



How We Rate Hospitals

February 2017

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1. Overview

Consumer Reports' hospital Ratings (<http://www.consumerreports.org/health/doctors-hospitals/hospital-ratings.htm>) include measures of Patient Outcomes (avoiding infections, readmissions, avoiding mortality, and adverse events in surgical patients), Patient Experience (including communication about hospital discharge, communication about drug information and other measures), and Hospital Practices (appropriate use of scanning and avoiding C-sections). Several of these measures are then combined to create our Safety Score. This document describes these Ratings in detail, starting with an overview of the Ratings on Consumer Reports online. We also periodically publish hospital Ratings in the pages of Consumer Reports magazine.

In constructing these Ratings, we do extensive research to bring together reliable, valid, and objective information on hospital quality. The source data come from the Centers for Medicare and Medicaid Services (CMS), the Centers for Disease Control and Prevention (CDC), state inpatient databases, and the American Hospital Association (AHA). Our research entails an in-depth evaluation of the quality and objectivity of each of these sources. If the data meet our quality standards, we then turn it into usable information that is accessible and meaningful to consumers. We routinely update our Ratings, both by updating the information that's already there and by retiring measures and adding new measures of hospital quality as they become available. Details about each measure are shown in the table on the following page.

With each set of measures, we enlist the help of external expert reviewers for feedback on measure methodology and on how we propose to turn the measures into Ratings. That feedback has been incorporated in the methods described in this document, and is a crucial part of making sure that we present information that is consistent with the current state of scientific knowledge on hospital quality.

Our Ratings use a 1-to-5 scale (corresponding to Consumer Report's well-known colored dots, called "blobs"), where higher numbers are better. For the components of the Safety Score and other composites, we include more significant digits in our calculations by using the "converted score" scale, which ranges from 0.5 to 5.5. Converting our Ratings to this scale enables us to combine and compare different quality components on a common scale. The technical details for expressing each measure on a converted score (CS) scale and for creating the blobs that appear in our Ratings are described in the sections of this report that follow.

Summary of Hospital Ratings Domains

Category	Measures	Source	Dates covered by data in our most recent update
Safety Score composite	(denoted with * below)		Varied; see below
Patient Outcomes	*Avoiding bloodstream infections *Avoiding surgical site infections *Avoiding catheter-associated urinary tract infections *Avoiding MRSA infections *Avoiding <i>C. difficile</i> infections	CMS	January 2015 – December 2015
	*Avoiding readmissions	CMS	July 2014 – June 2015
	*Avoiding mortality – medical	CMS	July 2012 – June 2015
	*Avoiding mortality – surgical	CMS	July 2013 – June 2015
Patient Experience	Overall patient experience *Communication about hospital discharge *Communication about drug information Doctor-patient communication Nurse-patient communication Pain control Help from hospital staff Room cleanliness Room quietness	CMS	January 2015 – December 2015
Hospital practices	*Appropriate use of abdominal scanning *Appropriate use of chest scanning	CMS	July 2014 – June 2015
	Avoiding C-sections	California Maternal Quality Care Collaborative (CMQCC)	January 2015 – December 2015
Heart Surgery	Isolated heart bypass surgery Overall Rating Patient survival Absence of surgical complications Appropriate medications Optimal surgical technique	The Society of Thoracic Surgeons	January 2015 - December 2015
	Aortic heart valve replacement Overall Rating Patient survival Absence of surgical complications	The Society of Thoracic Surgeons	January 2013 - December 2015

Note regarding changes to measures used by Consumer Reports:

March 2014 update:

Changes to the measures reported by Consumer Reports (CR) are outlined below. More details are available in the relevant section for each measure.

- Replaced the CMS heart failure, heart attack, pneumonia readmission measures with the hospital-wide, all-cause readmission measure, *Avoiding Readmissions* (see page 15).
- Added the CMS heart failure, heart attack, pneumonia mortality measure, *Avoiding Mortality - Medical* (see page 17).
- Added PSI-4 - Death among surgical patients with serious treatable complications, *Avoiding Mortality - Surgical* (see page 19).
- Added catheter-associated urinary tract infection data to the Safety Score (see page 30).
- Removed PSI-90, *Avoiding Complications*.
- Data sources: For hospital-acquired infections we no longer use any state-based data; we used data reported to CDC's National Healthcare Safety network (NHSN) which is then reported to CMS.

May 2014 update

- Added the AHRQ IQI 33 measure (Primary C-section rate, uncomplicated *Avoiding C-sections*) for 22 states (see page 27).

June 2014 update

- Added heart surgery Ratings (Isolated heart bypass surgery and aortic valve replacement surgery) (see page 34).
- Published infections composite (see page 11) and catheter-associated urinary tract infection Ratings (see page 8).

July 2015 update

- Added methicillin-resistant *Staphylococcus aureus* infection (MRSA) Ratings (see page 8).
- Added *Clostridium difficile* (*C. difficile*) infection Ratings (see page 8).
- Modified the infections composite to account for MRSA and *C. difficile* (see page 11).
- Changed the cut points for *Avoiding Readmissions* and *Mortality – Medical*.
- Added chronic obstructive pulmonary disease (COPD) and stroke to *Mortality – Medical*.
- Modified the calculation for *Mortality – Medical*.

February 2016 update

- Changed the *Avoiding C-sections* Rating from AHRQ IQI 33 measure (Primary C-section rate, uncomplicated) to NTSV (nulliparous, term, singleton, vertex) (see page 27).

August 2016 update

- Changed the cut points for *Avoiding Mortality – Surgical* (see page 19).

Limitations

Unlike most other Consumer Reports' Ratings, we do not collect hospital data ourselves, and so the actual implementation of the data collection and analysis is not in our control. There may be quality control issues that do not meet the high standards that Consumer Reports generally applies to our own data. In many cases, the Consumer Reports Health Ratings Center only has access to summarized results of data analysis, preventing us from validating the data calculations or presenting data to you in alternative ways. However, we carefully review the methods of data collection, validation, and analysis used by each data provider. Based on that extensive review, we use only the highest-quality data available that provides important and useful information for consumers. Our interpretations of the data incorporate our understandings of any data limitations, which are described in greater detail in the following sections.

Our hospital Ratings are based on a range of measures that we believe reflect the quality of important dimensions of patient care. However, there are many dimensions to hospital quality, beyond those reported here. For example, there may be information available about the hospital's performance in a specific clinical area that is important to you. In fact, Consumer Reports, in collaboration with The Society of Thoracic Surgeons, publishes ratings of surgical groups (www.consumerreports.org/health/doctors-hospitals/surgeon-ratings/heart-surgery-ratings/overview/index.htm) that perform coronary artery bypass surgery (CABG) who have volunteered to release their data to the public through Consumer Reports. State-based non-profit quality organizations, state departments of health and national for- and non-profit organizations publish quality data that may be helpful for you in assessing [physician group](#) and/or hospital quality. In addition, the Informed Patient Institute (<http://www.informedpatientinstitute.org>) publishes evaluations of medical service quality report cards.

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- "See what Consumer Reports says about _____. Click here for more information."
- "The ___ was recently featured in Consumer Reports. Click here for more information."

Please link back to the ConsumerReports.org article or blog you wish to share. Some articles and most ratings are behind the paywall, but usually there is some free content to link to for your audiences.

The specific rating cannot be discussed, only that you were rated. (“See how we rated” instead of “Rated #1”).

If you have any questions regarding our policies, please reach out to Jessica Tun in External Relations at Jessica.Tun@consumer.org.

2. Patient Outcomes

2.1. Avoiding Infections

Our Ratings include data from CMS on healthcare-acquired infections (HAI) that most hospitals are required to report to the government or receive a financial penalty. Beginning in 2011, reporting of select HAIs became linked to an annual across the board payment increase for Medicare payments to hospitals. If hospitals in the CMS Inpatient Prospective Payment System do not submit the scheduled information required on infections, they lose a portion of this annual payment increase. This payment structure is used as an incentive that causes virtually all of these hospitals to report.

Starting in 2014, hospitals received a reduction in payments for low quality through CMS's "[HAC Reduction Program](#)." (HAC stands for Hospital-Acquired Condition.) Through this program, if a hospital is in the bottom 25% for performance, it will receive a 1% penalty. For 2015, the measures used in the HAC calculation include two of the infection measures that are in CR's Ratings (central line and catheter urinary tract), in addition to a composite measure developed by AHRQ called [PSI 90](#) (a composite of complications that might have previously been called "never events" that includes items like deep-vein thrombosis, and pressure ulcers).

Hospitals report this data through The Centers for Disease Control and Prevention's (CDC's) National Healthcare Safety Network (NHSN). The CDC calculates a standardized infection ratio (SIR) which is reported to the public through CMS's Hospital Compare website (<http://www.medicare.gov/hospitalcompare/>).

Specific HAIs that are reported at the federal level and for which CR now reports Ratings include:

1. Central line associated bloodstream infections (CLABSIs)
2. Surgical site infections (SSIs)
3. Catheter-associated urinary tract infections (CAUTI)
4. Methicillin-resistant *Staphylococcus aureus* (MRSA) infections
5. *Clostridium difficile* (C. diff) infections.

Appendix A (page 14) includes the details of each of the measures above, in terms of what data are used in the calculation. Hospitals that report data to CDC are required to do so quarterly for every ICU and select other specialty areas in the hospital, for all patients as indicated in the chart (not just Medicare patients). Data are combined for four quarters, with a delay of approximately 10 months (so for example, the CLABSI data reported by CMS in July 2015 reflects the 12-month period ending in September 2014).

Central-line associated bloodstream infections (CLABSI) data

Hospitals are required to report an infection as a CLABSI if it is a laboratory-confirmed bloodstream infection where the central line (or umbilical catheter) was in place for more than two calendar days from the date of the confirmed infection and a central line (or umbilical catheter) was in place on the date of the confirmed infection or the day before and the organism cultured from the blood was not related to an infection at another site. The federal government requires that hospitals report

CLABSI's that occur in the intensive care unit (ICU) as well as selected medical and surgical wards. At this time, we are only Rating CLABSI in the ICU. In the January 2017 issue of Consumer Reports magazine we analyzed the data from 2011 to 2015 (pg 37).

Surgical-site Infections (SSI) data

For surgical site infections (SSI), the federal government requires hospitals to report only infections associated with abdominal hysterectomy and colon surgery. In order to capture those infections most likely to be reported consistently across facilities, only deep incisional and organ/space infections detected during the same admission as the surgical procedure or upon readmission to the same hospital that performed the surgical procedure are included in the report. Superficial incisional SSIs and those identified on post-discharge surveillance are excluded. [Some states](#) require that hospitals report on additional surgical site infections.

Catheter-associated urinary tract infection (CAUTI) data

Hospitals must report urinary tract infections that are associated with the patient having an indwelling urinary catheter (tube inside the body inserted in the bladder) and are diagnosed based on the patients' symptoms, as well as urinary tract infections without symptoms that have caused a bloodstream infection, within 48 hours of insertion of the catheter. Hospitals are currently only required to report infections that occur in adults and children that are admitted in the intensive-care unit and select other specialty areas. At this time, we are only Rating CAUTI in the ICU.

Methicillin-resistant *Staphylococcus aureus* (MRSA) infections data

Starting in July 2015, our Ratings include data on methicillin-resistant *Staphylococcus aureus* (MRSA) infections. MRSA is a type of staph bacteria that is resistant to many antibiotics. In a healthcare setting, such as a hospital or nursing home, MRSA can cause severe problems such as bloodstream infections, pneumonia and surgical site infections. Hospitals are required to report all hospital-onset laboratory-identified MRSA bloodstream infections that occur throughout the hospital.

***Clostridium difficile* (C. diff) infections data**

Starting in July 2015, our Ratings include data on *Clostridium difficile* infections. [In a recent survey](#) of hospitals, *C. difficile* was found to be the most commonly reported pathogen, responsible for 12% of hospital acquired infections (about 80,000 infections). *C. difficile* is a common cause of antibiotic-associated diarrhea and in rare cases can cause sepsis and death. [Antibiotic overprescribing and transmission from patient-to-patient](#) are the leading modifiable causes of *C. difficile* infections. Hospitals are required to report hospital-onset, laboratory-identified *C. difficile* infections throughout the hospital (with some exceptions - see page 14).

The basis of the Ratings: The standardized infection ratio (SIR)

For each hospital, we calculate the standardized infection ratio, a measure developed by the CDC and modeled after the standardized mortality ratio (or standardized incidence ratio), a common measure in epidemiology. The basis of the SIR is the number of observed infections at any one

hospital, divided by the number of infections that would be predicted (sometimes called ‘expected’) for that hospital (based on aggregate data from CDC).

The SIR (which is the basis for the Rating) compares data within each of several subgroups to the national baseline data for those subgroups, and then pools the comparisons across all subgroups. National data are derived from rates reported to the CDC’s NHSN. The baseline rates for CLABSI and SSI consist of data from approximately 1,500 hospitals in 2006-2008 in 48 states and the District of Columbia; a subset of NHSN data for individual hospitals is publicly available through CMS. CAUTI national baseline data are from 2009, while MRSA and C. diff baseline data are from 2010-2011.

While more recent national averages are available from NHSN, like CDC, we have continued to use these baseline data for consistency, to allow us to demonstrate changes in incidence of infections over time. This analysis adjusts for the fact that different reporting agencies and different hospitals have data over different time frames, populations served and services provided requiring comparisons to different baseline infection rates. For instance, the baseline CLABSI infection rate for cardiac ICUs nationwide is two per 1,000 central-line days (CLDs), so a particular cardiac ICU with a rate of three infections per 1,000 days has 50 percent more infections than would be predicted from the national baseline. For surgical ICUs, the national baseline CLABSI rate is 2.3 infections per 1,000 central-line days, so a surgical ICU reporting a rate of 4.6 infections per 1,000 CLDs produces infections at twice the national rate, or 100 percent more infections than baseline. The standardized infection ratio pools these comparisons across all ICUs for which a hospital reports CLABSI rate, giving a single Rating for each hospital’s reported ICUs. For more details of the calculation of the SIR, see <http://www.cdc.gov/HAI/pdfs/progress-report/hai-progress-report.pdf>.

A Standardized Infection Ratio of 1.0 means that the hospital reported the same number of infections as would be predicted from national baseline data. A SIR of more than 1.0 reflects more infections than predicted, and SIR less than 1.0 implies fewer infections than predicted.

Risk Adjustment

CAUTI and CLABSI SIRs are adjusted for patient mix by type of patient care location (ICU type), hospital affiliation with a medical school, and bed size of the patient care location. SSI uses a logistic regression model to risk adjust at the patient level (wound class and age) before pooling data together for that procedure type. MRSA data are risk adjusted by facility bed size, hospital affiliation with a medical school, and the number of patients admitted to the hospital who already have a MRSA bloodstream infection (“community-onset” cases). C. diff data are risk adjusted by facility bed size, hospital affiliation with a medical school, the number of patients admitted to the hospital who already have C. diff. (“community-onset” cases), and the type of test the hospital laboratory uses to identify C. diff. from patient specimens. These adjustments are already made to the data when they are publicly reported through CMS’s Hospital Compare; Consumer Reports does not make these adjustments.

Assigning Individual Infection Ratings

For all five infection types, we calculate Ratings scores for all hospitals that meet either of the following sample size requirements:

1. At least one total predicted infection. Smaller volumes yield less reliable ratings.

2. At least three infections, regardless of central-line days, number of surgical procedures, catheter days, or patient days. This allows us to identify additional hospitals with high infection rates, even in small volumes.

For each hospital with sufficient data, we report (separately for CLABSI, CAUTI, SSI, MRSA, and C. diff) the percentage different from predicted rates based on national data. This percentage difference from predicted rates is based on the SIR, and is reported as shown in the table on the following page. SIRs are rounded off for display purposes; all available digits of precision are maintained for internal calculations.

In addition, we now report the numerators (i.e., the number of CLABSI, CAUTI, SSI, MRSA, and C. diff infections) and the number of central-line days, urinary catheter days, surgical procedures, and total MRSA and C. diff patient days, respectively, for any hospital that has any valid data for that category.

To receive the highest Rating, a hospital must have at least 1 predicted infection and report zero infections. Although the SIR on which our Ratings are based reflects comparisons with predicted rates based on national data as a way for adjusting for the varying risk of infection in different ICUs or with different surgical procedures, the SIR should not be seen as a safety benchmark; “average” performance still means that the hospital was responsible for giving its patients infections. Enough hospitals report zero infections that we believe all hospitals can achieve this standard.

To help drive hospitals’ infection rates to zero, we reserve our highest rating for those hospitals that report zero infections for the time period that covers our Ratings. This is meant to be a “high bar.” However, external reviewers of our method have suggested that for hospitals with small patient volume, zero infections may be due more to chance, rather than to any action the hospital has taken to eliminate hospital-acquired infections. Given the limitations of the data to which we currently have access, we are unable to test this hypothesis at this time. For hospitals that report zero infections, we use the CDC’s recommended minimal threshold of one predicted infection¹ for these hospitals to receive a Rating. However, when zero-infection hospitals have fewer than three predicted infections² (the point at which zero becomes statistically significantly different from one), we include the following sentence beneath their Rating for that category: “Although this hospital reported zero infections, due to low patient volume this result is not statistically better than national rates.”

For all five infection types, we assign converted scores (CSs) on a scale from 0.5 to 5.5 using a piecewise linear transformation as follows:

- a. If the **SIR = 0**, then the hospital is assigned a CS value of 5.5. Only hospitals with zero reported infections (SIR = 0) can receive our highest rating, displayed with a blob score of .
- b. If **0 < SIR ≤ 0.5**, then the CS is calculated using a linear transformation that maps a SIR of 0 to a CS of 4.5 (note that no actual data value will exist at that point) and a SIR of 0.5 to a CS of 3.5. These hospitals will get a displayed blob score of .

¹ <http://www.cdc.gov/HAI/pdfs/progress-report/hai-progress-report-2014.pdf>

² For hospitals with zero infections and fewer than three predicted infections, the SIR is not significantly less than the performance that would be as predicted using the national baseline (based on a Poisson test using a significance level of 0.05).

- c. If $0.5 < \text{SIR} \leq 1.0$, then the CS is calculated using a linear transformation that maps a SIR of 0.5 to a CS of 3.5 and a SIR of 1.0 to a CS of 2.5. These hospitals will get a displayed blob score of .
- d. If $1.0 < \text{SIR} \leq 2.0$, then the CS is calculated using a linear transformation that maps a SIR of 1.0 to a CS of 2.5 and a SIR of 2.0 to a CS of 1.5. These hospitals will receive a displayed blob score of .
- e. If $2.0 < \text{SIR} \leq 4.0$, then the CS is calculated using a linear transformation that maps a SIR of 2.0 to a CS of 1.5 and a SIR of 4.0 to a CS of 0.5. These hospitals will receive a displayed blob score of .
- f. For $\text{SIR} > 4.0$, the CS is set to be equal to 0.5, with a displayed blob score of .

These calculations result in ratings scores as shown in the following table:

	CLABSI, CAUTI, SSI, MRSA, or C. diff Rating	Converted Score Range	SIR range	Interpretation
Better  Worse		CS = 5.5	SIR = 0.0	0 infections
		$4.5 > \text{CS} \geq 3.5$	$0.0 < \text{SIR} \leq 0.5$	At least 50% better than national baseline
		$3.5 > \text{CS} \geq 2.5$	$0.5 < \text{SIR} \leq 1.0$	Between the national baseline and 50% better than national baseline
		$2.5 > \text{CS} \geq 1.5$	$1.0 < \text{SIR} \leq 2.0$	Up to and including 100% worse than national baseline
		$1.5 > \text{CS}$	$2.0 < \text{SIR}$	More than 100% worse than national baseline

If you see a hospital that falls at one of the cutoff points between blob scores, you may see what looks like a discrepancy between its percentage difference from national average and its Rating. This is not an error, but results from rounding the percent difference to the nearest whole percent for display purposes. For example, if a hospital has a SIR = 0.502, then it receives a 3 blob, since its SIR is greater than 0.5. This hospital is 49.8% better than national rates; since we print these percentage differences to the nearest whole number percent, it will be reported online as being 50% better than national average.

Composite infection score

We created a composite infection score for each hospital by combining data for the following infection categories: 1=CLABSI, 2=CAUTI, 3=SSI, 4=MRSA, and 5=C. diff. We calculate a composite rating for hospitals that have infection data in at least three of these categories using a ratio of weighted averages:

$$\text{Composite SIR} = \frac{W_1 O_1 + W_2 O_2 + \dots + W_5 O_5}{W_1 E_1 + W_2 E_2 + \dots + W_5 E_5},$$

where the weights are used to mitigate the effect of masking lower performance in a single category and to account for the disproportionately high number of C. diff infections in most hospitals.

Specifically, the weights are determined as $W_i = wA_i \times wB_i$, where,

$$wA_i = \begin{cases} 1 & \text{if } 0 \leq SIR_i^* < 1 \\ 1 + \left(\frac{SIR_i^* - 1}{P98_i - 1} \right) \times (2 - 1) & \text{if } 1 \leq SIR_i^* \leq P98_i \\ 2 & \text{if } SIR_i^* > P98_i \end{cases}$$

$P98_i = 98^{\text{th}}$ Percentile for SIR_i

$$SIR_i^* = \frac{O_i}{\max(1, E_i)}, i = 1, 2, \dots, 5$$

$$wB_i = \begin{cases} 1 & \text{if } i = 1, 2, 3, 4 \\ \sqrt{\bar{E}_{(\text{Excluding } E_5)} / E_5} & \text{if } i = 5 \end{cases}$$

The composite SIR was converted to the following:

	Infection Composite Rating	Converted Score Range	Composite SIR range
Better  Worse		$5.5 \geq CS \geq 4.5$	$0.00 \leq SIR \leq 0.15$
		$4.5 > CS \geq 3.5$	$0.15 < SIR \leq 0.50$
		$3.5 > CS \geq 2.5$	$0.50 < SIR \leq 1.00$
		$2.5 > CS \geq 1.5$	$1.00 < SIR \leq 2.00$
		$1.5 > CS \geq 0.5$	$2.00 < SIR$

Limitations

Although extremely serious, these infections are relatively infrequent, which makes the infection rates volatile, as the occurrence of one or two infections can have a large impact on reported rates, especially in hospitals performing fewer procedures or using fewer devices. Many hospitals are working toward reducing infection rates in their ICUs, operating rooms, and throughout their facilities, so current rates may differ from those reported here. Whenever possible, we present the most current data publicly available.

Most SSIs are not identified until patients are discharged from the hospital, and infected patients do not always return to the hospital where the surgery was performed. To identify infections after discharge and accurately estimate the incidence of SSIs, hospitals use various approaches, including review of data sources for re-admission and emergency room visits, to improve the detection of SSIs. All patients who experience infections may not be re-admitted or go to the hospital's

emergency department, so there are many infections that will not be identified by the hospital's reporting system.

SSI data reported to CMS includes only two surgical procedures (colon and hysterectomy), which limits the generalizability of the data. It also does not allow Consumer Reports, or consumers, to evaluate SSIs in hospitals that specialize in other areas, such as orthopedic surgery or cardiac surgery.

CLABSI, SSI, CAUTI, MRSA, and C. diff data reported by CMS are self-reported by hospitals. Independent or external validation has not been performed in the majority of hospitals. Although most states that have mandated public reporting are required by state law to issue valid, accurate and reliable data, only some (for instance, New York, Tennessee, Colorado, Connecticut, Washington, and South Carolina) are doing regular evaluations or audits of the data. Consumers Union continues to advocate for laws requiring validation and auditing of hospital infection data. But we also believe that consumers have a right to the best information currently available on hospital-acquired infections, which are dangerous, costly, and even deadly.

Appendix A: Details of each infection measure

Infection Type	Numerator	Denominator	Risk Adjustment	National SIR	National Baseline
1. CLABSI	Primary bloodstream infections, i.e., not secondary to an infection at another body site, that are laboratory-confirmed and occur when a central line or umbilical catheter is in place or was in place within 48 hours before onset of the event, from all adult, pediatric, and neonatal ICUs at acute care hospitals.	The number of central line days in hospital locations in scope (Adult, Pediatric, and Neonatal ICUs) for quality reporting.	Type of patient care location; Hospital affiliation with a medical school; Bed size of the patient care location	0.54	1.0 SIR (2006-2008)
2. SSI	Deep incisional primary (DIP) and organ/space infections detected during the operative hospitalization, on readmission to the hospital where surgery was performed or on admission to another hospital, or through post-discharge surveillance.	# of criteria-specific colon surgeries performed within the facility + # of criteria-specific abdominal hysterectomy surgeries performed within the facility.	Patient age; wound classification	Colon: 0.92; Ab: 0.86	1.0 SIR (2006-2008)
3. CAUTI	Symptomatic urinary tract infections (SUTIs) and asymptomatic bacteremic urinary tract infections (ABUTIs) that are catheter-associated (i.e., patient has an indwelling urinary catheter at the time of or within 48 hours before onset of the event), from adult and pediatric ICUs at acute care hospitals.	The number of urinary catheter days in hospital locations in scope (Adult and Pediatric ICUs) for quality reporting.	Type of patient care location; Hospital affiliation with a medical school; Bed size of the patient care location	1.06	1.0 SIR (2009)
4. MRSA	The MRSA bacteremia measure includes the number of MRSA bacteremia LabID events that occur in all inpatient locations facility-wide within the displayed time frame.	The total number of patient days in hospital facility-wide inpatient locations in scope for quality reporting.	Teaching type; Facility bed size; Facility prevalence rate	0.92	1.0 SIR (2010-2011)
5. CDIIF	The number of C. diff LabID events that occur in all inpatient locations facility-wide (minus Neonatal ICUs, Well Baby Nurseries, or Well Baby Clinics) within the displayed time frame.	The total number of patient days in hospital facility-wide inpatient locations (minus Neonatal ICUs, Well Baby Nurseries, or Well Baby Clinics) in scope for quality reporting.	Teaching type; Facility bed size; Facility prevalence rate; Type of laboratory test the hospital laboratory uses to identify C. diff from patient specimens.	0.90	1.0 SIR (2010-2011)

2.2. Avoiding Readmissions

Hospital readmissions data are collected by the Centers for Medicare and Medicaid Services (CMS), an agency of the Federal government. In 2009, CMS began reporting a 30-day readmission measure for people diagnosed with heart failure, heart attack, and pneumonia. Medicare reimbursement to hospitals paid under the Inpatient Prospective Payment System is currently tied to hospitals' reporting of this measure, as well as their performance.

To provide a broader assessment of the quality of care at hospitals, in 2013 CMS began reporting a hospital-wide, all-cause readmission rate for most hospitals in the United States. In March 2014, we replaced the three condition specific readmission measures with the new hospital-wide readmission measure. The information reported by CMS shows an estimate of the likelihood that a patient will be readmitted within 30 days of discharge from a previous hospital stay for any condition. People may have been readmitted back to the same hospital or to a different hospital. They may have had an unplanned readmission for the same condition as their recent hospital stay, or for a different reason.

Readmissions rates are important quality indicators for several reasons. First, any hospital admission has inherent risks, and hence a second admission exposes the patient to additional risk. Second, readmissions can be caused by things that go wrong in the initial discharge. Third, we know that, to at least some extent, readmissions reflect errors or hospital-acquired conditions in the initial hospitalization.³

The data

CMS publishes readmission rates after statistical adjustment for how sick people were when they were initially admitted to the hospital and for the amount of cases available for each hospital. CMS provides each hospital's 30-day risk-standardized readmission rate (RSRR). [Details of the measure](#) are available on the Quality Net website.

Data reported on Hospital Compare cover discharges over a twelve-month period for over 4,000 hospitals. We provide the chance of readmission for any hospital with at least 25 cases. In addition, we provide a Rating score as described below.

Assigning Ratings scores

We re-scale the reported readmission rates on our converted score scale, as described in the chart below. Cut points for the blobs are based on a combination of the data distribution and on input and review by experts in quality measurement and clinical medicine.

³ Emerson et al., *Infect Control Hosp Epidemiol.* 2012;33(6):539-544.

	Rating	Converted Score Range	Readmission Rate
Better  Worse		$5.5 \geq CS \geq 4.5$	min- 10 th percentile
		$4.5 > CS \geq 3.5$	>10 th to 30 th percentile
		$3.5 > CS \geq 2.5$	>30 th to 70 th percentile
		$2.5 > CS \geq 1.5$	>70 th to 90 th percentile
		$1.5 > CS \geq 0.5$	>90 th percentile-max

Limitations

These data come from billing and other administrative data submitted by hospitals to Medicare. Such records were intended to capture information for billing purposes rather than patient outcomes, but they contain details about a patient’s stay in the hospital. These data reflect readmissions only for Medicare patients. Ratings come from recent data but it is possible that performance today will show improvements or declines in performance data that is not currently available to us. The percentages reported are not exact numbers but estimates based on the statistical model used, and have some margin of error. Hospitals that have relatively low numbers of discharges have wider margins of error, and because of the statistical model CMS uses, are statistically adjusted to be closer to the average of all hospitals.

Finally, while these are the best data available for assessing readmissions, and they are adjusted for the health status of the patients discharged by each hospital, comparisons among hospitals with very different patient populations are only approximate.⁴

⁴ More about the statistical methods used by CMS can be found here: <http://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HospitalQualityInits/Downloads/Statistical-Issues-in-Assessing-Hospital-Performance.pdf>

2.3. Avoiding Mortality - Medical

Mortality data are collected by the Centers for Medicare and Medicaid Services (CMS), an agency of the Federal government. CMS reports mortality rates for Medicare patients who died within 30 days of admission for patients who had been hospitalized for any of the following reasons: heart failure, heart attack, pneumonia, chronic obstructive pulmonary disease (COPD), or stroke.

The data

CMS publishes mortality data after statistical adjustment for how sick patients were when they were initially admitted to the hospital and for the amount of cases available for each hospital. [CMS provides each hospital's 30-day risk standardized mortality rate](#) for each medical condition.

Assigning Individual Medical Mortality Ratings

We create Ratings for each condition (heart attack, heart failure, pneumonia, COPD, stroke) and then combine them, weighted by the hospitals' mix of patients. For each hospital, we use whichever of the five conditions have sufficient data (at least 25 cases), and calculate the weighted geometric mean of the converted score for those measures.

Blob scores for the individual measures are derived as follows. (Note that the individual blob scores for each condition are not published on each hospital's report card; we report only the composite Rating). Cut points for the blobs are based on a combination of the data distribution and on input and review by experts in quality measurement and clinical medicine.

	Rating	Converted Score Range	Mortality Rate – heart failure, heart attack, pneumonia, COPD and stroke
Better  Worse		$5.5 \geq CS \geq 4.5$	Min - 10 th percentile
		$4.5 > CS \geq 3.5$	>10 th to 30 th percentile
		$3.5 > CS \geq 2.5$	>30 th to 70 th percentile
		$2.5 > CS \geq 1.5$	>70 th to 90 th percentile
		$1.5 > CS \geq 0.5$	>90 th percentile - max

Composite medical mortality score

The weighted geometric average of converted scores for measures with sufficient data is used to create the medical mortality composite. Weights of the individual mortality scores are proportional to the number of discharges for patients hospitalized for heart attack, heart failure, pneumonia, COPD, or stroke at that hospital.

Limitations

These data come from billing and other administrative data that hospitals submit to Medicare. Such records were intended to capture information for billing purposes rather than patient outcomes, but they contain significant details about a patient's stay in the hospital. These data reflect mortality only for Medicare patients.

Ratings come from the most recent data available, but there is a time lag in reporting these data to the public. It is possible that performance today will show improvements or declines in data that is not currently available to us. The percentages reported are not exact numbers but estimates based on the statistical model used, and have some a margin of error. Hospitals that have relatively low numbers of discharges have wider margins of error, and because of the statistical model CMS uses, are statistically adjusted to be closer to the average of all hospitals.

While these data are adjusted for the health status of the patients discharged by each hospital, comparisons among hospitals with very different patient populations are only approximate. More details about this measure can be found here:

<https://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier4&cid=1163010421830>

2.4. Avoiding Mortality - Surgical

The Center for Medicare and Medicaid Services (CMS) publishes data that measure how often patients died who had surgery that had a serious treatable complication. With rapid identification and effective treatment a portion of these people could have been saved. Complications include pneumonia, deep vein thrombosis or pulmonary embolus, sepsis, acute renal failure, shock/cardiac arrest, or gastrointestinal hemorrhage/acute ulcer. In July 2016, CMS recalibrated the measure and thus cannot be compared to previous years.

The data

CMS reports the data as the number of patient deaths in the hospital for every 1,000 patients who had surgery with select complications.

CMS publishes surgical mortality rates after statistical adjustment for how sick patients were when they were initially admitted to the hospital and for the amount of data cases for each hospital.

Assigning Ratings scores

We rescale the surgical mortality rates reported on Hospital Compare and assign them blob scores as described below. Cut points for the blobs are based on a combination of the data distribution and on input and review by experts in quality measurement and clinical medicine.

	Rating	Converted Score Range	Surgical Mortality (deaths per 1,000 patients)
Better ↑ ↓ Worse		$5.5 \geq CS \geq 4.5$	Min - 10 th percentile
		$4.5 > CS \geq 3.5$	>10 th to 30 th percentile
		$3.5 > CS \geq 2.5$	>30 th to 70 th percentile
		$2.5 > CS \geq 1.5$	>70 th to 90 th percentile
		$1.5 > CS \geq 0.5$	>90 th percentile - max

Limitations

These data come from billing and other administrative data submitted by hospitals to Medicare. Such records were intended to capture information for billing purposes rather than patient outcomes, but they contain significant details about a patient's stay in the hospital. These data reflect mortality only for Medicare patients.

Ratings come from the most recent data available, but there is a time lag in reporting these data to the public. It is possible that performance today will show improvements or declines in data that is not currently available to us. The percentages reported are not exact numbers but estimates based on the statistical model used, and have some a margin of error.

PSI data are only calculated for hospitals that are paid through the IPPS, which excludes Critical Access hospitals (CAHs), long-term care hospitals (LTCHs), Maryland waiver hospitals, cancer hospitals, children's inpatient facilities, rural health clinics, federally qualified health centers,

inpatient psychiatric hospitals, inpatient rehabilitation facilities, Veterans Administration/ Department of Defense hospitals, and religious, non-medical health care institutions.

While these data are adjusted for the health status of the patients discharged by each hospital, comparisons among hospitals with very different patient populations are only approximate.

Finally, this measure is limited by the accuracy of coding of complications in the billing records⁵ and research suggests that the patient safety indicators significantly underreport the number of errors that occur in hospitals.⁶ While this measure does draw on select complications to qualify cases for inclusion, the adverse event measured here is not the occurrence of these complications, but death.

⁵ Lawson et al., *Ann Surg* 2012; 256(6):973-981

⁶ Classen et al., *Health Aff* 2011; 30 (4): 581-589

3. Patient Experience

Our Patient Experience Ratings are based on survey data collected by the Federal Government's Centers for Medicare & Medicaid Services (CMS). Hospital CAHPS, or HCAHPS, is a more recent addition to the Consumer Assessment of Healthcare Providers and Systems (CAHPS) family of surveys administered by CMS. HCAHPS evaluates dimensions of patient care that are important to consumers (e.g. how often the room and bathroom were kept clean; how often pain was well-controlled) and that are related to safety concerns (e.g. communication about new medications, communication about discharge). For example,

- The average hospital patient receives 10 different drugs, some of which might look similar or have names that sound alike, and may be prescribed by different specialists who may not communicate well with each other. In fact, the Institute of Medicine estimates that, on average, there is at least one medication error per day for every patient.⁷
- Studies have shown that pain is often not controlled well after surgery, and that uncontrolled pain increases the risk of long hospital stays and reduced quality of life.^{8,9}
- The importance of proper discharge instructions is underscored by a report that found that more than a third of hospital patients fail to get needed follow-up care.¹⁰

Most hospitals are currently required to report HCAHPS data to receive full payment from Medicare.¹¹ Medicare's Hospital Value-Based Purchasing Program makes incentive payments to hospitals based on their performance on specific quality measures, including HCAHPS.¹²

The data

HCAHPS survey data are collected using a standardized survey instrument by CMS-approved and trained vendors contracted by individual hospitals (in rare occasions, the hospital serves as the approved vendor itself). Data are delivered to a centralized data bank, where they are analyzed and prepared for public reporting on CMS's Hospital Compare website (www.hospitalcompare.hhs.gov).

The survey asks a sample of former inpatients from each hospital about various dimensions of their experiences. CMS reports HCAHPS survey results for nine categories, some of which are composites of more than one survey question. We base our patient experience Ratings on these nine categories, shown in the table in Appendix C (page 24). We create Patient Experience Ratings for

⁷ <http://www.iom.edu/Reports/2006/Preventing-Medication-Errors-Quality-Chasm-Series.aspx>

⁸ Morrison et al, *Pain*. 2003;103(3):303-11.

⁹ Sinatra, R. *Pain Medicine*. 2010; 11: 1859–1871.

¹⁰ Moore et al., *Archives of Internal Medicine*. 2007; 167(12), 1305-1311.

¹¹ <http://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HospitalQualityInits/HospitalHCAHPS.html>

¹² <http://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HospitalQualityInits/HospitalHCAHPS.html>

hospitals with at least 100 completed surveys in the most recent 12 month period; smaller samples do not produce reliable Ratings.¹³

Assigning Ratings scores

For the measures with response options of Always/Usually/Sometimes/Never, we calculated the percentage of “always” or “usually” responses (e.g. the percent of respondents reported that their doctors always or usually communicated well) as the sum of the “always” and “usually” percentages reported by CMS. For discharge planning, we used the percentage of patients who said they were given instructions on what to do during their recovery at home.

For each of the first 8 measures, percentages are converted to converted scores using a piecewise linear transformation that assigns 100% a converted score of 5.5 and 75% a converted score of 0.5. Rates less than 75% are assigned a converted score of 0.5 and a blob score of 1. These converted scores are then rounded to the nearest whole number to create our blob scores.¹⁴ This leads to the scores shown in the following table:

	Patient Experience Rating	Converted Score Range	Adjusted percentage response
Better ↑ ↓ Worse		$5.5 \geq CS \geq 4.5$	95% - 100%
		$4.5 > CS \geq 3.5$	90% - 94%
		$3.5 > CS \geq 2.5$	85% - 89%
		$2.5 > CS \geq 1.5$	80% - 84%
		$1.5 > CS \geq 0.5$	79% or below

Overall Patient Experience

We calculate our Overall Patient Experience Rating in two stages. First, we calculate the arithmetic mean of the two overall response measures:

1. The percentage of respondents who would “definitely” recommend the hospital
2. The percentage of respondents who gave the hospital an overall rating of 9 or 10

These two measures are highly correlated ($r=0.98$ for all hospitals with at least 100 completed surveys). We then transform this mean to converted scores (CSs) using the piecewise linear transformation that maps 100% to a CS of 5.5 and 40% to a CS of 1.5; and 40% to a CS of 1.5 and 0% to a CS of 0.5. These CSs are then rounded to blob scores, with a CS of 5.5 being assigned a blob score of 5. These transformations lead to the following ranges of scores:

¹³ The number of completed surveys is not the same as the number of responses to individual survey items. While most items have response rates in the range of 90-95 percent of completed surveys, a few items do not apply to all patients (e.g. pain management and information about new medications), and have response rates as low as 65 percent of completed surveys. Individual item response rates or sample sizes are not available.

¹⁴ A converted score of 5.5 is assigned a blob score of 5.

	Overall Patient Experience Rating	Converted Score Range	Mean of two overall HCAHPS questions
Better  Worse		$5.5 \geq CS \geq 4.5$	85% - 100%
		$4.5 > CS \geq 3.5$	70% - 84%
		$3.5 > CS \geq 2.5$	55% - 69%
		$2.5 > CS \geq 1.5$	40% - 54%
		$1.5 > CS \geq 0.5$	39% or below

Limitations

The survey tool and methods of data collection have been carefully researched and validated. However, unlike some other Consumer Reports Ratings, we do not collect these data ourselves, and so the actual implementation of the data collection and analysis is not in our control. We rely on the CMS, who oversees all aspects of the survey, to train hospitals and vendors in how to collect the data, to investigate how the survey is actually implemented for each hospital, and to analyze the data that we then convert into our unique Ratings format.

Data collection is decentralized—in part to accommodate the legacy of data already collected by hospitals from patients—which gives hospitals the ability to continue asking additional questions not in HCAHPS or to tailor additional questions to their specific quality improvement efforts. (If they do include additional questions on the survey, CMS requires the HCAHPS items to appear first, to reduce the chance of response bias from the other questions.) This decision is also related to cost—hospitals pay for or conduct the data collection themselves and this allows them to piggyback objectives.

To achieve standardization, CMS, the Health Services Advisory Group, and the National Committee for Quality Assurance provide detailed survey administration requirements in the HCAHPS instruction manual (Quality Assurance Guidelines, V4.0, available at www.hcahpsonline.org), training programs, site visits, independent data audits and analyses, and vendor certification processes (www.hcahpsonline.org/qaguidelines.aspx).

The array of survey vendors involved in data collection introduces another set of concerns. While vendors are required to follow a strictly outlined set of procedures, there may be some inconsistencies in survey administration of which we are unaware, and over which we have no control. We do not provide Patient Experience Ratings for hospitals that are identified by CMS to have discrepancies in their data collection processes.

Finally, the Consumer Reports Health Ratings Center was only allowed access (by CMS) to the summarized results of their data analysis, preventing us from validating the data calculations or presenting data to you in alternative ways.

Despite these limitations, after our comprehensive review of the CMS survey methodology, we are confident that their stated methodologies are valid and reliable, and provide important information that allows comparison of patients' experiences in different hospitals on a common set of measures.

Appendix C: HCAHPS survey questions that comprise each Ratings category

Category	Response type	Survey questions
Communication about discharge	Yes/no	During this hospital stay, did doctors, nurses or other hospital staff talk with you about whether you would have the help you needed when you left the hospital? During this hospital stay, did you get information in writing about what symptoms or health problems to look out for after you left the hospital?
Communication about medications	Always Usually Sometimes Never	Before giving you any new medicine, how often did hospital staff tell you what the medicine was for? Before giving you any new medicine, how often did hospital staff describe possible side effects in a way you could understand?
Doctor-patient communication	Always Usually Sometimes Never	During this hospital stay, how often did doctors treat you with courtesy and respect? During this hospital stay, how often did doctors listen carefully to you? During this hospital stay, how often did doctors explain things in a way you could understand?
Nurse-patient communication	Always Usually Sometimes Never	During this hospital stay, how often did nurses treat you with courtesy and respect? During this hospital stay, how often did nurses listen carefully to you? During this hospital stay, how often did nurses explain things in a way you could understand?
Getting help	Always Usually Sometimes Never	During this hospital stay, after you pressed the call button, how often did you get help as soon as you wanted it? How often did you get help in getting to the bathroom or in using a bedpan as soon as you wanted?
Controlling pain	Always Usually Sometimes Never	During this hospital stay, how often was your pain well controlled? During this hospital stay, how often did the hospital staff do everything they could to help you with your pain?
Keeping room clean	Always Usually Sometimes Never	During this hospital stay, how often were your room and bathroom kept clean?
Keeping room quiet	Always Usually Sometimes Never	During this hospital stay, how often was the area around your room quiet at night?
Overall patient experience	Definitely yes Probably yes Probably no Definitely no 0-10	Would you recommend this hospital to your friends and family? Using any number from 0 to 10, where 0 is the worst hospital possible and 10 is the best hospital possible, what number would you use to rate this hospital during your stay?

4. Hospital Practices

4.1. Appropriate Use of Abdominal and Chest CT Scanning

Scanning data are reported by the Centers for Medicare and Medicaid Services (CMS) on their [Hospital Compare](#) website. We currently use two measures from this database to rate hospitals' appropriate use of scanning¹⁵:

1. the percent of all outpatient CT scans of the abdomen that are performed twice, once with contrast and one without
2. the percent of all outpatient CT scans of the thorax or chest that are performed twice, once with contrast and one without.

These two measures represent the risk of elevated exposure to additional and unnecessary radiation. A computerized tomography (CT) scan uses X-rays to produce detailed images inside the body. Before some CT scans, a “contrast” substance is either swallowed, or injected into a patient’s vein to help make features of the body stand out more clearly. Combination or double CT scans occur when a patient receives two CT scans—one scan without contrast followed by another scan with contrast.

Use of double scans exposes patients to double the radiation of a single scan. For example, radiation exposure from a single CT scan of the chest is about 350 times higher than for an ordinary chest X-ray; a double CT scan exposes a patient to 700 times more radiation than a chest X-ray. Additionally, the use of contrast material introduces risks of its own, such as possible harm to the kidneys or allergic reactions. Although double CT scans may be appropriate for some parts of the body and some medical conditions, they are usually not appropriate for scans of the chest or abdomen.

The data

These measures reflect scans on outpatients in medical imaging facilities that are part of a hospital or associated with a hospital. Data reflect a hospital’s performance for a one-year period and are updated annually, with generally an 18-month time lag from the end of the measurement period. Data are not risk-adjusted, and are calculated as raw/observed rates after the exclusion and inclusion criteria are applied.

Assigning Ratings scores

We used the double-scan rates for chest and abdomen in our Ratings. To convert these rates to our converted score (CS) scale, we used a piecewise linear transformation that assigns a rate of zero to a

¹⁵ Other scanning measures in the Hospital Compare dataset include: (1) percentage of outpatients who had an MRI of the Lumbar Spine with a diagnosis of low back pain without evidence of antecedent conservative therapy; (2) percentage of outpatients with mammography screening studies that receive further screening studies (mammography or ultrasound) within 45 days; (3) the percent of outpatients who got cardiac imaging stress test before low-risk outpatient surgery; and (4) the percent of outpatients with brain CT scans who received a sinus CT scan at the same time.

converted score of 5.5, and a rate of 25% to a converted score of 0.5. Rates greater than 25% are assigned CSs of 0.5.

This transformation corresponds to the Ratings scores shown in the table below.

	Rating Score	Converted Score Range	Range of double scanning rates
Better  Worse		$5.5 \geq CS \geq 4.5$	Rate $\leq 5\%$
		$4.5 > CS \geq 3.5$	$5\% < \text{rate} \leq 10\%$
		$3.5 > CS \geq 2.5$	$10\% < \text{rate} \leq 15\%$
		$2.5 > CS \geq 1.5$	$15\% < \text{rate} \leq 20\%$
		$1.5 > CS \geq 0.5$	$20\% < \text{rate}$

Limitations

These data come from billing and other administrative data submitted by hospitals to Medicare. Such records were intended to capture information for billing purposes, but they contain significant details about a patient’s health status and services rendered in their outpatient encounter.

These data also reflect outcomes only for Medicare patients, though we believe they provide a good indication of scanning rates overall. Ratings come from the most recent data available, but there is a time lag in reporting these data to the public. It is possible that performance today will show improvements or declines in data that is not currently available to us.

4.2. Avoiding C-sections

Cesarean sections are the most common surgical procedure conducted in the U.S. According to the CDC, C-section rates have been rising dramatically since 1999¹⁶ and have increased more than 500 percent since 1970 (total C-section rate in 1970 was 5% compared with the 2012 average of 32.8 percent).¹⁷ While it is not known what the "best" C-section rate is, but there is broad agreement that current average C-section rates are too high.¹⁸ While there are many C-section measures under discussion, what is different about NTSV rates is that there are clear cut quality improvement activities that can be done to address the differences. For first time mothers, having low risk deliveries (NTSV) the national target set by the U.S. Department of Health and Human services is 23.9.¹⁹ In addition, The American College of Obstetricians and Gynecologists has recently released guidelines intended to reduce C-sections that are not medically needed.²⁰ Currently, there is no requirement to publicly report C-section data.

The data

The Avoiding C-section Rating is based on NTSV (nulliparous, term, singleton, vertex) rates at the hospital. This is percentage of first time mothers with a low risk delivery getting a C-section. It does not include women who had a prior C-section or who had multiple babies in that delivery, delivered pre-term, had a delivery where the baby was in an abnormal position (for example, feet first or face up), or a delivery where the baby died. The data comes from one of 2 sources: The Leapfrog Group and the Maternal Quality Care Collaborative (CMQCC). The Leapfrog Group data is currently being updated.²¹ Data from CMQCC are based on California office of statewide health planning and development (OSPHD) Patient Discharge and Vital Records data for calendar year 2014. Online, we publish each hospital's primary C-section rate as a percentage, as well as the assigned Rating, developed as described below.

¹⁶ http://www.cdc.gov/nchs/data/nvsr/nvsr63/nvsr63_01.pdf

¹⁷ http://www.cdc.gov/nchs/data/nvsr/nvsr62/nvsr62_09.pdf#table21

¹⁸ Ye J, et al. Birth Issues in Perinatal Care, April 2014. <http://onlinelibrary.wiley.com/doi/10.1111/birt.12104/abstract>

¹⁹ Healthy People 2020: <http://www.healthypeople.gov/2020/topics-objectives/topic/maternal-infant-and-child-health/objectives>

²⁰ http://www.acog.org/Resources_And_Publications/Obstetric_Care_Consensus_Series/Safe_Prevention_of_the_Primary_Cesarean_Delivery

²¹ The Leapfrog Group does not warrant or endorse the accuracy, reliability, completeness, currentness or timeliness of any data in this display and does not warrant or endorse the methodology used in this display to compile data from different sources. The Leapfrog Group shall not be held liable for any and all losses or damages of any or all kinds caused by reliance on the accuracy, reliability, completeness, currentness or timeliness of such information. Any person or entity is solely responsible for determining whether the data provided on this display is suitable for their purposes. Any person or entity that relies on any data obtained from this display does so at their own risk. The data is provided as is, as available and with all faults, and The Leapfrog Group disclaims any and all warranties, express or implied, including any warranty of title, noninfringement, fitness for a particular purpose, merchantability or arising out of any course of conduct. The Leapfrog Group does not control or guarantee the accuracy, reliance, timeliness of completeness of information contained on a linked display.

Assigning Ratings scores

Hospitals need a minimum of 30 qualified deliveries, exclusions described above, in order to receive a Rating. Hospitals that do not have one year of data available, do not pass CR's desk audit, do not publically report their data, data are not reported in a usable format, or hospitals with insufficient data were not Rated. The C-section rates are rescaled using a piecewise linear transformation as described in the chart below and assign ratings on our "better to worse" scale. Hospitals with rates less than 5 receive a CS of 5.5 and hospitals with rates above 60 receive a CS of .5. Cut points for the blobs are based on published evidence, as well as input and review by experts in quality measurement and clinical medicine The anchor for the  Rating is the Healthy People 2020 target and the , , and  match those proposed by the Leapfrog group.

	Rating	Converted Score Range	Range of NTSV rates
Better  Worse		$5.5 \geq CS \geq 4.5$	5.0-18.4
		$4.5 > CS \geq 3.5$	>18.4-23.9
		$3.5 > CS \geq 2.5$	>23.9-27.0
		$2.5 > CS \geq 1.5$	>27.0-33.3
		$1.5 > CS \geq 0.5$	>33.3-60.0

Limitations

These data come from either self-reported survey data or billing and other administrative data submitted by hospitals. Such records were intended to capture information for billing purposes rather than patient outcomes, but they contain significant details about a patient's stay in the hospital.

Ratings come from recent data but it is possible that performance today will show improvements or declines in performance data that is not currently available to us.

To level the playing field, the measure controls for some things that affect C-section rates, such as not including multiple gestations and breech births. However, this measure does not account for all differences in patient characteristics (such as chronic illness) that might affect the C-section rates of an individual hospital. Several authors have shown that physician factors, rather than patient characteristics or obstetric diagnoses are the major driver for the difference in rates within a hospital.²²

This measure does not assess patient outcomes following a C-section.

²² Berkowitz, G.S., Fiarman, G.S., Mojica, M.A., et al. (1989). Effect of physician characteristics on the cesarean birth rate. *Am J Obstet Gynecol.* 161:146-9.; Goyert, G.L., Bottoms, F.S., Treadwell, M.C., et al. (1989). The physician factor in cesarean birth rates. *N Engl J Med.*320:706-9.; Luthy, D.A., Malmgren, J.A., Zingheim, R.W., & Leininger, C.J. (2003). Physician contribution to a cesarean delivery risk model. *Am J Obstet Gynecol.*188:1579-85.

Looking at primary C-sections is just one dimension of how well a hospital does in maternity care. There are other measures that are emerging related to the quality of delivery and neonatal care that affect the health of the mother and newborn. Examples include neonatal infection, early elective delivery and obstetrical trauma during delivery. Consumer Reports will continue to monitor the development and availability of such measure results in the future.

5. Safety Score

We created a composite of measures related to hospital safety. While there are additional dimensions to hospital safety than those included here, these represent a broad range of safety factors that, combined, serve as an indicator of a hospital's commitment to the safety of its patients. We have deliberately not included dimensions about procedures a hospital can follow but that have not been shown to affect health outcomes for patients.

The data

For the Safety Score, we use five major categories of safety-related measures, each with several components: avoiding infections, avoiding readmissions, communication about discharge and medications, appropriate use of scanning, and avoiding mortality. Details regarding the individual components of the Safety Score (including the limitations of the each) have been described earlier in this report; these sections are referenced below as appropriate.

Avoiding infections (see page 7): According to a recent study, hospital acquired infections affect about 650,000 patients each year; therefore on any given day, about one of every 25 hospitalized people are infected while they are in the hospital. About 12% of patients who are infected while in the hospital die in the hospital from the infections.²³ Hospital acquired infections are estimated to cost \$28 to \$45 billion dollars each year, in direct medical costs.²⁴ See our investigations on deadly hospital infections [www.consumerreports.org/health/doctors-hospitals/hospital-infection/deadly-infections-hospitals-can-lower-the-danger/overview/deadly-infections-hospitals-can-lower-the-danger.htm] for more information.

Avoiding readmissions (see page 15): In one study researchers found that almost one of every five Medicare patients was readmitted within 30 days of being released from the hospital and about one in three were readmitted within 90 days.²⁵ Unnecessary readmissions are tied to patient safety in several important ways.

First, any hospital admission has inherent risks. A November 2010 study by the Department of Health and Human Services' Office of the Inspector General calculated that infections, surgical mistakes, and other medical harm contribute to the deaths of 180,000 Medicare hospital patients a year, and that another 1.4 million are seriously hurt by their hospital care.²⁶ More recent estimates suggest that preventable harm contributes to the death of more than 440,000 people each year in hospitals across the United States.²⁷ Hence a second admission exposes the patient to additional safety risk.

²³ Magill et al., *New Engl J Med* 2014;370:1198-208

²⁴ www.cdc.gov/HAI/pdfs/hai/Scott_CostPaper.pdf

²⁵ Jencks et al., *N Engl J Med* 2009; 360:1418-1428.

²⁶ <http://oig.hhs.gov/oei/reports/oei-06-09-00090.pdf>

²⁷ James, J, *J Patient Saf*;2013;9: 122-128.

Second, readmissions can be caused by things that go wrong in the initial discharge.²⁸ In fact, a national public-private initiative, Partnership for Patients, has set a performance target to decrease preventable complications during a transition from one care setting to another in order to reduce hospital readmissions by 20 percent in 2013, compared with 2010. It is estimated that hitting this target would result in 1.6 million fewer patients being readmitted to a hospital within 30 days.²⁹

Third, we know that, to at least some extent, readmissions reflect errors in the initial hospitalization. For example, patients who develop hospital infections and other complications may end up being readmitted for further treatments.³⁰ In one study researchers found that patients who experienced specific complications were more likely to end up back in the hospital within a month than those who did not.³¹

Avoiding mortality – medical (page 17) and surgical (see page 19): Two mortality measures (30-day mortality for medical conditions and in-patient death of surgical cases who had serious complications) are included in our Safety Score. Recent estimates suggest that preventable medical harm contributes to the death of more than 440,000 people each year in hospitals across the United States.³² Consumers also grossly underestimate the impact of preventable errors; in one study by the Kaiser Family Foundation, more than half of consumers who responded to a survey thought that preventable errors caused 5000 or fewer deaths each year.³³

Communication about medications and discharge (see page 21): Two elements of the patient experience survey data—communication about new medication and communication about discharge instructions—are included in our Safety Score. Lack of communication about new medications can lead to misuse of medications or other medication errors. For example, when someone is admitted to the hospital they are likely to receive new medications. If the hospital-based physicians are not aware of the patient’s current medications there is the potential for inappropriate medications or doses to be prescribed. In fact, studies show that more than one-third of patients experience a medication error (such as omission of a required medication, an accidental duplication of a drug they were already taking, or the wrong dose of a medication) when they are admitted to the hospital.³⁴

Lack of communication about discharge instructions can lead to errors in post-discharge care. Studies have shown that medication discrepancies (such as intentional or non-intentional non-compliance, conflicting information, duplication) occurred in 14 percent of Medicare-aged patients who were discharged from the hospital.³⁵ Patients may be discharged from the hospital without understanding the instructions for care after leaving the hospital, or may stop taking important medications that they need.

²⁸ <http://www.ahrq.gov/professionals/quality-patient-safety/patient-safety-resources/resources/impptdis/index.html>

²⁹ <http://partnershipforpatients.cms.gov/>

³⁰ Emerson et al., *Infect Control Hosp Epidemiol*. 2012;33(6):539-544.

³¹ Friedman et al, *Med Care*. 2009;47(5):583-590.

³² James, J, *J Patient Saf* ;2013;9: 122-128.

³³ <http://kff.org/health-costs/poll-finding/national-survey-on-consumers-experiences-with-patient/>

³⁴ Gleason et al, *J Gen Intern Med*. 2010;25(5):441-447.

³⁵ Coleman et al., *Arch Intern Med*. 2005;165(16):1842-1847.

Appropriate use of scanning (see page 25): Double scans of the chest and abdomen are rarely necessary and unnecessarily expose patients to additional radiation; radiation from CT scans might contribute to an estimated 29,000 future cancers a year.³⁶ According to CMS, a single CT scan of the abdomen is 11 times higher than for an x-ray of the abdomen, and a double scan is therefore 22 times higher. A single CT scan of the chest is 350 times higher than a chest x-ray and a double scan is therefore 700 times higher.

The five components of the Safety Score (infections, readmission, mortality, communication, scanning) are equally weighted and scored on a .5-100.5 scale. Hospitals must have reported at least one component in each of the categories for us to calculate a Safety Score; there is no imputation of missing data. The data used in the calculation of the Safety Score are shown in the table below.

Safety Score Category	Components	Data Source	Weight
Avoiding infections (pages 7-12)	<ul style="list-style-type: none"> • Central-line associated bloodstream infections • Surgical-site infections • Catheter urinary-tract infections • Methicillin-resistant <i>Staphylococcus aureus</i> infections • <i>Clostridium difficile</i> infections 	CMS	20% of total based on combined CLABSI, SSI, CAUTI, MRSA, and C. diff score; hospitals need sufficient data for the composite of the five infection measures. See page 11 for how the infection composite is calculated.
Avoiding readmissions (pages 15-16)	<ul style="list-style-type: none"> • 30-day hospital-wide all-cause readmissions 	CMS	20% of total.
Avoiding mortality - (see pages 17-19)	<ul style="list-style-type: none"> • Medical: 30-day mortality for Heart attack, Heart failure, Pneumonia, COPD, Stroke • Surgical: AHRQ PSI 4 	CMS	20% of total, half for each component (medical and surgical), or if only one is available it comprises the full mortality measure.
Communication (pages 21-23)	<ul style="list-style-type: none"> • Communication about discharge instructions • Communication about new medications 	CMS	20% of total, half for each component (discharge and medications).
Appropriate use of scanning (pages 25-26)	<ul style="list-style-type: none"> • Double chest CT scans • Double abdomen CT scans 	CMS	20% of total, half for each component (chest and abdomen), or if only one is available, it comprises the full scanning measure.

³⁶ Berrington de González et al, *Arch Intern Med* 2009;169(22):2071-2077.

Calculation of the Safety Score

The Safety Score is expressed on a 100-point scale, where a hospital would score 100.5 if it earned the highest possible score in all measures (for example, 100% for patient experience measures, or zero infections), and would score .5 if it earned the lowest scores in all measures.

The measure categories that are based on interval data (infections, readmissions, mortality, communication, and scanning) and their components are expressed as converted scores (CSs), as described earlier in this document. Their components are combined into composites as follows:

1. **Infections.** A combined SIR is calculated and transformed to our CS scale using the methods described earlier (pages 7-12). A hospital can have a combined SIR even if none of the individual infection measures alone have sufficient data for a Rating.
2. **Readmissions** is the calculated CS as described earlier.
3. **Mortality** is the mean of the CSs for mortality-medical and mortality-surgical (described on pages 17-19). If only one measure is available, the Mortality CS set to be equal to that measure's CS.
4. **Communication** is the mean of the CSs for *Communication about Medications* and *Communication about Discharge*.
5. **Scanning** is the mean of the Chest and Abdomen CT double scan CSs, if both measures are available. If only one measure is available, the Scanning CS set to be equal to that measure's CS.

The mean of the CSs for these five measure categories is then calculated using equal weights. That mean is linearly transformed to a scale from 0.5 to 100.5, so that these five measure categories combined account for 100% of the Safety Score.

Selecting weights

We examined the impact of varying the weights of the five categories on the Safety Score and the rank order of hospitals. Several other weighting schemes we tried were also highly correlated with equal weights. Consequently, we chose to use equal weights.

Limitations

Each of the categories and components are based on data and scoring methods that have limitations and weaknesses themselves. These are described in detail in the relevant sections of this report.

In addition, the component measures represent data collected in different time periods. In each case, we use the most current valid data available. The difference in time periods measured may be a limitation for hospitals looking to use these data for quality improvement. Composites are useful because they can make a complex set of data easier to understand. However, composites have their limitations. For example, hospitals that perform well on the composite do not necessarily perform well on all of the components of the composite. Therefore, we show consumers most of a hospital's individual Ratings on the hospital Report Card page. In addition, the composite we created for hospital safety was limited by the data that is currently available to the public.

6. Heart Surgery Ratings

For our heart surgery Ratings, we've teamed with the Society of Thoracic Surgeons (STS) to publish ratings of hospitals (and surgical groups) based on their performance data for heart bypass surgery and aortic heart valve replacement surgery. The Society of Thoracic Surgeons (STS) rates hospitals using standardized measures endorsed by the National Quality Forum, a nonprofit organization that has established national health-care standards for performance improvement. Using this information, consumers can see how hospitals and surgical groups compare with national benchmarks for overall performance, survival, complications, and other measures.

STS is a nonprofit organization that represents some 5,400 surgeons worldwide who operate on the thorax, or chest. Developed in 1989, the STS National Adult Cardiac Surgery Database is the largest single-specialty database in the United States, containing more than 5 million surgical records. Participating hospitals and groups add data four times a year, providing an up-to-date picture of their surgical practice. Much of the information is collected at the point of care, which has advantages over data collected for administrative or insurance reasons.

STS contracts with an independent organization, the Duke Clinical Research Institute, to analyze the data and prepare reports for participating hospitals and surgical groups, comparing their performance with national benchmarks for surgical quality. STS, hospital administrators, and surgeons from each hospital have agreed to share the reports on heart surgery with Consumer Reports as part of their ongoing commitment to improving care and helping patients make informed decisions.

Approximately 95% of the 1,100 heart surgery programs in the United States are part of the STS Adult Cardiac Thoracic Database. As of December 2016, over 300 hospitals volunteered to publish their performance data for heart bypass, and aortic valve replacement surgery, publicly through Consumer Reports.

Heart Bypass Surgery (CABG) Ratings

A hospital's rating in this measure reflects its performance in isolated CABG operations, meaning that the patient is having only that surgery, not a combination procedure. A hospital's overall score is a composite of four separate measures. Two of them—recommended medications and optimal surgical technique—reflect how well surgeons adhere to the best-established practices. The other two—patient survival and the absence of surgical complications—reflect how their patients fare.

6. **Patient survival.** This is based on the chance that a patient will both survive at least 30 days after the surgery and be discharged from the hospital.
7. **Absence of surgical complications.** This is based on the chance that a patient will not experience any of these five serious complications of heart-bypass surgery during their hospitalization: extended breathing support on a ventilator, an infection in the breastbone incision, kidney failure, a stroke, or a repeat operation for postoperative bleeding or other causes.
8. **Recommended medications.** This is based on the chance that a patient will get all of the following prescriptions: a beta-blocker before and after the procedure to prevent an abnormal heart rhythm and control blood pressure; and aspirin to prevent blood clots, and a statin or other medication to lower LDL (bad) cholesterol afterward.

9. **Optimal surgical technique.** This is based on the chance that a patient will receive at least one graft involving an internal mammary artery, which runs under the breastbone. Such grafts improve long-term survival compared with grafts taken from veins, in part because they are more resistant to cholesterol buildup and can withstand the high pressure in the heart better.

For each of the four CABG measures as well as for the overall star Rating, STS compares a hospital’s performance with the average performance of all the hospitals in their database, and assigns a “star” rating. For survival and complications, the results are statistically adjusted for the overall health of a hospital’s patients, since some hospitals treat older or sicker patients than others. (That adjustment is not necessary for medications and surgical technique, however, because the right drugs and best surgical approaches should be used with all eligible patients regardless of their health.) The star Rating calculation begins by assuming all providers are average and then determines statistically if there is at least a 99 percent probability that the performance of any specific hospital is lower than average (one star) or higher than average (three star). For the several years that the STS has been calculating these scores, about 10-15 percent of all Adult Cardiac Surgery Database participants have been one star, about 10-15 percent have been three -star, and the remainder have been two -star, or average programs.

STS Star Rating	Consumer Reports Rating	Definition
3-star		Above average
2-star		Average
1-star		Below average

Aortic Valve Replacement Ratings

A hospital’s overall score for aortic valve replacement (AVR) is a composite of two separate measures of patient outcomes.

- **Patient survival.** This is based on the chance that a patient will both survive at least 30 days after the surgery and be discharged from the hospital.
- **Absence of surgical complications.** This is based on the chance that a patient will not experience any of these five serious complications of heart-bypass surgery during their hospitalization: extended breathing support on a ventilator, an infection in the breastbone incision, kidney failure, a stroke, or a repeat operation for postoperative bleeding or other causes.

For both AVR measures and for the overall star Rating, STS compares a hospital’s performance with the average performance of all the hospitals in their database. The results are statistically adjusted for the overall health of a hospital’s patients, since some hospitals treat older or sicker patients than others. The overall valve replacement Rating combines the scores from the two measures. For each individual performance measure, as well as the overall Rating, hospitals that score significantly above average get three stars, average performers get two stars, and those that score significantly below average receive one star. Stars are then converted to blob-scores as follows:

STS Star Rating	Consumer Reports Rating	Definition
3-star		Above average
2-star		Average
1-star		Below average

Limitations

The Ratings are currently limited to hospitals that voluntarily agree to participate in the STS database, and then agree to release the data to us. Even though survival and complications are statistically adjusted for how sick a hospital's patients are, other factors might have an impact on the differences between groups. That, together with other statistical issues, might sometimes make it difficult to compare hospitals directly. While these Ratings are based on the most comprehensive set of data available for heart surgery, some important quality measures might not be included in the STS ratings. Some of the measures are difficult to define precisely, so differences might exist in how hospitals collect and report their data. The percentages reported are not exact numbers but estimates based on the statistical model used, and have some a margin of error. Hospitals that do a relatively small number of isolated heart operations are statistically harder to differentiate from average than those that do a larger number of them. So hospitals with fewer operations are more likely to get an average, or two-star, Rating.

7. Central-Line Infections Analysis (from “Zero Tolerance” article, CR Magazine, January 2017)

Highest & Lowest performing teaching hospitals from the “Zero Tolerance” article featured in the January 2017 issue of *Consumer Reports* magazine.

Consumer Reports analyzed central-line associated bloodstream infections (CLABSIs) from 2011 to 2015. The sixteen available CMS data release periods with a full year of CLABSI data are divided into four “clusters”, as shown in **Figure 1**.

Figure 1

Data Release Period	Measurement Period																			
	2011 Q1	2011 Q2	2011 Q3	2011 Q4	2012 Q1	2012 Q2	2012 Q3	2012 Q4	2013 Q1	2013 Q2	2013 Q3	2013 Q4	2014 Q1	2014 Q2	2014 Q3	2014 Q4	2015 Q1	2015 Q2	2015 Q3	2015 Q4
cluster 1																				
cluster 2																				
cluster 3																				
cluster 4																				

We calculate an average SIR for each cluster based on the standardized infection ratios for each data release period. Cluster-level average SIRs are capped at 2.5.

Hospital performance over time is based on the weighted average of the four cluster-level average SIRs. We use exponentially decaying weights with a smoothing parameter of 0.5.

Cluster 1 Weight:	0.125
Cluster 2 Weight:	0.250
Cluster 3 Weight:	0.500
Cluster 4 Weight:	1.000

In order to be evaluated, hospitals must have a CR-reported SIR in at least twelve data release periods and in at least one of the four periods within each cluster. The 32 top performing (score below .28) and 31 bottom (score above .8) performing teaching hospitals were included in the article “Zero Tolerance”. Teaching hospitals are defined as hospitals that are members of the Council of Teaching Hospitals and Health Systems (COTH) as reported to the American Hospital Association in 2014.