

## ***Patient Safety Ratings and Patient Safety Excellence Award™ 2014 Methodology***

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### ***Contents***

Introduction.....	1
Data Source and Applications.....	2
Determining Patient Safety Indicator Ratings.....	3
Eligibility for the 2014 Patient Safety Excellence Award™.....	4
Designating 2014 Patient Safety Excellence Award™ Recipients.....	5
Limitations of the Data Analysis.....	5

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### ***Introduction***

Patient safety ratings reflect one aspect of the quality of care at a hospital by measuring how well the hospital prevents serious, potentially preventable complications and adverse events during a patient's hospital stay.

To evaluate hospital patient safety, Healthgrades uses inpatient data from the Medicare Provider Analysis and Review (MedPAR) database and the QI Windows® software from the Agency for Healthcare Research and Quality (AHRQ). We analyze 14 AHRQ-defined patient safety indicators (PSIs), each of which represent a serious, potentially preventable complication.

This methodology includes descriptions of how Healthgrades:

- Determines patient safety ratings for each of 14 PSIs
- Determines which hospitals are eligible for the Patient Safety Excellence Award™
- Designates Patient Safety Excellence Award™ recipients

## Data Source and Applications

Healthgrades uses Medicare inpatient data from the Medicare Provider Analysis and Review (MedPAR) database purchased from the Centers for Medicare and Medicaid Services (CMS). We evaluate all short-term acute care hospitals in the MedPAR file for three years (2010 through 2012). To process Patient Safety ratings, we utilize positions 1 through 9 in the medical claim for diagnoses codes and all available positions for procedures codes.

In addition, Healthgrades uses the QI Windows® Software (version 4.4) developed by the AHRQ and downloaded from <http://www.qualityindicators.ahrq.gov/Archive/Software.aspx#winqi>. For most indicators, the AHRQ software uses advanced statistical algorithms that can predict the number of patient safety incidents that are likely to occur at a hospital based on the types of patients treated at that hospital. This is the expected rate. More information about the AHRQ patient safety indicators (PSIs) and risk adjustment can be found at [http://www.qualityindicators.ahrq.gov/Modules/psi\\_resources.aspx](http://www.qualityindicators.ahrq.gov/Modules/psi_resources.aspx).

Table 1 provides the AHRQ definition for each of the 14 AHRQ-defined patient safety indicators (PSIs) Healthgrades analyzes, as well as its respective description used in Healthgrades reports.

**Table 1. Patient Safety Indicators and Translation**

Patient Safety Indicator	Translated in Healthgrades Reports as...
Death Rate Among Surgical Inpatients With Serious Treatable Complications	Death following a serious complication after surgery
Death Rate in Low-Mortality Diagnosis Related Groups (DRGs)	Death in procedures where mortality is usually very low
Pressure Ulcer Rate	Pressure sores or bed sores acquired in the hospital
Iatrogenic Pneumothorax Rate	Collapsed lung due to a procedure or surgery in or around the chest
Central Venous Catheter-Related Bloodstream Infection Rate	Catheter-related bloodstream infections acquired at the hospital
Postoperative Hip Fracture Rate	Hip fracture following surgery
Postoperative Hemorrhage or Hematoma Rate	Excessive bruising or bleeding as a consequence of a procedure or surgery
Postoperative Physiologic and Metabolic Derangement Rate	Electrolyte and fluid imbalance following surgery
Postoperative Respiratory Failure Rate	Respiratory failure following surgery
Postoperative Pulmonary Embolism or Deep Vein Thrombosis Rate	Deep blood clots in the lungs or legs following surgery
Postoperative Sepsis Rate	Bloodstream infection following surgery
Postoperative Wound Dehiscence Rate	Breakdown of abdominal incision site
Accidental Puncture or Laceration Rate	Accidental cut, puncture, perforation or hemorrhage during medical care
Foreign Object Left During Surgery or Procedure	Foreign objects left in body during a surgery or procedure (reported as number of events)

For more details on the criteria for each individual PSI, please refer to the technical specifications documents available directly from AHRQ at [http://www.qualityindicators.ahrq.gov/Modules/PSI\\_TechSpec.aspx](http://www.qualityindicators.ahrq.gov/Modules/PSI_TechSpec.aspx)

## Determining Patient Safety Indicator Ratings

To determine ratings for 13 of the 14 AHRQ-defined patient safety indicators (PSIs) for each hospital, Healthgrades uses the following steps:

1. Healthgrades runs the MedPAR hospital data through the AHRQ software to determine the actual number of patient safety incidents and to calculate expected rates for each of 13 PSIs for each hospital (see below for the remaining PSI—Foreign Object Left During Surgery or Procedure).
2. Healthgrades performs a case-mix index risk adjustment using the Medicare Case Mix Index (CMI). This risk adjustment is in addition to the risk adjustment that occurs via the AHRQ software. The CMI is a hospital-level indicator that represents the seriousness of the cases seen at a hospital. Higher CMI values indicate that more seriously ill patients are seen at the hospital. Healthgrades performs this additional risk adjustment because there was a significant bias in the expected rates for larger hospitals (which had consistently higher observed rates than expected).

Healthgrades adjusts the expected values so that the sum of the expected equals the sum of the observed for each PSI for each combination of the case mix index group and year. Healthgrades stratifies hospitals among eight CMI groups according to their case mix index, as shown in *Table 2*.

Specifically, Healthgrades uses these groupings to adjust the expected rates of patient safety events so that within each year, PSI, and CMI group, the overall O:E ratio = 1. We accomplish this as follows:

- For each year, PSI, and CMI group, we calculate the ratio of observed to expected patient safety events.
  - For each hospital, we multiply the expected number of events by the O:E ratio for the appropriate year, PSI, and CMI group.
3. Healthgrades statistically compares the calculated observed rate to the expected rate for each PSI to produce a z-score for each hospital.
  4. Healthgrades then translates the z-score to a patient safety rating based on how an individual hospital's PSI rating compares to all other hospitals evaluated for that PSI. Ratings are displayed on each hospital profile on Healthgrades.com. Performance for each PSI rating is grouped into one of three Healthgrades performance categories:
    - **Better Than Average** – The hospital is among the top 15% of all hospitals evaluated for the PSI.
    - **Average** – The hospital is among the middle 70% (neither the top 15% nor the bottom 15%) of all hospitals evaluated for the PSI.
    - **Worse Than Average** – The hospital is among the bottom 15% of all hospitals evaluated for the PSI.

**Table 2. Case Mix Index Groups**

Case Mix Index	Case Mix Index Group
0.05 < CMI <= 1.25	1
1.25 < CMI <= 1.35	2
1.35 < CMI <= 1.45	3
1.45 < CMI <= 1.55	4
1.55 < CMI <= 1.65	5
1.65 < CMI <= 1.75	6
1.75 < CMI <= 1.90	7
CMI > 1.90	8

One additional PSI (Foreign Object Left During Surgery or Procedure) differs from the other 13 PSIs because it is an event that should never happen—referred to by AHRQ as a “never event.” For this indicator, Healthgrades does not calculate a rating because this event should never

happen, which also means there is no expected rate. Instead of a rating, we report the number of events from 2010 through 2012 where a foreign object was left in a patient during a surgery or procedure.

When a hospital is not rated by Healthgrades in an individual PSI, it means the hospital did not have any patients that were eligible to be evaluated for that PSI.

### **Eligibility for the 2014 Patient Safety Excellence Award™**

To be eligible for the Healthgrades Patient Safety Excellence Award, a hospital must meet clinical quality thresholds, have zero occurrences of PSI Foreign Object Left During Surgery or Procedure and have data on at least seven out of eight core PSIs.

- **Clinical Quality Threshold** – To be eligible a hospital must be in the top 80% of hospitals for clinical quality as ranked by average z-score across the conditions and procedures that Healthgrades evaluates using Medicare data. Hospitals, such as small specialty hospitals, that have patient safety data but no Healthgrades ratings, are also eligible.
- **Zero Occurrences of PSI Foreign Object Left During Surgery or Procedure** – Eligible hospitals must not have any occurrences of the PSI Foreign Object Left During Surgery or Procedure. A hospital is ineligible for this award if even one patient has experienced this adverse event.
- **Data for Seven of Eight Core PSIs** – Healthgrades identifies a core set of eight PSIs that are serious, but potentially preventable, complications related to medical or surgical inpatient hospital care. This core set of PSIs is the most recent set of PSIs included in the CMS Inpatient Quality Reporting program and represent events that are most amenable to prevention when hospitals make changes. Eligible hospitals may have data for all 13 PSIs, but they must have data for at least seven of the eight core PSIs (see *Table 3*).

**Table 3. Healthgrades Core Set of Eight PSIs and Translation**

Patient Safety Indicator	Translated in Healthgrades Reports as...
Pressure Ulcer Rate	Pressure sores or bed sores acquired in the hospital
Iatrogenic Pneumothorax Rate	Collapsed lung due to a procedure or surgery in or around the chest
Central Venous Catheter-Related Bloodstream Infection Rate	Catheter-related bloodstream infections acquired at the hospital
Postoperative Hip Fracture Rate	Hip fracture following surgery
Postoperative Sepsis Rate	Blood stream infection following surgery
Postoperative Pulmonary Embolism or Deep Vein Thrombosis Rate	Deep blood clots in the lungs or legs following surgery
Postoperative Wound Dehiscence Rate	Breakdown of abdominal incision site
Accidental Puncture or Laceration Rate	Accidental cut, puncture, perforation or hemorrhage during medical care

## **Designating 2014 Patient Safety Excellence Award™ Recipients**

To recognize hospitals that provide excellent patient safety, Healthgrades uses the following process:

1. Healthgrades creates a composite patient safety z-score by:
  - Averaging the individual patient safety indicator (PSI) z-scores for each hospital.
  - Calculating a combined standard deviation across all of the individual PSI z-scores for each hospital. By definition, a set of z-scores has a mean of zero (0) and a variance of one (1), so the combined standard deviation is calculated as the square root of one (1) divided by the number of PSIs evaluated.

The resulting formula is:

$$Z_{AVG} / \text{SquareRoot}(1/N_{PSI})$$

where  $Z_{AVG}$  = average of the z-scores for PSI a hospital was evaluated in

$N_{PSI}$  = the number of PSIs a hospital was evaluated in

2. Healthgrades calculates a significance level associated with each composite patient safety z-score.
3. Healthgrades identifies those hospitals with a "Better than Expected" overall patient safety significance level (using a 90% confidence interval) as Patient Safety Excellence Award recipients.

## **Limitations of the Data Analysis**

While these analyses may be valuable in identifying hospitals that perform better than others, one should not use this information alone to determine the quality of care provided at each hospital. The analyses are limited by the following factors:

- The AHRQ QI Windows® Software contains risk-adjustment models that are not part of Healthgrades methodology. Risk factors for patient safety, therefore, are weighted and accounted for through the AHRQ software.
- Cases may have been coded incorrectly or incompletely by the hospital.
- Healthgrades conditions and procedures models can only account for risk factors that are coded into the billing data. Therefore, if a particular risk factor was not coded into the billing data (such as a patient's socioeconomic status and health behavior) then it was not accounted for.
- Although Healthgrades has taken steps to carefully compile these data, no techniques are infallible; therefore, some information may be missing, outdated or incorrect.

Also, note that if more than one hospital reported to CMS under a single provider ID, Healthgrades analyzed patient safety data for those hospitals as a single unit. Throughout this document, therefore, "hospital" refers to one hospital or a group of hospitals reporting under a single provider ID.