Are
<p>This measure helps to determine how efficiently a hospital cares for its patients. Low values indicate lower costs and thus better efficiency.</p>	<p>We calculate the inpatient expense per discharge measure by aggregating the cost center-level inpatient expense from the hospital cost report and dividing by the total acute inpatient discharges, adjusted for case mix and area wage indexes. See Appendix C for detailed calculations and the Medicare Cost Report locations (worksheet, line, and column) for each calculation element.</p>	<p>This measure uses Medicare Cost Report data for hospital cost reports ending in calendar year 2012. Adjusted inpatient expense per discharge measures the hospital's average cost of delivering inpatient care on a per-unit basis. Inpatient expense for each department is calculated from fully allocated cost using the ratio of inpatient charges to total charges. For inpatient nursing units, this will always be 100 percent of the fully allocated cost. For departments with inpatient and outpatient services, the ratio will vary. Non-reimbursable and special purpose cost centers are omitted as these have no charges for patient care.</p> <p>The hospital's CMS-assigned case mix index is used to account for differences in patient complexity. The CMS area wage index is used to account for geographic differences in cost of living.</p> <p>We rank hospitals on their adjusted inpatient expense per discharge.</p> <p>Hospitals with extreme outlier values in this measure were not eligible to be named benchmarks (see "Eliminating Outliers" on page 41).</p>	<p>Lower</p>

Profitability (Adjusted Operating Profit Margin)

Why We Include This Element	Calculation	Comment	Favorable Values Are
<p>Operating profit margin is one of the purest measures of a hospital's financial health. It is a measure of the amount of income a hospital is taking in versus its expenses.</p>	<p>We calculate the adjusted operating profit margin by determining the difference between a hospital's total operating revenue and total operating expense, expressed as a percentage of its total operating revenue, adjusted for related organization expense. Total operating revenue is the sum of net patient revenue plus other operating revenue. Operating expense is adjusted for related organization expense. See Appendix C for detailed calculations and the Medicare Cost Report locations (worksheet, line, and column) for each calculation element.</p>	<p>This measure uses Medicare Cost Report data for hospital cost reports ending in calendar year 2012.</p> <p>We rank hospitals on their adjusted operating profit margin.</p> <p>Extreme outlier values in this measure were not eligible to be named benchmarks (see "Eliminating Outliers" on page 41).</p>	<p>Higher</p>

HCAHPS Score (Patient Rating of Overall Hospital Performance)

Why We Include This Element	Calculation	Comment	Favorable Values Are
<p>We believe that including a measure of patient perception of care is crucial to the balanced scorecard concept. How patients perceive the care a hospital provides has a direct effect on its ability to remain competitive in the marketplace.</p>	<p>We used the HCAHPS survey instrument question, "How do patients rate the hospital, overall?" to score hospitals. Patient responses could fall into three categories, and the number of patients in each category was reported as a percent:</p> <ul style="list-style-type: none"> ▪ Patients who gave a rating of 6 or lower (low) ▪ Patients who gave a rating of 7 or 8 (medium) ▪ Patients who gave a rating of 9 or 10 (high) <p>For each answer category, we assign a weight as follows: 3 equals high or good performance, 2 equals medium or average performance, and 1 equals low or poor performance. We then calculate a weighted score for each hospital by multiplying the HCAHPS answer percent by the category weight. For each hospital, we sum the weighted percent values for the three answer categories. The result is the HCAHPS score. See Appendix C for full details.</p>	<p>Data are from CMS Hospital Compare, third quarter 2013 database. This database contains the HCAHPS results for data period January 1 through December 31, 2012.</p> <p>We rank hospitals based on the weighted percent sum or HCAHPS score. The highest possible HCAHPS score is 300 (100 percent of patients rate the hospital high). The lowest HCAHPS score is 100 (100 percent of patients rate the hospital low).</p>	<p>Higher</p>

Performance Measure	Data Sources and Periods	
	Current Performance	Multi-Year Trend Performance (Everest Award Winner Selection)
Risk-Adjusted Mortality Index	MedPAR FFY 2011 and 2012	MedPAR FFY 2009–2012*
Risk-Adjusted Complications Index	MedPAR FFY 2011 and 2012	MedPAR FFY 2009–2012*
Risk-Adjusted Patient Safety Index	MedPAR FFY 2011 and 2012	MedPAR FFY 2009–2012*
Core Measures Mean Percent	CMS Hospital Compare, 2nd quarter 2013 (October 1, 2011–September 30, 2012 dataset)	CMS Hospital Compare, 2nd quarter releases (2008–2012)
30-Day Mortality Rates (AMI, Heart Failure, Pneumonia)	CMS Hospital Compare, 3rd quarter 2013 (July 1, 2009–June 30, 2012 dataset)	Trend data not available
30-Day Readmission Rates (AMI, Heart Failure, Pneumonia)	CMS Hospital Compare, 3rd quarter 2013 (July 1, 2009–June 30, 2012 dataset)	Trend data not available
Severity-Adjusted Average Length-of-Stay	MedPAR FFY 2012	MedPAR FFY 2009–2012
Adjusted Inpatient Expense per Discharge	HCRIS 3rd quarter 2013 (2012 Medicare Cost Reports)	HCRIS, 2008–2012 Medicare Cost Reports
Adjusted Operating Profit Margin	HCRIS 3rd quarter 2012 (2012 Medicare Cost Reports)	HCRIS, 2008–2012 Medicare Cost Reports
HCAHPS	CMS Hospital Compare, 3rd quarter 2013 (January 1–December 31, 2012 dataset)	CMS Hospital Compare, 3rd quarter releases (2008–2012)

Determining the 100 Top Hospitals

Eliminating Outliers

Within each of the five hospital comparison groups, we ranked hospitals based on their performance on each of the measures relative to other hospitals in their group. Prior to ranking, we used three methods of identifying hospitals that were performance outliers. These hospitals were not eligible to be named winners.

Interquartile Range Methodology

We used the interquartile range methodology to identify hospitals with extreme outlier values for the following measures:

- Risk-adjusted patient safety index (high outliers only)
- Case mix- and wage-adjusted inpatient expense per discharge (high or low outliers)
- Adjusted operating profit margin (high and low outliers)

This was done because to avoid the possibility of hospitals with poor patient safety performance or a high probability of having erroneous cost report data being declared winners.

For more information on the interquartile range methodology, please see Appendix C.

*Two years of data are combined for each study year. See the Everest Award section for more details.

Mortality and Complications Outliers

For mortality and complications, which have observed and expected values, we identified hospitals with performance that was statistically worse than expected. This was done because we do not want hospitals that have poor clinical outcomes to be declared winners.

Hospital mortality is considered worse than expected if the observed value is higher than expected and the difference is statistically significant with 95-percent confidence. Confidence interval high and low index values (95 percent confidence) are calculated. When a hospital's observed value is 30 or greater, we use the approximate binomial confidence interval methodology. When a hospital's observed value is less than 30, we use the exact mid-p binomial confidence interval methodology. If the hospital's low confidence interval index value is greater than or equal to 1.0, the hospital is statistically worse than expected and is excluded from the list of possible winners.

Operating Profit Margin Outliers

We identified hospitals with a negative adjusted operating profit margin as outliers. This was done because we do not want hospitals that fail to meet this very basic financial responsibility to be declared winners.

Ranking

Within the five hospital comparison groups, we ranked hospitals on the basis of their performance on each of the performance measures independently, relative to other hospitals in their group. Each performance measure is assigned a weight for use in overall ranking. Each hospital's performance measure ranks were summed to arrive at a total score for the hospitals. The hospitals were then ranked based on their total scores, and the hospitals with the best overall rankings in each comparison group were selected as the winners.

All measures except the 30-day mortality and 30-day readmission rates received a weight of one in the final ranking process. For the 30-day mortality and readmission rate measures, we give the rates for each of the conditions (AMI, heart failure, and pneumonia) a weight of one-sixth in the final 100 Top Hospitals ranking process for winner selection. This study includes:

Comparison Group	Number of Winners	Number of Nonwinners	Total Hospitals in Study
Major Teaching Hospitals	15	177	192
Teaching Hospitals	25	404	429
Large Community Hospitals	20	309	329
Medium Community Hospitals	20	962	982
Small Community Hospitals	20	851	871
All Hospitals	100	2,703	2,803

Truven Health Policy on Revocation of a 100 Top Hospitals Award

To preserve the integrity of the study, it is the policy of Truven Health to revoke a 100 Top Hospitals award if a hospital is found to have submitted inaccurate or misleading data to any 100 Top Hospitals data source.

At the sole discretion of Truven Health, the circumstances under which a 100 Top Hospitals award could be revoked include, but are not limited to, the following:

1. Discovery by Truven Health staff, through statistical analysis or other means, that a hospital has submitted inaccurate data.
2. Discovery of media or Internet reports of governmental or accrediting agency investigations or sanctions for actions by a hospital that could have an adverse impact on the integrity of the 100 Top Hospitals studies or award winner selection.

Appendix A

Distribution of Winners by State and Region*

State	Number of Winners	
	Current Study	Previous Study
Alabama	0	1
Alaska	0	0
Arizona	1	2
Arkansas	0	0
California	13	15
Colorado	4	4
Connecticut	0	0
Delaware	0	1
District of Columbia	0	0
Florida	6	9
Georgia	2	1
Hawaii	0	0
Idaho	1	0
Illinois	9	7
Indiana	2	2
Iowa	3	3
Kansas	1	1
Kentucky	0	0
Louisiana	1	0
Maine	0	0
Maryland	0	1
Massachusetts	5	3
Michigan	3	8
Minnesota	3	1
Mississippi	0	0
Missouri	1	0
Montana	2	1
Nebraska	0	1
Nevada	0	0
New Hampshire	0	0
New Jersey	0	0

State	Number of Winners	
	Current Study	Previous Study
New Mexico	0	1
New York	0	0
North Carolina	3	4
North Dakota	0	0
Ohio	9	7
Oklahoma	0	0
Oregon	1	0
Pennsylvania	4	2
Rhode Island	0	0
South Carolina	1	1
South Dakota	1	1
Tennessee	2	3
Texas	11	9
Utah	4	5
Vermont	0	0
Virginia	2	2
Washington	0	0
West Virginia	0	0
Wisconsin	5	4
Wyoming	0	0

Census Region	Number of Winners	
	Current Study	Previous Study
Northeast	9	5
Midwest	37	35
South	28	32
West	26	28

*For a listing of states within each census region, see Appendix B.

Appendix B

States Included in Each Census Region

Northeast	Midwest	South	West
Connecticut	Illinois	Alabama	Alaska
Maine	Indiana	Arkansas	Arizona
Massachusetts	Iowa	Delaware	California
New Hampshire	Kansas	District of Columbia	Colorado
New Jersey	Michigan	Florida	Hawaii
New York	Minnesota	Georgia	Idaho
Pennsylvania	Missouri	Kentucky	Montana
Rhode Island	Nebraska	Louisiana	Nevada
Vermont	North Dakota	Maryland	New Mexico
	Ohio	Mississippi	Oregon
	South Dakota	North Carolina	Utah
	Wisconsin	Oklahoma	Washington
		South Carolina	Wyoming
		Tennessee	
		Texas	
		Virginia	
		West Virginia	

Appendix C: Methodology Details

Methods for Identifying Complications of Care

Without adjusting for differences, comparing outcomes among hospitals is like comparing the proverbial apples to oranges: difficult, if not impossible, to do. To make valid normative comparisons of hospital outcomes, it is necessary to adjust raw data to accommodate differences that result from the variety and severity of admitted cases.

Truven Health Analytics™ is able to make valid normative comparisons of mortality and complications rates by using patient-level data to control effectively for case mix and severity differences. We do this by evaluating ICD-9-CM diagnosis and procedure codes to adjust for severity within clinical case mix groupings. Conceptually, we group patients with similar characteristics (i.e., age, sex, principal diagnosis, procedures performed, admission type, and comorbid conditions) to produce expected, or normative, comparisons. Through extensive testing, we have found that this methodology produces valid normative comparisons using readily available administrative data, eliminating the need for additional data collection.³²

Normative Database Development

For this study, Truven Health constructed a normative database of case-level data from the most recent three years of MedPAR data (2010, 2011, and 2012). The data include both fee-for-service Medicare claims and HMO encounters. Demographic and clinical data are also included: age, sex, and length-of-stay; clinical groupings (MS-DRGs), ICD-9-CM principal and secondary diagnoses*; ICD-9-CM principal and secondary procedures†; present-on-admission coding; admission source and type; and discharge status.

Present-on-Admission Data

Under the Deficit Reduction Act of 2005, as of federal fiscal year (FFY) 2008, hospitals receive reduced payments for cases with certain conditions — such as falls, surgical site infections, and pressure ulcers — that were not present on the patient's admission, but occurred during hospitalization. As a result, CMS now requires all inpatient prospective payment system hospitals to document whether a patient has these conditions when admitted. Truven Health proprietary risk-adjustment models for mortality, complications, and length-of-stay include present-on-admission (POA) data that was reported in the 2010, 2011, and 2012 MedPAR datasets.

Risk-Adjusted Mortality Index Models

Truven Health has developed an overall mortality risk model. From this model, we excluded long-term care, psychiatric, substance abuse, rehabilitation, and federally owned or controlled facilities. In addition, we excluded certain patient records from the dataset: psychiatric, substance abuse, rehabilitation, and unclassified cases (MS-DRGs 945, 946, and 999); cases where patient age was less than 65 years; and where patient transferred to another short-term, acute-care hospital. Palliative care patients (v66.7) are included in the mortality risk model, which is calibrated to determine probability of death for these patients.

* We used 25 diagnostic codes in the 2011 MedPar dataset and 9 in the 2009 and 2010 MedPAR datasets.

† We used 25 procedure codes in the 2011 MedPar dataset and 6 in the 2009 and 2010 MedPAR datasets.

A standard logistic regression model is used to estimate the risk of mortality for each patient. This is done by weighting the patient records of the client hospital by the logistic regression coefficients associated with the corresponding terms in the model and the intercept term. This produces the expected probability of an outcome for each eligible patient (numerator) based on the experience of the norm for patients with similar characteristics (age, clinical grouping, severity of illness, and so forth).³³⁻³⁷

Staff physicians at Truven Health have suggested important clinical patient characteristics that also were incorporated into the proprietary models. After assigning the predicted probability of the outcome for each patient, the patient-level data can then be aggregated across a variety of groupings, including hospital, service, or the MS-DRG classification systems.

Expected Complications Rate Index Models

Risk-adjusted complications refer to outcomes that may be of concern when they occur at a greater than expected rate among groups of patients, possibly reflecting systemic quality-of-care issues. The Truven Health complications model uses clinical qualifiers to identify complications that have occurred in the inpatient setting. The complications used in the model are:

Complication	Patient Group
Post-operative complications relating to urinary tract	Surgical only
Post-operative complications relating to respiratory system except pneumonia	Surgical only
GI complications following procedure	Surgical only
Infection following injection/infusion	All patients
Decubitus ulcer	All patients
Post-operative septicemia, abscess, and wound infection	Surgical, including cardiac
Aspiration pneumonia	Surgical only
Tracheostomy complications	All patients
Complications of cardiac devices	Surgical, including cardiac
Complications of vascular and hemodialysis devices	Surgical only
Nervous system complications from devices/complications of nervous system devices	Surgical only
Complications of genitourinary devices	Surgical only
Complications of orthopedic devices	Surgical only
Complications of other and unspecified devices, implants, and grafts	Surgical only
Other surgical complications	Surgical, including cardiac
Miscellaneous complications	All patients

Complication	Patient Group
Cardio-respiratory arrest, shock, or failure	Surgical only
Post-operative complications relating to nervous system	Surgical only
Post-operative acute myocardial infarction	Surgical only
Post-operative cardiac abnormalities except AMI	Surgical only
Procedure-related perforation or laceration	All patients
Post-operative physiologic and metabolic derangements	Surgical, including cardiac
Post-operative coma or stupor	Surgical, including cardiac
Post-operative pneumonia	Surgical, including cardiac
Pulmonary embolism	All patients
Venous thrombosis	All patients
Hemorrhage, hematoma, or seroma complicating a procedure	All patients
Post-procedure complications of other body systems	All patients
Complications of transplanted organ (excludes skin and cornea)	Surgical only
Disruption of operative wound	Surgical only
Complications relating to anesthetic agents and CNS depressants	Surgical, including cardiac
Complications relating to antibiotics	All patients
Complications relating to other anti-infective drugs	All patients
Complications relating to anti-neoplastic and immunosuppressive drugs	All patients
Complications relating to anticoagulants and drugs affecting clotting factors	All patients
Complications relating to blood products	All patients
Complications relating to narcotics and related analgesics	All patients
Complications relating to non-narcotic analgesics	All patients
Complications relating to anti-convulsants and anti-Parkinsonism drugs	All patients
Complications relating to sedatives and hypnotics	All patients
Complications relating to psychotropic agents	All patients
Complications relating to CNS stimulants and drugs affecting the autonomic nervous system	All patients
Complications relating to drugs affecting cardiac rhythm regulation	All patients
Complications relating to cardiotonic glycosides (digoxin) and drugs of similar action	All patients
Complications relating to other drugs affecting the cardiovascular system	All patients
Complications relating to anti-asthmatic drugs	All patients
Complications relating to other medications (includes hormones, insulin, iron, and oxytocic agents)	All patients

A normative database of case-level data including age, sex, LOS, clinical grouping (MS-DRGs), and comorbid conditions was constructed using the most recent three years of available MedPAR data (2010, 2011, and 2012). Long-term care, psychiatric, substance abuse, rehabilitation, and federally owned or controlled facilities were not included. In addition, we excluded certain patient records from the dataset: psychiatric, substance abuse, rehabilitation, and unclassified cases (MS-DRGs 945, 946, and 999); cases where patient age was less than 65 years and where patient transferred to another short-term acute-care hospital.

A standard regression model is used to estimate the risk of experiencing a complication for each patient. This is done by weighting the patient records of the client hospital by the regression coefficients associated with the corresponding terms in the prediction models and intercept term. This method produces the expected probability of a complication for each patient based on the experience of the norm for patients with similar characteristics. After assigning the predicted probability of a complication for each patient in each risk group, it is then possible to aggregate the patient-level data across a variety of groupings.³⁸⁻⁴¹

Patient Safety Indicators

The Agency for Healthcare Research and Quality (AHRQ) is a public health service agency within the federal government's Department of Health and Human Services. The agency's mission includes both translating research findings into better patient care and providing policymakers and other healthcare leaders with information needed to make critical healthcare decisions. We use AHRQ's Patient Safety Indicators (PSIs) in calculating our risk-adjusted patient safety index performance measure. This information on PSIs is from the AHRQ website (ahrq.gov):

The Patient Safety Indicators (PSIs) are a set of indicators providing information on potential in hospital complications and adverse events following surgeries, procedures, and childbirth. The PSIs were developed after a comprehensive literature review, analysis of ICD-9-CM codes, review by a clinician panel, implementation of risk adjustment, and empirical analyses.

The PSIs can be used to help hospitals identify potential adverse events that might need further study; provide the opportunity to assess the incidence of adverse events and in hospital complications using administrative data found in the typical discharge record; include indicators for complications occurring in hospital that may represent patient safety events; and, indicators also have area level analogs designed to detect patient safety events on a regional level.⁴²

For the risk-adjusted patient safety index performance measure, we began our research with all PSIs that occurred with sufficient frequency to generate provider-specific output. Of the 20 PSIs included in the original AHRQ methodology, only 15 produced non-zero PSI rates on the Medicare data. Four measures are for birth or other obstetrical-related conditions, which do not occur in the age group under study here. Transfusion reactions generated rates that were too low for the AHRQ PSI software to generate provider-specific output. Due to the unreliability of E coding, we also excluded complications of anesthesia (PSI 1), foreign body left in during procedure (PSI 5), postoperative hip fracture (PSI 8), and accidental puncture and laceration (PSI 15), which rely on E codes. Since the original analysis was done, death in low-mortality DRGs (PSI 2) no longer has risk values in the model.

Since the POA coding has become available with the MedPAR 2009 dataset, pressure ulcer (PSI 3) and postoperative pulmonary embolism or deep vein thrombosis (PSI 12), which are highly impacted by POA coding, are included. The AHRQ model version used in this study was Version 4.3, published August 2012. The model used POA coding in MedPAR data.

The final set of 10 PSIs included in this study was:

- PSI 3: Pressure ulcer
- PSI 4: Death among surgical inpatients with serious treatable complications
- PSI 6: Iatrogenic pneumothorax
- PSI 7: Central venous catheter-related bloodstream infections
- PSI 9: Perioperative hemorrhage or hematoma
- PSI 10: Postoperative physiologic and metabolic derangements
- PSI 11: Postoperative respiratory failure
- PSI 12: Perioperative pulmonary embolism or deep vein thrombosis
- PSI 13: Postoperative sepsis
- PSI 14: Postoperative wound dehiscence

ECRI and PSI: Complementary Methodologies

Given its high level of importance, we chose to increase our emphasis on patient safety by using both the PSI and expected complications rate index (ECRI) methodologies to calculate two separate outcome measures. Both PSI and ECRI are methodologies for identifying complications of care. Although the definitions have some similarities, there are enough differences that the two are useful complements to each other. ECRI is an overall complication methodology in which the outcome is the occurrence of one or more of 47 complications of care. The AHRQ PSIs used in our study are based on 10 separate models that evaluate the occurrence of 10 distinct complications of care, one of which is mortality related — an adverse outcome that is not included in ECRI.

Index Interpretation

An outcome index is a ratio of an observed number of outcomes to an expected number of outcomes in a particular population. This index is used to make normative comparisons and is standardized in that the expected number of events is based on the occurrence of the event in a normative population. The normative population used to calculate expected numbers of events is selected to be similar to the comparison population with respect to relevant characteristics, including age, sex, region, and case mix.

The index is simply the number of observed events divided by the number of expected events and can be calculated for outcomes that involve counts of occurrences (e.g., deaths or complications). Interpretation of the index relates the experience of the comparison population relative to a specified event to the expected experience based on the normative population.

Examples:

10 events observed ÷ 10 events expected = 1.0: The observed number of events is equal to the expected number of events based on the normative experience.

10 events observed ÷ 5 events expected = 2.0: The observed number of events is twice the expected number of events based on the normative experience.

10 events observed ÷ 25 events expected = 0.4: The observed number of events is 60 percent lower than the expected number of events based on the normative experience.

Therefore, an index value of 1.0 indicates no difference between observed and expected outcome occurrence. An index value greater than 1.0 indicates an excess in the observed number of events relative to the expected based on the normative experience. An index value less than 1.0 indicates fewer events observed than would be expected based on the normative experience. An additional interpretation is that the difference between 1.0 and the index is the percentage difference in the number of events relative to the norm. In other words, an index of 1.05 indicates 5 percent more outcomes, and an index of 0.90 indicates 10 percent fewer outcomes than expected based on the experience of the norm. The index can be calculated across a variety of groupings (e.g., hospital, service).

Core Measures

Core measures were developed by the Joint Commission and endorsed by the National Quality Forum (NQF), the nonprofit public-private partnership organization that endorses national healthcare performance measures, as minimum basic care standards. They are a widely accepted method for measuring quality of patient care that includes specific guidelines for heart attack (acute myocardial infarction or AMI), heart failure (HF), pneumonia, pregnancy and related conditions, and surgical care. Our composite core measures mean percent is based on the AMI, HF, pneumonia, and surgical care areas of this program, using Hospital Compare data reported on the Centers for Medicare & Medicaid Services (CMS) website. The data in this study are from the second quarter 2013 database. This contains data from October 1, 2011, through September 30, 2012.

In calculating each hospital's core measures mean percent, the comparison group median core measure value was substituted for a missing core measure. In addition, the comparison group median core measure value was substituted when the hospital reported core measures with patient counts less than or equal to 25 or with relative standard error greater than or equal to 0.30. This was done because the original reported values were considered statistically unreliable.

AMI Core Measures

AMI-8A[‡] Heart attack patients given percutaneous coronary intervention within 90 minutes of arrival

AMI-10[‡] Heart attack patients given a prescription for statin at discharge

HF Core Measures

HF-1 Heart failure patients given discharge instructions

Pneumonia Core Measures

PN-3B Pneumonia patients whose initial emergency room blood culture was performed prior to the administration of the first hospital dose of antibiotics

PN-6 Pneumonia patients given the most appropriate initial antibiotic(s)

Surgical Care Improvement Project Core Measures

SCIP_CARD_2 Surgery patients who were taking heart drugs called beta blockers before coming to the hospital, who were kept on the beta blockers during the period just before and after their surgery

SCIP-INF-1 Surgery patients who were given an antibiotic at the right time (within one hour before surgery) to help prevent infection

SCIP-INF-2 Surgery patients who were given the right kind of antibiotic to help prevent infection

SCIP-INF-3 Surgery patients whose preventive antibiotics were stopped at the right time (within 24 hours after surgery)

SCIP-INF-4[‡] Heart surgery patients whose blood sugar (blood glucose) is kept under good control in the days right after surgery

SCIP-INF-9 Surgery patients whose urinary catheters were removed on the first or second day after surgery

SCIP-INF-10 Patients having surgery who were actively warmed in the operating room or whose body temperature was near normal by the end of surgery

SCIP-VTE-1 Surgery patients whose doctors ordered treatments to prevent blood clots after certain types of surgeries

SCIP-VTE-2 Patients who got treatment at the right time (within 24 hours before or after their surgery) to help prevent blood clots after certain types of surgery

[‡]We did not include this measure for small community hospitals due to very low reporting.

30-Day Risk-Adjusted Mortality Rates and 30-Day Risk-Adjusted Readmission Rates

This study currently includes two extended outcome measures — 30-day mortality and 30-day readmission rates, as defined by the CMS Hospital Compare dataset (third quarter 2013). The longitudinal data period contained in this analysis is July 1, 2009, through June 30, 2012. The Hospital Compare website and database were created by CMS, the Department of Health and Human Services, and other members of the Hospital Quality Alliance. The data on the website come from hospitals that have agreed to submit quality information that will be made public. Both of the measures used in this study have been endorsed by the NQF.

CMS calculates the 30-day mortality and 30-day readmission rates from Medicare enrollment and claims records using sophisticated statistical modeling techniques that adjust for patient-level risk factors and account for the clustering of patients within hospitals. Both rates are based on heart attack, heart failure, and pneumonia patients.

CMS' three mortality models (heart attack, heart failure, and pneumonia) estimate hospital-specific, risk-standardized, all-cause 30-day mortality rates for patients hospitalized with a principal diagnosis of heart attack, heart failure, or pneumonia. All-cause mortality is defined as death from any cause within 30 days after the admission date, regardless of whether the patient dies while still in the hospital or after discharge.

CMS' three readmission models estimate hospital-specific, risk-standardized, all-cause 30-day readmission rates for patients discharged alive to a non-acute-care setting with a principal diagnosis of heart attack, heart failure, or pneumonia. Patients may have been readmitted back to the same hospital, to a different hospital or to an acute-care facility. They may have been readmitted for the same condition as their recent hospital stay or for a different reason (this is to discourage hospitals from coding similar readmissions as different readmissions).²⁹

HCAHPS Overall Hospital Rating

To measure patient perception of care, this study uses the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) patient survey. HCAHPS is a standardized survey instrument and data collection methodology for measuring patients' perspectives of hospital care. HCAHPS is a core set of questions that can be combined with customized, hospital-specific items to produce information that complements the data hospitals currently collect to support internal customer service and quality-related activities.

HCAHPS was developed through a partnership between CMS and AHRQ that had three broad goals:

- Produce comparable data on patients' perspectives of care that allow objective and meaningful comparisons among hospitals on topics that are important to consumers.

- Encourage public reporting of the survey results to create incentives for hospitals to improve quality of care.
- Enhance public accountability in healthcare by increasing the transparency of the quality of hospital care provided in return for the public investment.

The HCAHPS survey has been endorsed by the NQF and the Hospital Quality Alliance. The federal government’s Office of Management and Budget has approved the national implementation of HCAHPS for public reporting purposes.

Voluntary collection of HCAHPS data for public reporting began in October 2006. The first public reporting of HCAHPS results, which encompassed eligible discharges from October 2006 through June 2007, occurred in March 2008. HCAHPS results are posted on the Hospital Compare website, found at hospitalcompare.hhs.gov, or through a link on medicare.gov. A downloadable version of HCAHPS results is available.

For this study edition, we used Hospital Compare data from the third quarter 2013 database. This database contains the HCAHPS results for data period January 1 through December 31, 2012. Although we are reporting hospital performance on all HCAHPS questions, only performance on the Overall Hospital Rating question, “How do patients rate the hospital, overall?” is used to rank hospital performance. Patient responses fell into three categories, and the number of patients in each category was reported as a percent:

- Patients who gave a rating of 6 or lower (low)
- Patients who gave a rating of 7 or 8 (medium)
- Patients who gave a rating of 9 or 10 (high)

For each answer category, we assigned a weight as follows: 3 equals high or good performance, 2 equals medium or average performance, and 1 equals low or poor performance. We then calculated a weighted score for each hospital by multiplying the HCAHPS answer percent by the category weight. For each hospital, we summed the weighted percent values for the three answer categories. Hospitals were then ranked by this weighted percent sum. The highest possible HCAHPS score is 300 (100 percent of patients rate the hospital high). The lowest possible HCAHPS score is 100 (100 percent of patients rate the hospital low).

Length-of-Stay Methodologies

The study’s LOS performance measure uses the Truven Health proprietary, severity-adjusted resource demand methodology. The LOS model is calibrated from three years of MedPAR data (2010, 2011, 2012), taking into account present-on-admission (POA) coding. Under the Deficit Reduction Act of 2005, as of federal fiscal year 2008, hospitals receive reduced payments for cases in which certain conditions — like falls, surgical site infections, and pressure ulcers — were not present on the patient’s admission but occur during their hospitalization. As a result, CMS now requires all inpatient prospective payment system hospitals to document whether a patient has these conditions when admitted.

Our severity-adjusted resource demand model allows us to produce risk-adjusted performance comparisons on LOS between or across virtually any subgroup of inpatients. These patient groupings can be based on clinical groupings, hospitals, product lines, geographic regions, physicians, etc. This regression model adjusts for differences in diagnosis type and illness severity, based on ICD-9-CM coding. It also adjusts for patient age, gender, and admission status. Its associated LOS weights allow group comparisons on a national level and in a specific market area.

POA coding allows us to determine appropriate adjustments to LOS weights based on pre-existing conditions versus complications that occurred during hospital care. We calculate expected values from model coefficients that are normalized to the clinical group and transformed from log scale.

Performance Measure Normalization

The mortality, complications, patient safety index, and LOS measures are normalized based on the in-study population and by comparison group to provide a more easily interpreted comparison among hospitals. To address the impact of bed size and teaching status, including extent of residency program involvement, and compare hospitals to other like hospitals, we assign each hospital in the study to one of five comparison groups (major teaching, teaching, large community, medium community, and small community hospitals). (Detailed descriptions of the patient and hospital comparison groups can be found in the Methodology section of this document.)

For the mortality and complications measures, we base our ranking on the difference between observed and expected events, expressed in standard deviation units (z-scores) that have been normalized. We normalize the individual hospital z-scores by finding the difference between the hospital z-score and the mean z-score for their comparison group. The difference is then divided by the standard deviation of the comparison group's z-scores to produce the normalized z-score for the hospital.

For the length-of-stay measure, we base our ranking on the normalized severity-adjusted LOS index expressed in days. This index is the ratio of the observed and the normalized expected values for each hospital. We normalize the individual hospital's expected values by multiplying them by the ratio of the observed to expected values for the comparison group. The hospital's normalized index is then calculated by dividing the hospital's observed value by its normalized expected value. We convert this normalized index into days by multiplying by the average length-of-stay of the in-study hospitals (grand mean LOS).

Interquartile Range Methodology

For each measure, we calculate an interquartile range (IQR) based on data for all in-study hospitals. Two outlier points (trim points) are set for each measure: one upper limit and one lower limit.

A value (X) is considered an outlier if either of the following is true:

- X > upper-limit outlier point
- X < lower-limit outlier point

The procedure for calculating the IQR and outlier points is as follows:

- Determine the first quartile (Q1). This is the 25th percentile value of all records in the population.
- Determine the third quartile (Q3). This is the 75th percentile value of all records in the population.
- Calculate the IQR by subtracting Q1 from Q3. ($IQR = Q3 - Q1$)
- Calculate the upper-limit trim point for PSI index and the upper- and lower-limit trim points for inpatient expense per discharge:
 - upper limit = $Q3 + (3.0 \times IQR)$
 - lower limit = $Q1 - (3.0 \times IQR)$
- Calculate the upper- and lower-limit trim points for operating profit margin:
 - upper limit = $Q3 + (2.0 \times IQR)$
 - lower limit = $Q1 - (2.0 \times IQR)$

Data points that are outside the IQR limits are considered to be extreme outliers and are excluded.

Why We Have Not Calculated Percent Change in Specific Instances

Percent change is a meaningless statistic when the underlying quantity can be positive, negative, or zero. The actual change may mean something, but dividing it by a number that may be zero or of the opposite sign does not convey any meaningful information because the amount of change is not proportional to its previous value.⁴⁴

We also do not report percent change when the metrics are already percentages. In these cases, we report the simple difference between the two percentage values.

Protecting Patient Privacy

In accordance with patient privacy laws, we do not report any individual hospital data that are based on 11 or fewer patients. This affects the following measures:

- Risk-adjusted mortality index
- Risk-adjusted complications index
- 30-day mortality rates for AMI, heart failure, and pneumonia (CMS does not report a rate when count is less than 25)
- 30-day readmission rates for AMI, heart failure, and pneumonia (CMS does not report a rate when count is less than 25)
- Average length-of-stay

Medicare Cost Report Line Items Used in the Performance Measures Calculations

A number of our calculations include data from the Medicare Cost Report. Below you will find our calculations and the cost report locations (worksheet, line, and column) for all of these items. The following apply to the 100 Top Hospitals study and the hospital Medicare Cost Report for the hospital fiscal year ending in 2012. Please note that the locations of the elements will sometimes vary between cost reports. The line and column references are the standard based on CMS Form 2552-96. Any deviations from this standard are checked by system and manual data analysis to ensure that the coding has been done properly.

Case Mix- and Wage-Adjusted Inpatient Expense per Discharge

$$[(0.62 \times \text{Acute Inpatient Expense} \div \text{CMS Wage Index}) + 0.38 \times \text{Acute Inpatient Expense}] \div \text{Acute Inpatient Discharges} \div \text{Medicare Case Mix Index}$$

Acute Inpatient Expense = Inpatient Expense — Subprovider Expense — Nursery Expense — Skilled Nursing Facility Expense — Intermediate-Care Facility Expense — Other Long-Term Care Facility Expense — Cost Centers Without Revenue (e.g., organ procurement, outpatient therapy, other capital-related costs, etc.)

Inpatient Expense = Sum Over All Departments
[(Inpatient Department Charges ÷ Department Charges) × Department Cost]

Individual Element Locations in the Medicare Cost Report:

- Acute Inpatient Discharges — Worksheet S-3, Line 14, Column 15
- Inpatient Department (cost center) elements:
 - Fully Allocated Cost — Worksheet C, Part 1, Column 1
 - Total Charges — Worksheet C, Part 1, Column 8
 - Inpatient Charges — Worksheet C, Part 1, Column 6
- Medicare Case Mix Index — Federal Register: CMS Inpatient Prospective Payment System (IPPS) Federal Fiscal Year (FFY) 2012 Final Rule Table 2 (cost report end dates in 2012 Q1, Q2 Q3) or IPPS FFY 2013, Table 2 (cost report end dates in 2012 Q4)
- CMS Wage Index — CMS Federal Register: CMS IPPS FFY 2012 (cost report end dates in 2012 Q1, Q2 Q3) or IPPS FFY 2013, Table 2 (cost report end dates in 2012 Q4)

Adjusted Operating Profit Margin

$$[(\text{Net Patient Revenue} + \text{Other Operating Revenue} - (\text{Total Operating Expense} + \text{Related Organization Expense})) \div (\text{Net Patient Revenue} + \text{Other Operating Revenue})] \times 100$$

Other Operating Revenue = [Total Other Income — Other Income: Contributions, Donations, etc. — Other Income from Investments]

Individual Element Locations in the Medicare Cost Report:

- Net Patient Revenue — Worksheet G-3, Line 3, Column 1
- Total Other Income — Worksheet G-3, Line 25, Column 1
- Other Income: Contributions, Donations, etc. — Worksheet G-3, Line 6, Column 1
- Other Income From Investments — Worksheet G-3, Line 7, Column 1
- Total Operating Expense — Worksheet G-3, Line 4, Column 1
- Related Organization Expense — Worksheet A-8, Line 12, Column 2

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