



How We Rate Hospitals

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Patient Experience

Overview

Our Patient Experience Ratings are based on survey data collected by the Centers for Medicare & Medicaid Services (CMS) through its Hospital CAHPS program. 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. 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 their experiences with the communication about discharge and medications, doctor and nurse communication, getting help, pain control, and keeping rooms clean and quiet. CMS makes HCAHPS survey results available for nine categories, some of which are composites of more than one survey question. Our Ratings of patient experience are based on these nine categories, which include an overall score, and scores for eight components of patient experience. These categories are shown in the table on the following page.

For each of these categories, results are statistically adjusted in two ways:

1. The mode of survey administration chosen by each hospital—mail, telephone, interactive voice response, or a mix of these
2. Each hospital's patient mix—age, education, self-reported health, language other than English, service line (maternity, medical, or surgical), length of time between discharge and survey completion, and admission through the ER.¹

For more information on the mode and patient-mix adjustments, see <http://www.hcahponline.org/modeadjustment.aspx>.

Hospitals report patient experience data to CMS after the end of each quarter (March, June, September, and December). Given the extensive scrutiny these data are subjected to and the steps in analyzing data from all hospitals in a consistent manner, there is a 10-month time lag between when the data are submitted and when they are released. So, for example, the July 2011 release covers patients' experiences in the 12-month period ending September 2010.

More information can be found on the HCAHPS website, www.hcahponline.org or on the Hospital Compare Web site at <http://www.hospitalcompare.hhs.gov>. The survey tool can be found at <http://www.hcahponline.org/surveyinstrument.aspx>.

¹ "The Effects of Survey Mode, Patient Mix, and Nonresponse on CAHPS Hospital Survey (HCAHPS) Scores." M.N. Elliott, A.M. Zaslavsky, E. Goldstein, W. Lehrman, K. Hambarsoomian, M.K. Beckett and L. Giordano. *Health Services Research*. 44: 501-518. 2009.

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?

Patient Experience Ratings on ConsumerReports.org

The data

After centralized data analysis, CMS uses a statistical model to combine questions into the composites shown above, adjusting for patient mix and survey mode, and then reports the percentages of patients who gave each type of response for each category of question. Communicating about discharge is reported by CMS as the percentage of patients responding “yes”. The question about recommending the hospital to family and friends is reported as the percentage of responses that were definitely yes, probably yes, or no (sum of probably no and definitely no). The question about rating the hospital on a scale of 0–10 is reported as the percentage of patients who rated the hospital 9-10, 7-8, and 6 or below. All other measures are reported as the percentage of patients who responded always, usually, or the combination of sometimes and never. These percentages are adjusted for patient mix and survey mode, and are reported as whole numbers.

We only present Patient Experience Ratings for hospitals with at least 100 completed surveys; smaller samples do not produce reliable Ratings. 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.

Assigning Ratings scores for ConsumerReports.org

For the measures with response options of Always/Usually/Sometimes/Never, we calculated the percentage of “always” or “usually” responses (e.g. 92 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. We used these percentages as the basis for Ratings for the first 8 categories, using the following intervals for the five Rating scores:

	Patient Experience Rating	Adjusted percentage response
Better	●	95% - 100%
	◐	90% - 94%
↑ ↓	○	85% - 89%
	◑	80% - 84%
Worse	●	79% or below

Overall Patient Experience

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

- The percentage of respondents who would Definitely recommend the hospital
- 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 rounded this mean to the nearest whole percent.

Second, we assigned Ratings to those means, as shown in the table below:

	Overall Patient Experience Rating	Mean of two overall HCAHPS questions
Better	●	85% - 100%
	◐	70% - 84%
↕	○	55% - 69%
	◑	40% - 54%
Worse	●	39% or below

Data Limitations

The survey tool and methods of data collection have been carefully researched and validated. However, unlike 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 Centers for Medicare & Medicaid Services (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.

There may potentially be quality control issues that do not meet the high standards that Consumer Reports generally applies to its own data. 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.hcahponline.org),

training programs, site visits, independent data audits and analyses, and vendor certification processes (<http://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 Ratings for hospitals which 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. Our Ratings methodology has been reviewed internally by the Statistics and Data Quality Management and Survey Research Departments, and externally by several leading experts and researchers in the field. Their feedback has been incorporated in the methods described in this document.

Patient Outcomes: Bloodstream and surgical-site infections

Overview

More than half of states currently have laws requiring the public reporting of data on healthcare-acquired infections (HAIs). Two types of infections that are most commonly addressed in these laws are Central Line Associated Bloodstream Infections (CLABSIs) and Surgical Site Infections (SSIs).

CLABSIs are associated with significant deaths, complications, and costs. Multiple improvement projects² have shown that hospitals can prevent CLABSIs often for sustained periods of time³. Our focus in this analysis is on the most commonly-reported types of CLABSIs, which are those occurring while patients have central lines while they are in intensive care units (ICUs). Some states also report on CLABSIs in other patient locations, such as general wards or specialty-care locations (e.g. dialysis units); these other locations are not currently included in our analysis.

In 2002, in the United States, an estimated 14 million operations were performed. After bloodstream infections, surgical-site infections (SSIs) were the second most common healthcare-acquired infection, accounting for 17 percent of all HAIs among hospitalized patients. While advances have been made in infection control practices, including improved operating room ventilation, sterilization methods, barriers (e.g. gloves, masks, and gowns), surgical technique, and giving antibiotics within 60 minutes of the incision, SSIs remain a substantial cause of complications and death among hospitalized patients. In one study, among nearly 100,000 HAIs reported in one year, deaths were associated with SSIs in more than 8,000 cases.

Bloodstream and surgical-site infections Ratings on ConsumerReports.org

Bloodstream infections data

Currently, we use CLABSI (one type of bloodstream infection) data that are publicly reported by eighteen states (California, Colorado, Connecticut, Delaware, Illinois, Maine, Maryland, Massachusetts, Missouri, New Hampshire, New York, New Jersey, Oregon, Rhode Island, South Carolina, Tennessee, Vermont, and Virginia); an additional four states publicly report data, but not in a way we can use for our Ratings (Florida, Pennsylvania, Oklahoma, and Washington).

Some hospitals also voluntarily report CLABSI data for ICUs to the Leapfrog Group. The Leapfrog Group (www.leapfroggroup.org) uses the collective leverage of large purchasers of health services

² For example, in the states of Pennsylvania, Michigan, and Rhode Island; in New York City, funded by the United Hospital Fund; at the Institute for Healthcare Improvement; and the research efforts of Peter Pronovost, M.D. at Johns Hopkins University.

³ Lipitz-Snyderman A, et. al., The ability of Intensive Care Units to Maintain Zero Central Line-Associated Bloodstream Infections. *Archives of Internal Medicine*. 2011: 171 (9), 856-858,

to stimulate improvements in the safety, quality, and affordability of American health care. The Leapfrog Group was founded in November 2000 by the Business Roundtable, and is now independently operated with support from its members. The Leapfrog Hospital Survey compares hospitals' performance on the national standards of safety, quality, and efficiency that they believe are most relevant to consumers and purchasers of care. In 2009, over 900 hospitals across the country reported CLABSI data through The Leapfrog Hospital Survey.⁴

Each reporting agency (state health departments and The Leapfrog Group) identifies particular ICU types on which they report these data (see Appendix A), and a reporting period (often one year, but some states report quarterly or for other periods), which are not consistent across agencies. While some of these agencies report rates or other measures, most of them report both the total number of CLABSIs contracted by ICU patients, and the total number of days its ICU patients spent with central lines in place, a measure called central line-days, or CLD. Not all hospitals in a state have, or report on, all ICUs. Several states simply report the total number of CLABSIs and CLDs totaled over all ICUs, without identifying individual ICU types.

There are few public state reports that include neonatal, burn or trauma ICUs, presumably because of the complicated nature of managing lines in these ICUs and the small numbers of hospitals in which the latter two exist; when data are reported separately for any of these three types of ICUs, we do not include them in our calculations.

We report the number of infections and the number of central line days for any hospital that reported at least one infection, regardless of central line days. In addition, we provide Ratings for all hospitals that meet *either* of the following sample size requirements:

1. At least 1,000 Central Line Days (CLD). Volumes less than this yield less reliable ratings.
2. At least 3 infections, regardless of CLD. A hospital that reports three or more infections, even in fewer than 1,000 CLD, could not achieve better than a rate of three infections per 1,000 CLD; this is 50 percent higher than the national infection rate for medical ICUs.

Surgical-site infections data

Currently, 10 states publicly report data on one or more surgical site infections in standardized ways we can analyze (Colorado, Massachusetts, Minnesota, Missouri, New Hampshire, New York,

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Ohio, Oregon, South Carolina, and Vermont) including different combinations of knee prosthesis, hip prosthesis, vaginal hysterectomy, abdominal hysterectomy, coronary bypass (either chest site alone or chest and donor sites combined), colon surgery, cesarean section, hernia repair, spinal fusion, and gallbladder surgery.

Each state that publicly reports surgical site infections reports the total number of procedures conducted, and the total number of infections patients contracted at the sites of those surgeries during a specified time period. Each state reporting agency reports data for a set of surgical procedures (see Appendix A), and a reporting period (often one year, but some states report quarterly or for other periods), which are not consistent across agencies. Not all hospitals in a state conduct, or report on, all surgical procedures.

An infection is considered to be a surgical site infection if it occurs within 30 days of the surgery, or within one year if an implant is in place and the infection appears to be related to the surgery.

We report the number of infections and the number of surgical procedures for any hospital with at least 1 surgical-site infection, regardless of the number of procedures performed. In addition, we provide Ratings for all hospitals that meet *either* of the following sample size requirements:

1. At least 100 surgical procedures. Volumes less than this yield less reliable ratings.
2. At least three infections, regardless of the number of surgeries performed.

The basis of the Ratings: The standardized infection ratio

For each hospital, we calculate the standardized infection ratio, a measure developed by CDC and modeled after the standardized mortality ratio (or standardized incidence ratio), a common measure in epidemiology. This measure compares data within each of several subgroups to national (or some other benchmark) data for those subgroups, and then pools the comparisons across all subgroups. The standardized infection ratio (SIR) is calculated separately for ICU bloodstream infections, standardized across ICUs, and for surgical site infections, standardized across type of surgical procedure.

In the case of bloodstream infections data, the standardized infection ratio compares the number of infections reported for each individual ICU to national infection rates for that type of ICU. National data are derived from data reported to the National Healthcare Safety Network (NHSN) a data repository supported by the Centers for Disease Control and Prevention (CDC). A recent NHSN report⁵ provides infection rates (infections per 1,000 CLD) for 17 ICU types, as well as a growing list of other patient-care locations. These rates are composite data from approximately 1,500 hospitals in 2006-2008 in 48 states and the District of Columbia; information for individual hospitals is not publicly available from NHSN.

This analysis adjusts for the fact that Leapfrog and the states have data from varying mixtures of ICUs, requiring comparisons to different average infection rates. For instance, the average

⁵ Edwards et. Al, National Healthcare Safety Network (NHSN) Report, data summary for 2006 through 2008, issued December 2009, *Am J Infect Control*; 37: 783-805.

infection rate for cardiac ICUs nationwide is two per 1,000 central line days, 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 average. For surgical ICUs, the national average 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 CLD produces infections at twice the national rate, or 100 percent more infections than average. The standardized infection ratio pools these comparisons across all ICUs for which a hospital reports CLABSI data, giving a single Rating for each hospital's reported ICUs.

Consider Albany Medical Center (AMC) in Albany, NY as an example. For 2008, New York State reported CLABSI data for seven ICUs at AMC, including its neonatal ICU. We base our calculations on the six other ICUs (See table below). In its cardiothoracic ICU patients, AMC reported seven infections and 2,882 central line days. The national published rate for cardiothoracic ICUs is 1.39 infections per thousand central line days. If patients in the cardiothoracic ICU at AMC had experienced CLABSI infections at that national rate, then we would predict⁶

$$1.39 \text{ (infections/1000 CLD)} \times 2882 \text{ CLD} / 1000 = 4.0 \text{ infections.}$$

These calculations are shown in the following table for all six Albany Medical Center ICUs.

ICU type	Albany Medical Center 2008		2006-2008 National Rate (CLABSI/ 1000 CLD)	Predicted Infections
	CLABSI	Central Line Days (CLD)		
Coronary	1	2197	2.01	4.4
Cardiothoracic	7	2882	1.39	4.0
Medical	5	3321	2.30	7.6
Surgical	11	4448	2.31	10.3
Neurosurgical	0	528	2.46	1.3
Pediatric	14	1972	2.96	5.8
Neonatal	4	3352		
Total (excluding neonatal)	38	15348		33.46

Over the six Albany Medical Center ICUs (coronary, cardiothoracic, medical, surgical, neurosurgical, and pediatric), a total of 33.46 infections are predicted, if each ICU produced infections consistent with the national rate for that ICU type. The hospital actually reported 38 infections in those six ICUs, so they reported $38/33.46 = 1.14$ times the national rate, or 14 percent more infections than would be predicted from the national rates, based on the number of days patients were on central lines in each ICU. This value, 1.14, is the standardized infection ratio for this hospital for the period January – December 2008.

⁶ We use the word “predicted” to refer to statistical expectation, and use the two terms synonymously for the purposes of this report. Although “expectation” is the correct statistical term, we avoid using it because of the implication that any infections should be expected (in the common use of the term).

In summary, the standardized infection ratio (SIR) for a hospital is calculated as follows:

1. For each reporting ICU, multiply the number of CLD by the *published national* infection rate for that ICU type, divided by 1,000, to estimate the number of infections predicted for that ICU if it were to report CLABSIs at the same frequency as the national rate.
2. Calculate the sum of predicted infections and the sum of reported infections across all reported ICUs.
3. Calculate SIR = (total reported infections/total predicted infections).

A Standardized Infection Ratio=1 means that the hospital’s ICUs produce CLABSIs at the same rate overall as would be predicted from national rates. A SIR>1 reflects more infections than predicted, and SIR<1 implies fewer infections than predicted.

Since each agency (the states and The Leapfrog Group) reports on a different mix of ICUs, in some cases we calculated the pooled rate for more than one NHSN ICU. For example, NHSN data are reported separately for medical/surgical ICUs in major teaching hospitals, in other hospitals with more than 15 beds, and in other hospitals with 15 or fewer beds. For data from individual states, we generally do not have access to reliable information about hospitals’ teaching status nor the number of beds, which CDC determines from questions hospitals answer when they enter data into NHSN. For data from the Leapfrog Group and from states that report on the teaching status of its hospitals, when feasible we use those indications to standardize those ICUs accordingly. Otherwise, we pooled the published data for these three strata of medical/surgical ICUs, and for medical ICUs for Major teaching and all other hospitals.

The national rates we used, calculated from the published data from NHSN, are:

ICU type	Total CLABSI reported to NHSN	Total CLD reported to NHSN	Rate (CLABSI/ 1000 CLD)
Medical Cardiac	876	436,409	2.007
Medical overall	2,097	911,476	2.301
Medical, teaching	1,410	549,088	2.568
Medical, others	687	362,388	1.896
Medical/Surgical overall	4,053	2,441,719	1.660
Medical/Surgical teaching	1,474	699,300	2.108
Medical/Surgical, others	2,579	1,742,419	1.480
Neurologic	61	45,153	1.351
Neurosurgical	396	160,879	2.461
Pediatric Medical/Surgical	929	314,306	2.956
Surgical	1,683	729,989	2.306
Surgical Cardiothoracic	879	632,769	1.389

Standardized infection ratios are also calculated for surgical-site infections, following a similar process. Since each state that publicly reports SSIs reports on a potentially different set of surgical

procedures (see Appendix A), the standardized infection ratio compares the number of infections reported for each reported surgical procedure to national infection rates for that procedure type. Since some states report surgical-site infections separately by risk category ranging from 0 (low risk) to 3 (high risk), we include those risk categories in this standardization as well. As with bloodstream infections, national data are derived from data reported to the National Healthcare Safety Network (NHSN) a data repository supported by the Centers for Disease Control and Prevention (CDC). The national rates we used, calculated from the published data from NHSN, are:


Surgery type	Risk Level	Total infections reported to NHSN	Total procedures reported to NHSN	Rate (Infections/100 surgeries)
Abdominal hysterectomy	All	890	54,078	1.646
	0	367	33,477	1.096
	1	370	16,822	2.200
	2,3	153	3,779	4.049
CABG	All	3,808	134,714	2.827
Chest	All	186	11,659	1.595
	0,1	120	8,771	1.368
	2,3	66	2,888	2.285
Chest and Donor	All	3,622	123,055	2.943
	0	6	1,738	0.345
	1	2,319	91,007	2.548
	2	1,288	30,204	4.264
	2,3	1,297	30,310	4.279
Colon	All	3,453	62,140	5.557
	0	683	17,126	3.988
	1	1,686	30,159	5.590
	2	945	13,387	7.059
C-Section	All	570	30,994	1.839
Gallbladder	All	92	14,652	0.628
Hernia	All	169	7,477	2.260
Hip	All	1,651	130,391	1.266
	0	334	49,576	0.674
	1	938	65,046	1.442
	2,3	379	15,769	2.403
Knee	All	1,528	171,183	0.893
	0	409	70,675	0.579
	1	786	79,653	0.987
	2,3	333	20,855	1.597
Spinal fusion	All	633	41,210	1.536
Vaginal Hysterectomy	All	165	18,869	0.874
	0	90	12,413	0.725
	1,2,3	75	6,456	1.162

Assigning Ratings scores for ConsumerReports.org

For each hospital with sufficient data, we report the percentage different from national average rates separately for bloodstream infections and surgical site infections. The percentage difference from average (rounded to two decimal places) is based on the SIR, and is reported as shown in the table below.

SIR range	Example	Reported on ConsumerReports.org
SIR > 1.00	SIR=1.25	25% Worse Than Average
SIR < 1.00	SIR=0.60	40% Better Than Average
SIR = 1.00		Average
0 infections reported		Zero infections reported

For both bloodstream infections and surgical site infections, we then assign Ratings to the SIR based on the values shown in the following table:

	Bloodstream Infection or Surgical-Site Infection Rating	Standardized Infection ratio range
Better	●	SIR = 0
	◐	0.0 < SIR ≤ 0.5
	○	0.5 < SIR ≤ 1.0
	◑	1.0 < SIR ≤ 2.0
Worse	●	2.0 < SIR

To get a Rating of ●, a hospital must achieve the standard of zero infections in at least 1,000 central line days (for bloodstream infections) or in 100 procedures (for surgical site infections). Although the standardized infection ratio on which our Ratings are based reflects comparisons with average national rates as a way for adjusting for the varying risk of infection in different ICUs or with different surgical procedures, we do not believe that average performance is sufficient. All hospitals should be working toward having zero hospital-acquired infections, and there are enough hospitals reporting zero infections that there is good reason to believe that all hospitals can achieve this standard.

A hospital receives a Rating of ◐ if its reported infection rate is at least 50 percent better than (or half) the national average rate for its mix of ICUs, and receives a ● if its reported rate is more than 100 percent worse than (or double) national rates. Ratings of ○ and ◑ are those between 50 percent better than national rates and 100 percent worse than national rates, respectively.

Data Limitations

Each state health agency and Leapfrog reports on a somewhat different set of ICUs and surgical procedures, and covering a particular period of time.

For ICU bloodstream infections, not all hospitals have the same assortment of ICUs; a smaller hospital may have only a combined medical/surgical ICU, while a larger hospital may have 6 or more ICUs, including separate medical and surgical ICUs. Reports from Maine, Oregon, Virginia, and California do not provide data for individual ICUs (except for California, which provides separate data for pediatric ICUs only), and their overall infection rates were compared to the pooled NHSN infection rate for medical/surgical ICUs. Reports from New Jersey, Maryland, and South Carolina combine all ICU types, and so we use their published predicted values (called “expected value” in statistical terms) to calculate the SIR.

Definitions of ICUs are somewhat malleable, and patients may be treated in any of a number of ICUs based on their condition and availability of beds. Some states use different definitions of how infections are classified to be counted as CLABSIs.

For surgical-site infections, the Ratings are based on only those surgeries that the state requires reporting on, not all of the procedures performed in the hospital. A hospital’s overall performance at preventing these infections may be better or worse than the particular surgical procedures that they report. Not all hospitals perform all procedures. Some states report surgical procedures separately by risk category, and others report for all risk categories combined. When necessary, we combine the NHHN data across risk categories so that we compare each state’s data to the comparable national rates.

States report data on different schedules, so comparisons among hospitals in different states might not be reliable.

Different hospitals treat different populations of patients, some of whom may be more susceptible to infection than others. The standardization we do for national rates is currently the best adjustment available to accommodate these differences. However, we maintain that all hospitals should be able to eliminate hospital-acquired infections, regardless of the patients they treat.

These data are historical, and reflect infections during different time periods, depending on the state. 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. We hope that all 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.

Three types of surgical-site infections are included: superficial (involves the skin or subcutaneous tissue), deep incisional surgical-site infection (involves deep soft tissues), or organ space (includes any part of the body that is opened and manipulated during surgery). The data we gather from states includes all of these types of infections combined; we have no way of determining which types of infections are reflected in the data.

Most SSIs are not identified until patients are discharged from the hospital and patients with infection do not always return to the hospital where the surgery was performed. Infections associated with implants (for example, in knee or hip replacements) can occur up to a year after

surgery. 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.

So far, more than two dozen state legislatures have passed laws requiring hospitals to publicly disclose how many patients develop hospital-acquired infections. Of those data, reports on the incidence of bloodstream infections in intensive care units are most reliable because confirmatory tests can be used to readily identify patients. As yet only 18 states are reporting bloodstream infection rates and only 10 states are reporting surgical-site infections in standardized ways we can analyze. Each is required by state law to issue valid, accurate and reliable data. But only some (in particular, New York, Tennessee, Colorado, Connecticut, and South Carolina) are doing regular evaluations or audits of the data. Some in the hospital industry say infection data that lack validation should be withheld from the public. 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 bloodstream and surgical infections, which are dangerous, costly, and even deadly.

Success at infection control requires a sustained change in the culture and approach of hospitals. As we add more safety measures it will be interesting to see if this translates to success in other aspects of hospital care. Moreover, public reporting will likely encourage hospitals to improve both their data collection and their efforts to prevent infections. Meanwhile, if you have a choice of hospitals in states that report bloodstream or surgical infection data, you can use the information, along with other data from our Compare Hospitals Ratings—patient satisfaction, steps to prevent infection, and hospital's aggressiveness of care—and recommendations from your health care provider to help find the best hospital for you.

Appendix A
Public reporting of ICU bloodstream infection and surgical site infection data
Effective September 9, 2011

Agency	ICUs reported	Surgical sites reported
California Department of Public Health	All adult ICUs combined Pediatric	
Colorado Department of Public Health and Environment	Medical Cardiac Surgical Surgical Cardiothoracic Medical/Surgical Medical	CABG chest and donor Knee Hip Vaginal hysterectomy Abdominal hysterectomy Hernia
Connecticut Department of Public Health	Medical Medical/Surgical Pediatric Medical/Surgical	
Delaware Health and Social Services, Division of Public Health	Medical Medical/Surgical Pediatric Medical/Surgical	
Illinois Department of Public Health	Medical/Surgical Medical Surgical Pediatric Medical Pediatric Medical/Surgical Pediatric Cardiothoracic	
Dirigo Health Agency's Maine Quality Forum	All Adult ICUs combined	
Maryland Health Care Commission	All Adult ICUs combined	
Massachusetts Department of Public Health	Medical Cardiac Surgical Surgical Cardiothoracic Medical/Surgical Medical Neurosurgical Pediatric cardiothoracic Pediatric Medical Pediatric medical/surgical	Hip Knee
Minnesota Department of Health		Vaginal hysterectomy Knee
Missouri Department of Health and Senior Services	Coronary Surgical Medical/Surgical Medical Pediatric	Abdominal hysterectomy Hip CABG Chest and Donor

Appendix A (continued)

Agency	ICUs reported	Surgical sites reported
New Hampshire Department of Health and Human Services	Medical Cardiac Cardiothoracic Medical/Surgical Medical	CABG chest and donor CABG chest only Colon Knee
State of New Jersey Department of Health and Senior Services	All adult ICUs combined	
New York State Department of Health	Coronary Cardiothoracic Medical Medical/Surgical Surgical Neurosurgical Pediatric	CABG chest CABG donor Hip Colon
Ohio Department of Health		CABG chest only C-section Knee
Office for Oregon Health Policy & Research (OHPR)	All Adult ICUs combined	CABG Knee
Rhode Island Department of Health	Coronary Medical Medical/Surgical Neurosurgical Pediatric Medical/Surgical Surgical Surgical Cardiothoracic	
South Carolina Department of Health and Environmental Control	All adult ICUs combined Pediatric	CABG chest only CABG chest and donor Colon Gallbladder Hip Abdominal hysterectomy Knee Vaginal hysterectomy Spinal fusion
Tennessee Department of Health	Medical Cardiac Surgical Cardiothoracic Medical Medical/Surgical Surgical Surgical Neurosurgical Pediatric Medical/Surgical	

Appendix A (continued)

Agency	ICUs reported	Surgical sites reported
Vermont Department of Banking, Insurance, Securities & Health Care Administration	All adult ICUs combined	Hip Abdominal Hysterectomy Knee
Virginia Department of Health	All adult ICUs combined	
The Leapfrog Group	Medical Medical/Surgical Surgical Pediatric Coronary Neurology Neurosurgical Surgical Cardiothoracic	

Patient Outcomes: Chance of readmission

Overview

Hospital readmissions data are collected by the Centers for Medicare and Medicaid Services (CMS). In 2004, Medicare reimbursement to hospitals became tied to hospitals' reporting of quality data for patients diagnosed with heart failure, heart attack, and pneumonia.

"Readmission" refers to a patient who has had a recent stay in the hospital, who needs to go back into a hospital again. 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 heart attack, heart failure, or pneumonia. Patients may have been readmitted back to the same hospital or to a different hospital or acute care facility. They may have been readmitted for the same condition as their recent hospital stay, or for a different reason.

High readmission rates are thought to be due, at least in part, to uncoordinated care – like leaving the hospital and not having adequate follow up. According to a 2009 analysis of hospital data published in *The New England Journal of Medicine*⁷, almost one of every five Medicare patients (19.6%) was readmitted within 30 days of being released from the hospital; about one in three (34%) were readmitted within 90 days. About half of readmitted patients with medical problems (rather than surgical) had no record of a doctor's visit between the two admissions. Furthermore, among surgical patients readmitted within 30 days, 70 percent were readmitted for a medical— not a surgical—reason. The estimated cost of unplanned readmissions was \$17.4 billion for one year.

Need for Readmission Ratings on Consumer Reports Health

The data

The chance of readmission Ratings are calculated from readmission rates, after statistical adjustment for how sick patients were when they were admitted to the hospital and for the amount of data available for each hospital. Statistical methods are described at:

<http://www.hospitalcompare.hhs.gov/staticpages/for-professionals/ooc/statistical-methods.aspx>

For each individual condition (heart attack, heart failure, or pneumonia), CMS provides each hospital's 30-day risk-standardized readmission rate (RSRR). First, the risk-adjusted 30-day readmission rate for a particular hospital is estimated from a hierarchical linear model as the number of readmissions that would be anticipated in the particular hospital during the study period, given the patient case mix and the hospital's unique quality of care effect on readmission. The same model also calculates expected readmission as the number of readmissions that would

⁷ Jencks SF, Williams MV, Coleman EA. Rehospitalizations among patients in the Medicare fee-for-service program. *New England Journal of Medicine*, 2009 Apr 2;360(14):1418-28.

be expected if the same patients with the same characteristics had instead been treated at an “average” hospital, given the “average” hospital’s quality of care effect on readmission for patients with that condition. The RSRR is the ratio of the risk-adjusted readmission rate to the expected readmission rate, multiplied by the national unadjusted readmission rate for the condition for all hospitals. So, the higher a hospital’s predicted 30-day readmission rate, relative to expected readmission for the hospital’s particular case mix of patients, the higher its adjusted readmission rate will be. Hospitals with better quality will have lower rates. More information about CMS’s analysis is available at: <http://www.hospitalcompare.hhs.gov/staticpages/for-consumers/ooc/readmission-measures.aspx>

The current data reported on Hospital Compare cover discharges between July 2007 and June 2010 in over 4000 hospitals. We provide the chance of readmission for each condition (heart attack, heart failure, and pneumonia) for any hospital with at least 25 cases for that condition. In addition, for the over 2000 hospitals that have readmissions data for all 3 conditions, we provide a composite Rating.

Assigning Ratings scores for ConsumerReports.org

We assign Ratings by re-scaling individual measures to the 1-to-5 range. Original data is linearly transformed to the relevant part of the range from 0.5 to 5.5, and then rounded to whole number Ratings (the upper end of 5.5 is chosen intentionally, and is forced down to a Rating of 5).

We only provide Ratings for hospitals that have readmissions rates all three conditions (heart attack, heart failure, and pneumonia). For each measure, there are a number of outliers with particularly high rates. If we were to include these outliers in determining the endpoints of the linear transformation, it would skew the distribution to assign higher Ratings overall, which we believe would be misleading. Instead, we identify outliers at the high end (atypically high rates), using the definition that an outlier is 1.5 times the inter-quartile range greater than the 3rd quartile⁸. These outliers are removed from the determination of the transformation for fractional blobs.

For the readmission data, we re-scale each of the three conditions (HA, HF, PN) to the fractional blob scale, as follows:

1. The highest *non-outlier* rate within a condition is aligned with the score value of 0.5. Removing the high rate outliers eliminates their effect of stretching out the scale, ensuring that hospitals have a higher bar to pass to receive good scores.

⁸ There are several accepted definitions of what constitutes an outlier. This is one common definition, and is used in the creation of boxplots in many popular statistical packages. See, for example, Renze, John. "Outlier." From [MathWorld](http://mathworld.wolfram.com/Outlier.html)--A Wolfram Web Resource, created by Eric W. Weisstein. <http://mathworld.wolfram.com/Outlier.html>

2. The lowest readmission rate within a measure is aligned with the Ratings value of 4.5, based on our medical expert's judgment that none of these readmission rates is low enough to qualify for our highest Rating of a 5. Low-rate outliers were maintained, in order to allow hospitals with low readmission rates to be differentiated from those with higher rates.
3. Remaining values are linear rescaled using these two points as anchors.

We then calculate the weighted mean of the three sets of re-scaled scores, using as weights the relative proportion of national discharges for patients hospitalized for heart attack (approximately 18%), heart failure (44%), or pneumonia (38%).

That weighted mean is rounded to whole numbers to produce our blob scores of ●, ◐, ○, and ◑. Note that 4.5 is rounded down to ◑, and hospitals with overall blobs rounding to 0 or -1 (the outliers) are rounded up to a ●.

Data Limitations

These data come from billing and other administrative data submitted by hospitals to Medicare. Such records have their limitations as they were intended to capture information for billing purposes rather than patient outcomes.

These data also reflect readmissions only for Medicare patients, and only those patients who were initially treated for three specific conditions, though we believe they provide a good indication of readmission rates overall.

Ratings come from recent data but it's possible that updates will show improvements or declines in performance. 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.

Finally, while the data are adjusted for the health status of the patients discharged by each hospital, comparisons among hospitals with very different patient populations should be done cautiously. The statistical methods used by CMS for risk adjustment are documented here <<http://www.hospitalcompare.hhs.gov/staticpages/for-professionals/ooc/statistical-methods.aspx>>.