



How We Rate Hospitals

March 2010

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Patient Ratings

Overview

Hospital Patient Ratings are based on survey data collected by the 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. The development of the survey and data analysis methods followed sophisticated and well-accepted survey and statistical methodologies. Data are collected using a standardized survey instrument, by the hospitals themselves, or by CMS-approved and trained vendors contracted by individual hospitals. Data are delivered to a centralized data bank, where they are analyzed and prepared for public reporting. Results are reported publicly each quarter, based on the most recently available four quarters' data; for example, the December 2009 release, which we posted in February 2010, is based on the 12-month period ending March 2009.

The HCAHPS results reported by CMS are statistically adjusted for mode of survey administration chosen by each hospital—mail, telephone, interactive voice response, or mixed-mode—and for 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.

For each hospital, data summaries are available for 10 measures, reflecting communication with doctors and nurses, receiving help from hospital staff, communication about new medications, pain management, room and bathroom cleanliness, quietness, discharge planning, and two overall questions about the hospital experience.

Consumer Reports' Patient Ratings include scores for 8 of these measures, and an overall score based on the average of the two overall measures.

HCAHPS Survey Methods and Reporting

Hospitals survey a sample of all patients who are at least 18 years old at the time of discharge and who stayed at the hospital at least one night. The following patients are excluded:

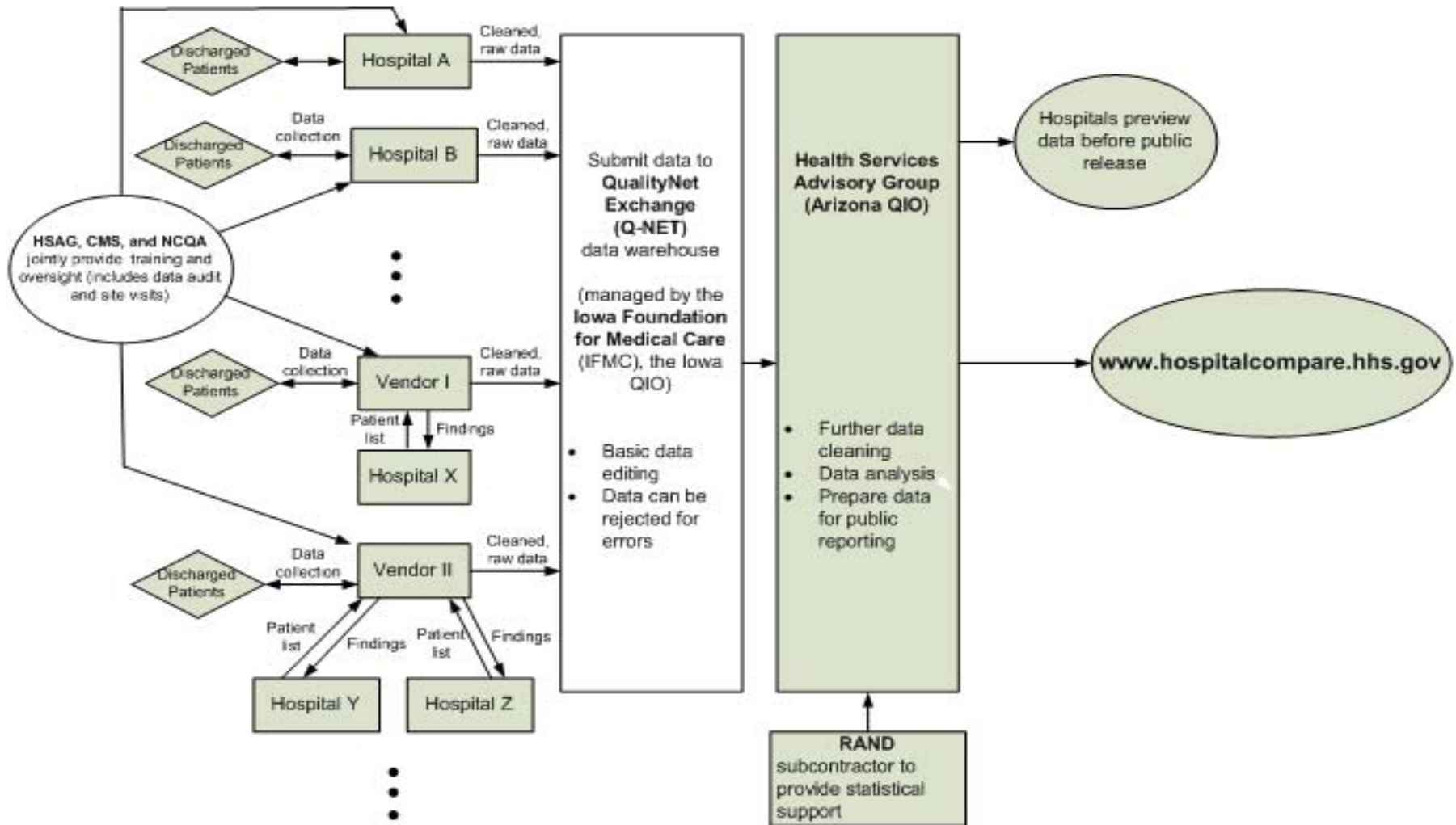
- Patients younger than 18 years old at the time of discharge
- Psychiatric patients
- Patients who died in the hospital
- Patients who did not stay at least one night in the hospital
- “No-Publicity” patients – Patients who request that they not be contacted
- Court/Law enforcement patients (i.e., prisoners)
- Patients with foreign home addresses (excluding U.S. territories – Virgin Islands, Puerto Rico, and Northern Mariana Islands)
- Patients discharged to hospice care (Hospice-home or Hospice-medical facility)
- Patients who are excluded because of state regulations

More information can be found the official HCAHPS website, www.hcahpsonline.org or on the Hospital Compare Web site at <http://www.hospitalcompare.hhs.gov>.

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 9-month time lag between when the data are submitted and when they are released. So, for example, the December 2009 release covers patients' experiences in the 12-month period ending March 2009.

Hospitals or their survey vendors collect data directly from discharged patients, and then submit their data to QualityNet (Q-NET) Exchange, a secure data transmission and data warehouse facility operated by the Iowa Foundation for Medical Care, the Iowa Quality Improvement Organization (QIO). After initial screening for basic data errors, Q-NET passes data to the Health Services Advisory Group (HSAG), the QIO for Arizona. HSAG analyzes data from all hospitals, and prepares the results for public reporting on the CMS Hospital Compare Website (www.hospitalcompare.hhs.gov); hospitals have the opportunity to preview their data before this public release. Our understanding of the management and flow of these data is shown in the diagram on the next page.

HCAHPS Data Flow



The Survey Instrument

The survey tool can be found at <http://www.hcahpsonline.org/surveyinstrument.aspx>. The HCAHPS survey asks questions about the following eight domains regarding a patient's hospital experience, six of which are composites of more than one question, and two overall items:

- **Communication with Nurses**

- 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?

- **Communication with Doctors**

- 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?

- **Responsiveness of Hospital Staff**

- 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?

- **Pain Management**

- 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?

- **Communication About Medications**

- 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?

- **Discharge Planning**

- 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?

- **Cleanliness of Hospital Environment**

- During this hospital stay, how often were your room and bathroom kept clean?

- **Quietness of Hospital Environment**

- During this hospital stay, how often was the area around your room quiet at night?

Two overall questions regarding the patient experience are:

- **Recommend the Hospital**

Would you recommend this hospital to your friends and family?

- **Overall Hospital Rating**

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-Mix and Mode Adjustments

Based on a randomized experiment, researchers developed a regression-based model for adjusting the survey responses for a hospital's mode of survey administration and for patient mix. Mode adjustments are fixed across survey administrations. The patient variables used in the adjustment are: age, self-rated health, education, service line (medical, surgical, maternity), interaction of age with service line, relative lag time, admission through the emergency room, and language other than English spoken at home.¹ Age, self-rated health, and education are the most important patient-level adjusters, and language is the smallest. For more information on the mode and patient-mix adjustments, see <http://www.hcahpsonline.org/modeadjustment.aspx>.

Consumer Reports' HCAHPS data analysis and presentation

The data

After centralized data analysis, CMS reports statistics for 10 measures for each hospital:

1. How often did doctors communicate well with patients?
2. How often did nurses communicate well with patients?
3. How often did patients receive help quickly from hospital staff?
4. How often did staff explain about medicines before giving them to patients?
5. How often was patients' pain well controlled?
6. How often were patients' rooms kept quiet at night?
7. How often were patients' rooms and bathrooms kept clean?
8. Were patients given information about what to do during their recovery at home?
9. How do patients rate the hospital overall?
10. Would patients recommend the hospital to friends and family?

Measures 1-7 are based on questions with possible responses of never, sometimes, usually, or always. For these 7 measures, CMS reports the percentage of responses in 3 categories: Always, Usually, or (sometimes or never). Measure 8 is yes/no; CMS reports the percentage of patients responding "yes". Measure 9 is on a scale of 0–10; CMS reports the percentage of responses in

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.

each of 3 categories: 9-10, 7-8, and 6 or below. Measure 10 has possible responses of definitely no, probably no, probably yes, or definitely yes; CMS reports the percentage of responses that were definitely yes, probably yes, or no. These percentages, after patient-mix and mode adjustments, are reported as whole numbers. We do not have access to more detailed data or summaries.

Sample size considerations

For each hospital, CMS reports the survey response rate and whether the number of completed surveys was 300 and above, 100-299, or below 100. 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% 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% of completed surveys. Individual item response rates or sample sizes are not available.

Because CMS has a public reporting requirement based on these data, they publish all hospitals' data, regardless of sample size, on the Hospital Compare website. For hospitals with fewer than 100 responses, CMS provides a footnote warning the reader that results may not be reliable because of sample size.

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

Converting the data to Ratings

For the first 7 measures for each hospital, we calculated the percentage of “always” or “usually” responses (e.g. 92% 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 scores for the first 8 measures (the last two are used in creating an overall score), using the following intervals for the 5 categories:

Better	●	95% - 100%
	◐	90% - 94%
	○	85% - 89%
	◑	80% - 84%
Worse	●	79% or below

These intervals were chosen with several guiding principles. First, we judged that a hospital for which 95% or more of respondents said “always” or “usually” to a measure qualifies as superior performance.

Second, the subsequent intervals are based on statistical significance. Given that the scores form a continuum, it is not possible to draw lines between score groups that distinguish between significantly different hospitals. Instead, we use a strategy in which the bottom of the ● group is significantly different from the top of the ○ group, and the bottom of the ○ group is significantly different from the top of the ● group. So, for a question in an individual hospital with as few as 65 responses, a rate of 89% (the top of the ○ range) is significantly less than a rate of 95% (the bottom of the ● range) ($p=0.04$) and a rate of 79% (a score of ●) is significantly less than a rate of 90% (a score of ○). At that sample size, a rate of 84% (a score of ○) does not differ significantly from 90% (a score of ●; $p=0.111$); but for $n=100$, that difference is significant as well (0.040).

Third, these intervals provide good discrimination among hospitals and among the response distributions for each of the measures.

Overall Score

We calculated our overall score as the arithmetic mean of these two measures, which are highly correlated ($r=0.98$ for all hospitals with at least 100 completed surveys):

- 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

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.

In addition, CMS has identified some hospitals as having discrepancies in their data collection process; we do not provide Ratings for these hospitals.

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, 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.

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.

Does Your Hospital Follow Correct Procedures? Steps to Prevent Infection

Overview

To improve patient outcomes, the Joint Commission and the Federal Government's Centers for Medicare and Medicaid Services (CMS) collaborated in the development of the Surgical Care Improvement Project (SCIP). Through SCIP, hospitals report data from patient charts for seven process-of-care measures (see <http://www.jointcommission.org/PerformanceMeasurement/PerformanceMeasurement/SCIP+Core+Measure+Set.htm>). Of these, we use 3 measures related to surgical infection prevention:

1. The percentage of surgical patients who received antibiotic within 1 hour of incision (SCIP1)
2. The percentage of surgical patients who received the correct antibiotic for their condition (SCIP2)
3. The percentage of patients whose antibiotic was stopped within 24 hours after surgery (48 hours for CABG or other Cardiac Surgery patients) (SCIP3)

We also present a unique composite score of these three measures.

Data collection

Hospitals report these data for adult patients (at least 18 years of age) who experienced one of the following seven common inpatient surgical procedures:

- Coronary arterial bypass graft
- Other Cardiac Surgery
- Hip Arthroplasty
- Knee Arthroplasty
- Colon Surgery
- Hysterectomy, and
- Vascular Surgery.

Hospitals can sample cases either monthly or quarterly, and the required sampling scheme depends on the number of surgical procedures conducted. Data are reported quarterly to CMS, and after centralized analysis, are made available on the Hospital Compare website for the most recent 4 quarters for which data are available (the December 2009 release reports on data from the period April 2008 – March 2009). Because of different exclusion criteria for each of the measures, the sample size for each of the three measures differs slightly for each hospital.

In our Hospital Ratings, we display the percentage compliance for each of these measures, and provide an overall composite score for “Steps to Prevent Infection” that summarizes hospitals’ performance on all 3 measures. We display results for a hospital that has at least 100 reported surgeries for all 3 measures.

Composite Score

Our composite is calculated as the product of the three percentages (SCIP1 × SCIP2 × SCIP3), rounded to the nearest whole percent. This idea is motivated by an attempt to estimate the probability that a patient will experience all 3 processes correctly. If this were an accurate estimate, the three probabilities would need to be statistically independent. Because patients who do not successfully receive SCIP1 are excluded from the calculation of SCIP2 and SCIP3 (i.e. a patient has to be counted in the numerator of SCIP1 in order to be included in the denominators of SCIP2 and SCIP3), the latter two measures are statistically independent of the first one. Since SCIP2 and SCIP3 are not necessarily independent of one another, this composite is only an approximation of the probability; nonetheless, as an index, it provides good discrimination among hospitals. The intervals we use to determine the blobs have some degree of statistical significance² as well.

The distribution of scores for the 2556 hospitals from the December 2009 release with at least 100 surgeries reported per measure are shown in the table below.

	Composite Score	Composite: Approximate Pr(all 3 processes done correctly)	Number of hospitals (%)³
Better	●	95% - 100%	172 (6.7%)
	◐	90% - 94%	517 (20.2%)
	○	85% - 89%	576 (22.5%)
	◑	80% - 84%	499 (19.5%)
Worse	●	79% or below	792 (31.0%)

In this method, any hospital that has less than 95% compliance in any one of the measures cannot earn higher than a score of 4; 95% compliance on all three measures would earn a 3-blob, and a hospital with less than 80% compliance on any one measure necessarily receives a score of 1.

Our current understanding of the data flow for the SCIP measures is shown on the next page.

Data Limitations

These data reflect hospitals' compliance with the three SCIP measures. These are *process* measures, meaning that they reflect the degree to which hospitals follow accepted processes. While there is no direct association between how a hospital scores on these measures and patient outcomes, previous research has demonstrated that following these three processes results in lower rates of surgical infections overall.

Unlike many 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

² 20 out of 25 (80% compliance) with p=0.95 has a tail probability of 0.007

24 out of 25 (96% compliance) with p=0.80 has a tail probability of 0.005.

For samples larger than 100, the boundaries of most intervals differ significantly.

³ Based on the December 2009 data release from CMS, for hospitals with at least 100 surgeries for all 3 measures.

Centers for Medicare & Medicaid Services (CMS), who oversees all aspects of the data collection, to ensure the validity and reliability of the data, and to analyze the data, which we then convert into our unique Ratings.

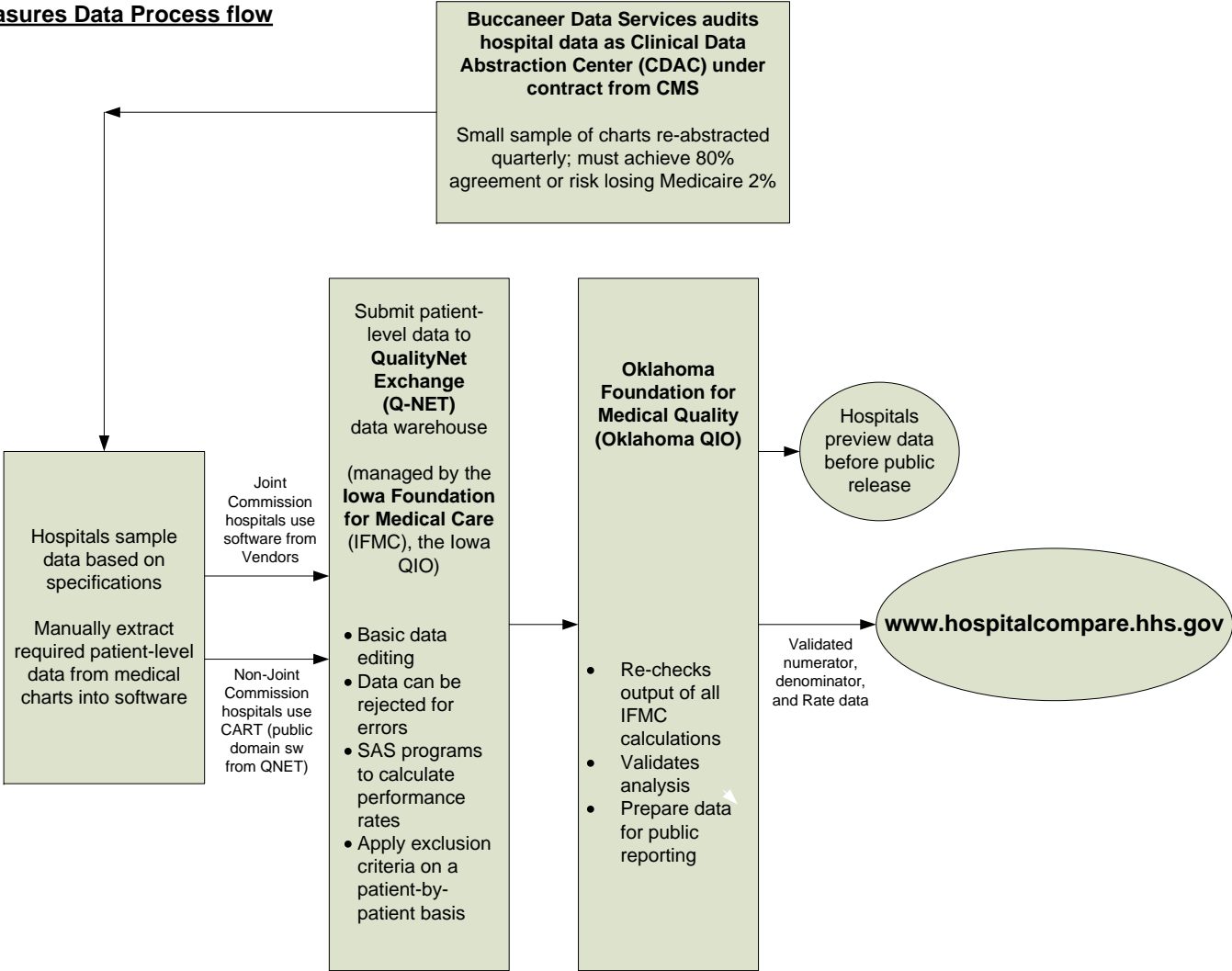
There may potentially be quality control issues that do not meet the high standards that Consumer Reports generally applies to its own data. There may be some inconsistencies in data collection of which we are unaware, and over which we have no control.

To achieve standardization, CMS and the Joint Commission provide detailed specifications for reporting, available at (<http://www.jointcommission.org/PerformanceMeasurement/PerformanceMeasurement/Current+NQM+Manual.htm>), and oversee data audits and analyses.

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

Despite these limitations, after our comprehensive review of the SCIP methodology, we are confident that their stated methodologies are valid and reliable, and provide important information that allows comparison of different hospitals on a common set of infection prevention 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.

SCIP Measures Data Process flow



How Do Patients Fare? Bloodstream infections

More than half of states currently have legislation requiring the public reporting of data on healthcare-associated infections (HAIs). Central Line Associated Bloodstream Infections (CLABSIs) are a particular type of HAI associated with significant mortality, morbidity and costs. Multiple improvement projects⁴ have shown that hospitals can prevent CLABSIs often for sustained periods of time.

Currently, we use CLABSI data that are publicly reported by ten states (Colorado, Delaware, Maine, Missouri, New York, Rhode Island, South Carolina, Tennessee, Vermont, and Virginia); as of March 2010, an additional five states publicly report data, but not in a form we can use for our Ratings (Florida, Illinois, Ohio, Pennsylvania, and Washington). Many state reports also include other infections data (for example, surgical-site infections), but CLABSIs in the ICU are the most commonly and consistently reported. 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. We hope to include these more extensive data in future analyses, when public reporting of these data become more consistently available.

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 care 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 are most relevant to consumers and purchasers of care. In 2009, over 1200 hospitals across the country completed The Leapfrog Hospital Survey.⁵

CLABSI data includes both the number of central line-days (CLD)⁶ and the number of CLABSIs within a particular time period for each ICU reported.

⁴ 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.

⁵ 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.

⁶ The total number of days patients were on central venous catheters in the ICU.

Each reporting agency (state health departments and The Leapfrog Group) identifies particular ICU types on which they report these data, and a reporting period (typically one year), which are not consistent across agencies. Not all hospitals in a state have, or report on, all ICUs. There are few public 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 they exist; we do not include these three ICU types in our calculations.

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 summarizes comparisons of data from 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 report⁷ provides infection rates (infections/1000 CLD) for 17 ICU types, as well as a growing list of other patient-care locations. These rates are composite data from approximately 1500 hospitals in 2006-2008 in 48 states and the District of Columbia; information for individual hospitals is not publicly available from NHSN.

Our 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 infection rate for cardiac ICUs nationwide is two per 1000 central line days, so a particular cardiac ICU with a *rate* of three infections per 1000 days has 50 percent more infections than average. For surgical ICUs, the national average rate is 2.3 infections per 1000 central line days, so a surgical ICU reporting a rate of 4.6 infections per 1000 CLD has 100% more infections than average. The Standardized Infection Ratio pools these comparisons across all ICUs for which a hospital reports CLABSI data.

Consider Albany Medical Center (AMC) in Albany, NY as an example. New York State reported CLABSI data for 7 ICUs at AMC, including its neonatal ICU. We base our calculations on the 6 other ICUs (See table below). In its cardiothoracic ICU patients, AMC reported 7 infections and 2882 central line days in 2008. The national published rate for cardiothoracic ICUs is 1.39 infections per thousand CLD. If patients in the cardiothoracic ICU at AMC had experienced CLABSI infections at that national rate, then we would predict⁸

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

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

⁷ 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.

⁸ 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).

ICU type	Albany Medical Center 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
Neurologic	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, Neurologic, 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 6 ICUs, so they reported $38/33.46 = 1.14$ times the national rate, or 14% 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.

In summary, the Standardized Infection Ratio (SIR) 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 1000, to estimate the number of infections predicted for that ICU if it were to report CLABSIs at the same frequency as the national rate (CLD x national rate / 1000).
2. Within each hospital, calculate the sum of predicted infections and the sum of reported infections across all reporting ICUs.
3. Calculate $SIR = (\text{total reported infections} / \text{total predicted infections})$.

Note that 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.

The SIR has the advantage of comparing each ICU's reported infections to the published national rate for that ICU type, thus adjusting for the different risk of infections in different types of ICUs, or, potentially, other patient care locations.

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 (see Appendix A). 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. We do not have access to reliable information about hospitals' teaching status, which CDC determines from questions hospitals answer when they enter data into NHSN. Consequently, we pooled the published data for these three strata of medical/surgical ICUs. We also pooled rates for medical

ICUs for Major teaching and all other hospitals, and the three types of pediatric ICUs. The national rates we used, calculated from the published data from NHSN, are:

Location	Total CLABSI reported to NHSN	Total CLD reported to NHSN	Rate (CLABSI/1000 CLD)
Coronary ICU	876	436,409	2.007
Cardiothoracic ICU	879	632,769	1.389
Medical ICU	2,097	911,476	2.301
Medical/Surgical ICU	4,053	2,441,719	1.660
Surgical ICU	1,683	729,989	2.306
Neurologic ICU	61	45,153	1.351
Pediatric ICU	1147	390,253	2.956
Neurosurgical ICU	396	160,879	2.461

We publish reported infections for all hospitals that meet *either* of the following sample size requirements:

1. At least 1000 Central Line Days (CLD). Volumes less than this yield less reliable ratings.
2. At least 3 infections, regardless of CLD. A hospital that reports 3 or more infections, even in fewer than 1000 CLD, could not achieve better than a rate of 3 infections/1000 CLD; this is 50% higher than the national infection rate for medical ICUs.

For each hospital with sufficient data, we publish information on ConsumerReportsHealth.org as the percentage difference between its reported overall infection rates and national rates for those types of ICUs, based on the SIR, rounded to two decimal places.

Reported data	Reported on ConsumerReportsHealth
SIR > 1.00 <i>e.g. SIR=1.25</i>	$100 \times (\text{SIR} - 1)\%$ Worse Than Average <i>e.g. 25% Worse Than Average</i>
SIR < 1.00 <i>e.g. SIR=0.60</i>	$100 \times (1 - \text{SIR})\%$ Better Than Average <i>e.g. 40% Better Than Average</i>
SIR = 1.00	Average
0 infections reported and CLD \geq 1000	Zero infections reported
Insufficient sample, or Hospital not included in a public state report, or State reports but not in a form we can use	Not yet rated
No available public state report, and hospital does not voluntarily report data to The Leapfrog Group.	State not reporting

Although we report hospitals' ICU-standardized infection ratios based on comparisons with average national rates as a way for adjusting for their mix of ICUs, we do not believe those averages themselves represent acceptable rates of infection. All hospitals should be working toward having zero CLABSIs, and there are enough hospitals reporting zero infections that there is good reason to believe that all hospitals can achieve this standard.

Data Limitations

Each state health agency and Leapfrog reports on a somewhat different set of ICUs, and covering a particular period of time (see Appendix A). Further, 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 and Virginia do not provide data for individual ICUs, and their overall infection rates were compared to the pooled NHSN infection rate for medical/surgical ICUs. 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. 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 in particular types of ICUs is the best adjustment available to accommodate these ICU and patient differences. However, we maintain that all ICUs in all hospitals should be able to eliminate CLABSIs through proper handling of central lines, regardless of the patients they treat.

We currently do not include any tests of statistical significance in our presentation of these data, and just report the percentage difference from predicted national infection rates for each hospital's particular mix of ICUs. Small percentage-point differences are not meaningful.

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 and throughout their facilities, so current rates may differ from those reported here. Whenever possible, we present the most current data publicly available.

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 ten states are reporting bloodstream infection rates in standardized ways we can analyze. Each is required by state law to issue valid, accurate and reliable data. But only four—New York, and to some extent, Colorado, South Carolina, and Tennessee—require 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 infections, which are particularly dangerous, costly, and even deadly.

Success at SCIP and CLABSI require 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 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 CLABSI data effective February 28, 2010
ICUs and dates included

Agency	ICUs reported	Period covered
Colorado Department of Public Health and Environment	Medical Cardiac Surgical Surgical Cardiothoracic Medical/Surgical Medical	August 2008 – July 2009
Delaware Health and Social Services, Division of Public Health	Medical Medical/Surgical Pediatric Medical/Surgical (only one ICU per hospital)	January 2008 – June 2009
Dirigo Health Agency's Maine Quality Forum	All Adult ICUs combined	January 2008 – June 2009
Missouri Department of Health and Senior Services.	Coronary Surgical Medical/Surgical Medical Pediatric	July 2008 – June 2009
New York State Department of Health	Coronary Cardiothoracic Medical Medical/Surgical Surgical Neurosurgical Pediatric	January – December 2008
Rhode Island Department of Health	Coronary Medical Medical/Surgical Neurosurgical Pediatric Medical/Surgical Surgical Surgical Cardiothoracic	April – December 2009
South Carolina Department of Health and Environmental Control	Medical/Surgical Medical Surgical Pediatric	December 2008 – November 2009
Tennessee Department of Health	Medical Cardiac Surgical Cardiothoracic Adult Medical Adult Medical/Surgical Adult Surgical Surgical Neurosurgical Pediatric Medical/Surgical	January – December 2008
Vermont Department of Banking, Insurance, Securities & Health Care Administration	Medical Surgical Medical/Surgical	October 2008 – September 2009
Virginia Department of Health	All adult ICUs combined	January – December 2009
The Leapfrog Group	Medical Medical/Surgical Surgical Pediatric Medical Pediatric Surgical Pediatric Medical/Surgical Coronary Care Neurology	January – December 2008
Public reports we currently cannot use in our Ratings: <i>Florida, Illinois, Ohio, Pennsylvania, Washington</i>		