



HealthGrades Patient Safety in American Hospitals Study

March 2011

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HEALTHGRADES®

The Eighth Annual

HealthGrades Patient Safety in American Hospitals Study

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When you seek treatment at a hospital for one particular medical problem, you don't expect to acquire an additional injury, infection, or other serious condition during your stay. Although some complications may be unavoidable, too often patients suffer from injuries or an illness that could have been prevented if the hospital adopted safe practices and developed better systems that support improved patient safety. In this eighth annual study, HealthGrades evaluated nearly 40 million hospitalization records from the nation's nearly 5,000 nonfederal hospitals to track trends in patient safety incidents and identified hospitals that are in the top 5% in the nation.

Summary of Findings

In 2002, the Agency for Healthcare Research and Quality (AHRQ), in collaboration with the University of California-Stanford Evidence-Based Practice Center, identified 20 indicators of potentially preventable patient safety events that could be readily identified in hospital discharge data. This set of evidence-based patient safety indicators was created and released to the public in 2003 to be used by various health care stakeholders to assess and improve patient safety in U.S. hospitals.

For the first part of this study, HealthGrades used the Patient Safety Quality Indicators Software (Windows version 4.2) developed by AHRQ¹ to study the national event rate, mortality, and cost associated with 13 of the patient safety indicators among Medicare beneficiaries from 2007 through 2009. The 13 patient safety indicators studied are listed in *Appendix B*.

For the second part of this study, using the rates calculated for 13 patient safety indicators studied, HealthGrades calculated an overall patient safety composite score for each hospital to identify and recognize the best-performing hospitals in the United States for the three-year period 2007 through 2009 (*Appendix A*). These best-performing hospitals were recognized with the HealthGrades 2011 Patient Safety Excellence Award™.

From 2007 through 2009:

- There were **708,642 total patient safety events** affecting 667,828 Medicare beneficiaries (*Appendix C*).
- There were **79,670 patient deaths** among patients who experienced one or more patient safety events (*Appendix C*).
- **One in ten surgical patients died** after developing one of the following serious but treatable complications: pulmonary embolism or deep vein thrombosis; pneumonia; sepsis; shock or cardiac arrest; or gastrointestinal bleeding (*Appendix C*).

Patient safety events cost the federal Medicare program nearly \$7.3 billion and resulted in 79,670 potentially preventable deaths from 2007 through 2009.

- The 13 patient safety events were associated with **\$7.3 billion of excess cost** (*Appendix E*).
 - The excess cost associated with patient safety events means that for every hospitalization, from 2007 through 2009, there was an additional \$181.17 added to the cost of every Medicare hospitalization to treat just these 13 preventable patient safety events (*Appendix E*).
- Of all Medicare inpatients **52,127** developed a **hospital-acquired bloodstream infection** (*Appendix C*). Of these patients, 8,114 did not survive their hospitalization.
 - Hospital-acquired bloodstream infections cost the federal government an estimated \$1.2 billion (*Appendix E*).
 - South Dakota, Iowa, Montana, Nebraska, Oregon, Kansas, Wisconsin, North Dakota, and Minnesota led the nation with the lowest risk-adjusted bloodstream infection rates (*Table 2*).
- Four of 13 indicators, iatrogenic pneumothorax, post-operative respiratory failure, post-operative pulmonary embolism or deep vein thrombosis, and post-operative abdominal wound dehiscence, were included in the proposed rule for the hospital value-based purchasing program for Medicare inpatient services. These four patient safety events:
 - Accounted for 229,664 in-hospital events (*Appendix C*).
 - Accounted for 29,917 deaths among patients experiencing one or more of the four indicators (*Appendix C*).
 - Cost the federal government an estimated \$3.7 billion in excess costs.
- The best-performing states for all 13 patient safety events combined were: Iowa, Vermont, Minnesota, Nebraska, Delaware, Massachusetts, Hawaii, New Hampshire, and Rhode Island (*Appendix F*).
- Cities (that is, designated market areas with populations of at least one million) with the best overall performance in the 13 indicators of patient safety were: Minneapolis-St. Paul, MN; Wichita, KS; Cleveland, OH; Wilkes-Barre, PA; Toledo, OH; Boston, MA-NH; Greenville, SC-NC; Honolulu, HI; Charlotte, NC; and Oklahoma City, OK (*Appendix G*).
- If all hospitals had the patient safety performance of the 268 Patient Safety Excellence Award Hospitals, from 2007 to 2009:
 - 174,358 patient safety events may have been avoided (*Appendix D*).
 - 20,688 of our nation's seniors may have survived their hospitalizations (*Appendix D*).
 - The federal government could have saved nearly \$1.8 billion in excess health care costs (*Appendix D*).
- Medicare patients treated at **hospitals recognized with a HealthGrades Patient Safety Excellence Award** had, on average, a **46.26% lower risk of experiencing** one or more of the 13 patient safety events studied compared to patients treated at bottom-ranked hospitals (*Appendix D*).

Introduction

In a 2004 survey conducted by the Kaiser Family Foundation, over half of the people (57%) indicated that they were not sure what the term medical error meant or that they had not heard the term before. When asked how many Americans they believe die each year as a result of preventable medical errors, most (49%) responded less than 5,000, 18% responded 50,000, but only 14% indicated that they thought more than 100,000 people die each year as the result of a potentially preventable medical error.² In November of 2010, a study conducted by the Office of Inspector General estimated that every month 15,000 Medicare beneficiaries experience a potentially preventable medical error that contributes to their death.³

Preventable medical errors are so pervasive and costly to the government that the proposed rule for the hospital value-based purchasing program for Medicare inpatient services released in January 2011 contains four measures of patient safety utilizing the AHRQ Patient Safety Indicators. Beginning in 2014, these indicators will be weighted and contribute to each hospital's total performance score and will drive the value-based incentive payment for the facility.⁴ In addition, the Centers for Medicare and Medicaid Services is currently developing a 10-year, \$70 billion plan aimed at reducing hospital-acquired infections.⁵

Since 2004, HealthGrades has been at the forefront of measuring patient safety in American hospitals and making that information available to consumers at www.HealthGrades.com. HealthGrades seeks to educate and empower consumers with hospital quality information so that they can make an informed decision about where to receive their hospital care. This study evaluates one aspect of hospital quality: patient safety. In its simplest form, a hospital patient safety event or medical error is a complication of care that was directly caused by the hospital (e.g., medical instrument left in the body after a procedure) or the hospital failed to take the necessary steps to prevent it (e.g., infection). Patient safety is often measured separately from other quality measures because it crosses the disease continuum. Other quality measures focus on adherence to specific evidence-based guidelines to treat a particular condition or compare mortality for a specific condition. This study of patient safety focuses on unintended errors across all conditions and procedures performed in a hospital.

In this annual study of patient safety, HealthGrades evaluates the impact of 13 types of patient safety events that occur in American hospitals. Using these 13 indicators, HealthGrades has identified the prevalence of these events and the impact to the health care system in terms of potential lives lost and health care dollars spent. In this study, we also conducted a state and city evaluation for their performance on these indicators. States were evaluated both on overall performance for the 13 indicators, as well as indicator by indicator and specifically on hospital-acquired infections. Cities with a population of one million individuals or more were rank ordered by their combined rates on the 13 indicators. Lastly, we identified the 268 hospitals nationwide that have the overall lowest incidence rates of these events and summarized the net impact if all hospitals performed at that level.

Methodology Brief

To evaluate patient safety in U.S. hospitals, HealthGrades used Medicare inpatient data from the Medicare Provider Analysis and Review (MedPAR) database and Patient Safety Indicator software from the Agency for Healthcare Research and Quality (AHRQ) to calculate event rates for 13 indicators of patient safety for all of the nation's hospitals (see *Appendix B* for a listing of indicators). All analysis was based on data from 2007 through 2009 with the exception of Foreign Body Left after a Procedure, which was based only on data from 2009.

To evaluate **overall hospital performance** and **identify the best-performing hospitals** HealthGrades used the same software to evaluate every hospital in the country on the 13 patient safety indicators. The following steps were used to evaluate overall hospital performance and identify the best-performing hospitals:

1. For each patient safety indicator at each hospital, HealthGrades compared the **actual rate** to a risk-adjusted **expected rate** to produce an individual patient safety z-score for each indicator.
2. The resulting z-scores were then averaged to determine the hospital's **overall patient safety score**. To be eligible to receive an overall patient safety score, a hospital had to have outcomes in nine of the 13 patient safety indicators and they must have an average star rating of at least 2.5 in at least 16 of the 26 HealthGrades cohorts (e.g., procedure and diagnosis categories; for more details, see *HealthGrades Hospital Report Cards™ Mortality and Complication Outcomes Methodology* at www.HealthGrades.com).
3. The overall patient safety score was then rank ordered, from most positive (best performing) to most negative (worst performing), within teaching and non-teaching peer groups.
4. Lastly, the top 5% of the nation's nearly 5,000 hospitals studied were designated as Patient Safety Excellence Recipients (268 hospitals with the lowest overall average patient safety event rates).

Finally, **all cost figures attributable to patient safety events** were extrapolated using results from previous research by Zhan and Miller.⁶

Detailed Findings

Patient Safety Events are Common in U.S. Hospitals

HealthGrades identified a total of **708,642 patient safety events** that occurred in 40,348,218 acute care Medicare hospitalizations from 2007 through 2009. These events occurred among 667,828 unique patients. This means that among hospitalized Medicare patients, 1.66% experienced one or more of the 13 patient safety events. Medicare patients who experienced one or more patient safety events had a one-in-eight chance of dying. In fact, there were **79,670 actual inhospital deaths** that occurred among patients who experienced one or more of the 13 patient safety events (*Appendix C*).

Common Patient Safety Events Cost Lives and Dollars

Four patient safety indicators with the **highest incidence rates** (death among surgical inpatients with serious treatable complications, pressure ulcer, post-operative respiratory failure, and post-operative sepsis) accounted for 68.51% of all patient safety events from 2007 through 2009 (*Table 1* below). For the incidence rates of all 13 patient safety indicators, see *Appendix C*. For the excess mortality and costs attributable to each patient safety indicator, see *Appendix E*. Death among surgical inpatients with serious treatable complications includes patients undergoing surgery indicated as

From 2007 through 2009, 79,670 Medicare inpatient patients who experienced one or more patient safety events died.

elective in the patient record who develop one of the following complications after surgery: pulmonary embolism or deep vein thrombosis; pneumonia; sepsis; shock or cardiac arrest; or gastrointestinal bleeding. One in ten of these surgical patients died.

Table 1: Most Commonly Occurring Patient Safety Indicators per 1,000 At-Risk Hospitalizations

Patient Safety Indicator	Incidence Rate per 1,000 At-Risk Hospitalizations	Excess Cost Attributable to PSI (Billion)
Death among surgical inpatients with serious treatable complications*	103.82	NA*
Pressure ulcer (decubitus ulcer)	26.64	\$1.99
Post-operative respiratory failure	17.18	\$1.96
Post-operative sepsis	16.10	\$0.64

* By definition, all patients with the Death among surgical inpatients with serious treatable complications event died and were excluded from Zhan and Miller's analysis on attributable mortality and cost associated with patient safety indicators.

Two of the most common indicators, pressure ulcer and post-operative respiratory failure, accounted for 54.08% of the nearly \$7.3 billion excess cost.

Patient safety events are not only common, but costly. Using cost numbers from the Zhan and Miller⁶ research, we estimate that the 13 patient safety indicators studied cost the U.S. health care system nearly \$7.3 billion from 2007 through 2009 (*Appendix E*). Two of the most common indicators (pressure ulcer and post-operative respiratory failure) accounted for 54.08% of this \$7.3 billion.

Hospital-Acquired Bloodstream Infections

Two of the 13 patient safety indicators (post-operative sepsis and central venous catheter-related bloodstream infections) are measures of hospital-acquired bloodstream infections. Post-operative sepsis is a measure of patients developing sepsis following surgeries classified as elective. Elective surgery in this case refers to those cases that are non-emergent. Central venous catheter-related bloodstream infections are those infections associated with the use of tubes utilized to give patients fluids, medications, or to quickly draw blood for testing. These tubes are typically placed in large blood vessels in the neck, groin or arm. Bloodstream infections represent just one type of hospital-acquired infection but are serious and costly. In evaluating these two measures of hospital-acquired infections from 2007 to 2009:

- There were 52,127 hospital-acquired infections among Medicare patients treated at the nation's hospitals (*Appendix C*).
- There were 8,114 deaths that occurred among patients developing a hospital-acquired bloodstream infection (*Appendix C*).
- These infections cost the federal government an estimated \$1.22 billion dollars in excess cost (*Appendix E*).
- Closing the gap on just these two types of hospital-acquired infections between the Patient Safety Excellence hospitals and all other hospitals could have prevented 28,975 hospital-acquired bloodstream infections (*Appendix D*).
- The 10 states with the lowest risk-adjusted rates of hospital-acquired bloodstream infections are: South Dakota, Iowa, Montana, Nebraska, Oregon, Kansas, Wisconsin, North Dakota, Minnesota, and Oklahoma (*Table 2*).

Table 2: Hospital-Acquired Bloodstream Infections Risk-Adjusted Rates by State

State	Observed-to-Expected Ratio	State Rank	State	Observed-to-Expected Ratio	State Rank
South Dakota	0.58	1	Massachusetts	0.94	27
Iowa	0.62	2	Indiana	0.95	28
Montana	0.64	3	Georgia	0.96	29
Nebraska	0.67	4	Maine	0.97	30
Oregon	0.75	5	Tennessee	0.99	31
Kansas	0.75	6	Illinois	1.00	32
Wisconsin	0.76	7	Virginia	1.01	33
North Dakota	0.78	8	West Virginia	1.01	34
Minnesota	0.78	9	Texas	1.01	35
Oklahoma	0.79	10	South Carolina	1.03	36
Vermont	0.81	11	Michigan	1.04	37
Washington	0.82	12	New York	1.05	38
Wyoming	0.82	13	Missouri	1.05	39
Idaho	0.82	14	New Mexico	1.06	40
Pennsylvania	0.86	15	Connecticut	1.08	41
Mississippi	0.86	16	California	1.09	42
Louisiana	0.88	17	Kentucky	1.10	43
Arkansas	0.88	18	Arizona	1.14	44
Alaska	0.88	19	Colorado	1.14	45
Utah	0.88	20	Florida	1.20	46
North Carolina	0.91	21	Rhode Island	1.25	47
Hawaii	0.92	22	Maryland	1.30	48
New Hampshire	0.92	23	New Jersey	1.33	49
Delaware	0.93	24	Nevada	1.35	50
Alabama	0.93	25	Dist. of Columbia	2.00	51
Ohio	0.94	26			

Value-Based Purchasing

In January 2011, the Centers for Medicare and Medicaid Services released its proposed rule for value-based purchasing. The proposed rule included 18 process of care measures and eight domains of patient experience that hospitals will be measured on and receive incentive-based payments starting in 2013.⁴

In 2014, four of the measures evaluated in this study will be included in the proposed rule for the hospital value-based purchasing program for Medicare inpatient services: iatrogenic pneumothorax, post-operative respiratory failure, post-operative pulmonary embolism or deep vein thrombosis, and post-operative abdominal wound dehiscence. These four patient safety events:

- Accounted for 229,664 in-hospital events (*Appendix C*).
- Accounted for 29,917 deaths among patients experiencing one or more of the four indicators (*Appendix C*).
- Cost the federal government an estimated \$3.7 billion in excess costs (*Appendix E*).

Patient Safety Performance Varies by State and City

HealthGrades evaluated state performance on the 13 patient safety indicators overall and by indicator. The results of this evaluation can be found in *Appendix F*.

The **top 10 states for patient safety**, those with the lowest overall rates of these 13 patient safety indicators combined, were:

- | | |
|-------------|-----------------|
| • Iowa | • Delaware |
| • Vermont | • Massachusetts |
| • Alaska | • Hawaii |
| • Minnesota | • New Hampshire |
| • Nebraska | • Rhode Island |

Since most consumers receive health care within the city that they live, HealthGrades evaluated cities as defined by the Nielsen Designated Market Areas (DMA) on their combined rates of these 13 patient safety events. Only cities with a population of at least one million people or more were considered in this analysis. Results can be found in *Appendix G*.

The **top 10 cities for patient safety**, those with the lowest overall rates of the 13 patient safety indicators, were:

- | | |
|----------------------------|---------------------|
| • Minneapolis-St. Paul, MN | • Boston, MA-NH |
| • Wichita, KS | • Greenville, SC-NC |
| • Cleveland, OH | • Honolulu, HI |
| • Wilkes-Barre, PA | • Charlotte, NC |
| • Toledo, OH | • Oklahoma City, OK |

Large Safety Gaps Identified Between Poorest- and Best-Performing Hospitals

The first part of this study examined the overall impact of 13 patient safety indicators across the nation's hospitals, states, and cities. The second part of this study identified the best-performing hospitals based on 13 patient safety indicators to establish a best-practice benchmark against which other hospitals can be evaluated. Best-performing hospitals were identified as the top 5% of ranked hospitals based on overall hospital performance and were recognized with the HealthGrades 2011 Patient Safety Excellence Award.

To be considered for the overall patient safety performance assessment, hospitals had to be rated in nine of the 13 patient safety indicators used in the study, be full-service hospitals (rated in at least 16 of 26 HealthGrades cohorts), and have a current overall HealthGrades star rating of at least 2.5, with 5.0 being the best possible overall star rating. (For more details, see *HealthGrades Hospital Report Cards™ Mortality and Complication Outcomes Methodology* at www.HealthGrades.com.)

Nationwide, 268 hospitals were recognized with the HealthGrades 2011 Patient Safety Excellence Award. **These best-performing hospitals represent 5% of all U.S. hospitals examined in this study** (*Appendix A*).

Nationwide, 268 hospitals were recognized with the HealthGrades 2011 Patient Safety Excellence Award.

Table 3: Best-Performing Hospitals by Hospital Type

Hospital Type	Number of Best-Performing Hospitals (Patient Safety Excellence Award Recipients)
Teaching Hospitals	128
Non-teaching Hospitals	140

The 268 Patient Safety Excellence Hospitals were located in 107 cities in 43 States. Fifty-five cities can boast multiple Patient Safety Excellence Hospitals with Boston, Chicago, New York, and Pittsburg leading the way with ten hospital recipients followed by Minneapolis, Cleveland, and Philadelphia with nine hospital recipients.

We found that there were wide, highly significant gaps in individual patient safety indicators and overall performance between the hospitals recognized with the HealthGrades 2011 Patient Safety Excellence Award and the bottom-ranked hospitals. More specifically, we found that **Patient Safety Excellence Award hospitals, as a group, significantly outperformed the bottom 5% hospitals on every patient safety indicator.** We also found that Patient Safety Excellence Award hospitals, as a group, had an overall patient safety performance equating to, on average, a **46.26% lower risk of experiencing one or more patient safety events** compared to the bottom 5% hospitals. This finding of better performance was consistent across all 13 patient safety indicators studied (range: 29.74% to 74.16% relative risk decrease) (*Appendix D*).

Patient Safety Excellence Award Hospitals Associated with Significantly Fewer Safety Events, Fewer Associated Deaths, and Lower Cost

If all hospitals had performed at the level of Patient Safety Excellence Award hospitals, approximately 174,358 patient safety events and 20,688 Medicare deaths could have been avoided while saving the United States nearly \$1.8 billion from 2007 through 2009 (*Appendix D*).

Interpretation of Results

Two significant changes occurred in the evaluation of patient safety events in this year's study compared to last year's study. The first is that the definition of several of the indicators were changed by AHRQ to accommodate changes to the International Classification of Diseases Ninth Revision, and the second is that present on admission (POA) indicators are now available in the MedPAR data file used in this analysis.⁷

The impact of these changes is that year-over-year comparisons of the event rates are not appropriate. To readers of our previous patient safety annual studies, it would appear that the number of patient safety events in the United States is decreasing. In reality, this is not a conclusion that can be drawn based on the changes in the underlying data used for the analysis. For example, the pressure ulcer (decubitus ulcer) indicator was changed to include only advanced pressure ulcers, stage three and four. Previously, hospitals were not required to capture this level of detail in the data submitted to Medicare. Because pressure ulcer staging information only became available in 2009, we cannot compare year-over-year changes for this indicator (e.g., comparing 2007 to 2008 and 2009).

Even without year-over-year comparisons, what is unquestionably clear is that patient safety events continue to be pervasive in American hospitals. When looking at the event rate of these preventable patient safety events, one must keep in mind that this study evaluates only 13 potential patient safety

Patients treated at best-performing hospitals had, on average, a 46.26% lower chance of experiencing one or more medical errors compared to poorest-performing hospitals.

If all hospitals had performed at the level of Patient Safety Excellence Award™ hospitals, approximately 174,358 patient safety events and 20,688 Medicare deaths could have been avoided, saving nearly \$1.8 billion from 2007 through 2009.

events. There are a multitude of additional patient safety events that occur every day in the U.S. health care system, such as adverse drug events where no data is made publicly available for organizations such as HealthGrades to evaluate and make available for consumers. This means that the **708,642 events** we identified from 2007 to 2009 represent only a fraction of the total patient safety events (*Appendix C*).

In 1999, the Institute of Medicine published a landmark study estimating medical errors as the eighth leading cause of death in the United States.⁸ Yet, a follow up study in 2005 found that while the study brought the issue to the forefront of the industry, progress has been “frustratingly slow”.⁹ Given the magnitude of the problem, it is important that all patients understand what a medical error is and that they take steps to mitigate their risk of experiencing a patient safety event when entering a hospital.

Proactive Patient Guidelines for Patient Safety

The following guidelines can help patients and their families understand their risks and take steps to become an active member of the health care team and protect themselves from a preventable patient safety event.

1. Take time to research objective quality information about your local hospitals.

If you are going to the hospital in a non-emergency situation, take the time to research objective quality information about that hospital. HealthGrades (www.HealthGrades.com) provides objective quality and patient safety information about hospitals, as do many states and the federal government at www.hospitalcompare.hhs.gov.

If you see information that concerns you, ask both your doctor and hospital personnel about the information and what steps they are taking to improve their performance as well as what steps they will take to ensure you do not have an adverse event. Do not rely solely on a friend or a physician's recommendation because not all hospitals are the same. We found that if all hospitals were performing at the level of the top hospitals for patient safety:

- 174,358 patient safety events may have been avoided between 2007 and 2009; and
- 20,688 Medicare lives could have been saved during the same time period (*Appendix D*).

2. Learn more about your own personal risks.

Learn more about your own personal risks of experiencing a complication or a poor outcome following a procedure or hospitalization. Elderly patients and patients with underlying health conditions are at higher risk for developing an in-hospital complication. Speak to your physician before any procedure to understand your individual risks, what you can do to mitigate those risks, and steps that the physician and hospital will take to accommodate your unique risk profile.

- One in ten Medicare surgical patients died after developing a serious but treatable medical complication following surgery.

3. Be your own advocate and don't be afraid to ask questions.

Be your own advocate and ask about safety precautions and protocols.

- We found that 52,127 hospital-acquired bloodstream infections occurred post-operatively or from the use of catheters (*Appendix C*). Know the specific steps your health care providers are taking to prevent these infections if you are undergoing surgery and/or need a catheter.

4. Protect yourself against delirium.

Patients undergoing surgery or being hospitalized are at risk for delirium due to the combination of illness, medications, and a lack of sleep. Patients that develop delirium in the hospital are at increased risk of adverse events such as post-operative hip fractures.

To protect yourself, talk to your physician about your risk and how to adjust your medications to reduce your risk. Also ask your friends and family members to help you by making sure you have access to glasses and hearing aids if you wear them. Sleeping well and getting out of bed with assistance from your health care team as much as possible can also help to combat hospital-acquired delirium.

5. Learn about your condition and know your health care team.

Be sure to ask your health care provider to explain your condition and your medications. You have the right to know what your diagnosis is and the purpose of every medication you are being given. You should also ask for the results of all tests and procedures.

Prior to checking into the hospital, make a list of every medication you take and the dose. Before you leave the hospital, talk to your health care provider about your medications. Make sure you know what medications to take, when to take them, why it is prescribed for you, if there are possible side effects, and are there any medications you should discontinue taking. Write down the name and phone number of the person you can call if you have questions about your medications.

Write down the name of the doctors participating in your care. During a hospitalization, you may see many doctors and this can lead to uncoordinated and fragmented care. Most importantly, make sure you know the primary physician who is coordinating your care among all of the different specialists. Your primary care physician is often a good person for this role.

6. Have a follow-up plan.

Have a follow-up plan. When being discharged from the hospital, have your follow-up appointments scheduled before leaving. Also be sure to have very specific instructions about what to do if your symptoms should change.

Acknowledgements

Health Grades, Inc., 999 18th Street, Suite 600, Denver, Colorado 80202. Health Grades Inc. is the leading independent health care ratings organization, providing quality ratings, profiles and cost information on the nation's hospitals, physicians, nursing homes and prescription drugs.

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Appendix A: HealthGrades 2011 Patient Safety Excellence Award™ Recipients by Designated Market Area

The following hospitals are recipients of the HealthGrades Patient Safety Excellence Award* in 2011. Some of the Patient Safety Excellence Award recipients have multiple locations. In these cases, results for all locations were used in the analysis and each of the facilities is designated as a recipient of the award.

Patient Safety Excellence Award Recipients 2011* by Designated Market Area	City	State	Teaching Status
Dothan, AL			
Southeast Alabama Medical Center	Dothan	AL	Non-teaching
Ft. Smith, AR			
Mercy Medical Center	Rogers	AR	Non-teaching
Jonesboro, AR			
NEA Baptist Memorial Hospital	Jonesboro	AR	Teaching
Phoenix, AZ			
Arrowhead Hospital	Glendale	AZ	Non-teaching
Banner Boswell Medical Center	Sun City	AZ	Teaching
Chandler Regional Medical Center	Chandler	AZ	Non-teaching
Flagstaff Medical Center	Flagstaff	AZ	Non-teaching
Mayo Clinic Hospital	Phoenix	AZ	Teaching
Verde Valley Medical Center	Cottonwood	AZ	Non-teaching
West Valley Hospital	Goodyear	AZ	Non-teaching
Tucson(Sierra Vista), AZ			
Northwest Medical Center	Tucson	AZ	Non-teaching
Chico-Redding, CA			
Feather River Hospital	Paradise	CA	Non-teaching
Oroville Hospital	Oroville	CA	Non-teaching
Los Angeles, CA			
Desert Valley Hospital	Victorville	CA	Non-teaching
Good Samaritan Hospital	Los Angeles	CA	Teaching
Hoag Memorial Hospital Presbyterian	Newport Beach	CA	Non-teaching
Kaiser Permanente Anaheim Medical Center	Anaheim	CA	Teaching
Kaiser Permanente Los Angeles Medical Center	Los Angeles	CA	Teaching
Saint John's Health Center	Santa Monica	CA	Non-teaching
Monterey-Salinas, CA			
Community Hospital of the Monterey Peninsula	Monterey	CA	Non-teaching
Dominican Hospital	Santa Cruz	CA	Non-teaching
Palm Springs, CA			
Eisenhower Medical Center	Rancho Mirage	CA	Non-teaching
Sacramento, CA			
Mercy General Hospital	Sacramento	CA	Teaching

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Continued

Patient Safety Excellence Award Recipients 2011* by Designated Market Area	City	State	Teaching Status
San Diego, CA			
Scripps Green Hospital	La Jolla	CA	Teaching
San Francisco, CA			
Kaiser Permanente San Francisco Medical Center	San Francisco	CA	Teaching
Kaiser Permanente Santa Rosa Medical Center	Santa Rosa	CA	Teaching
Washington Hospital	Fremont	CA	Non-teaching
Santa Barbara, CA			
French Hospital Medical Center	San Luis Obispo	CA	Non-teaching
Santa Barbara Cottage Hospital	Santa Barbara	CA	Teaching
Sierra Vista Regional Medical Center	San Luis Obispo	CA	Non-teaching
Denver, CO			
Exempla Saint Joseph Hospital	Denver	CO	Teaching
Grand Junction, CO			
St. Mary's Hospital and Regional Medical Center	Grand Junction	CO	Teaching
Hartford & New Haven, CT			
Day Kimball Hospital	Putnam	CT	Non-teaching
Lawrence & Memorial Hospital	New London	CT	Teaching
Manchester Memorial Hospital	Manchester	CT	Non-teaching
Saint Francis Care	Hartford	CT	Teaching
Washington, DC-MD			
Mary Washington Hospital	Fredericksburg	VA	Non-teaching
Winchester Medical Center	Winchester	VA	Teaching
Jacksonville, FL			
Flagler Hospital	Saint Augustine	FL	Non-teaching
Miami-Ft. Lauderdale, FL			
Cleveland Clinic Hospital	Weston	FL	Teaching
Holy Cross Hospital	Fort Lauderdale	FL	Non-teaching
Kendall Regional Medical Center	Miami	FL	Teaching
Mercy Hospital	Miami	FL	Teaching
Mount Sinai Medical Center	Miami Beach	FL	Teaching
<i>including:</i> Mount Sinai Medical Center and Miami Heart Institute	Miami Beach	FL	Teaching
Orlando, FL			
Florida Hospital Orlando	Orlando	FL	Teaching
Holmes Regional Medical Center	Melbourne	FL	Non-teaching
<i>including:</i> Palm Bay Community Hospital	Palm Bay	FL	Non-teaching
Munroe Regional Medical Center	Ocala	FL	Non-teaching
Ocala Regional Medical Center/West Marion Hospital	Ocala	FL	Non-teaching

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Continued

Patient Safety Excellence Award Recipients 2011* by Designated Market Area	City	State	Teaching Status
Tampa, FL			
Blake Medical Center	Bradenton	FL	Non-teaching
Citrus Memorial Hospital	Inverness	FL	Non-teaching
Heart of Florida Regional Medical Center	Davenport	FL	Non-teaching
Morton Plant Hospital	Clearwater	FL	Teaching
Sarasota Memorial Hospital	Sarasota	FL	Non-teaching
Seven Rivers Regional Medical Center	Crystal River	FL	Non-teaching
Venice Regional Medical Center	Venice	FL	Non-teaching
W. Palm Beach, FL			
Boca Raton Regional Hospital	Boca Raton	FL	Non-teaching
Indian River Medical Center	Vero Beach	FL	Non-teaching
Atlanta, GA			
Northeast Georgia Medical Center	Gainesville	GA	Non-teaching
<i>including:</i> Northeast Georgia Medical Center - Lanier Park	Gainesville	GA	Non-teaching
Northside Hospital - Forsyth	Cumming	GA	Non-teaching
Piedmont Hospital	Atlanta	GA	Teaching
Saint Mary's Health Care System	Athens	GA	Non-teaching
Honolulu, HI			
The Queens Medical Center	Honolulu	HI	Teaching
Cedar Rapids, IA			
Mercy Medical Center - Dubuque	Dubuque	IA	Non-teaching
Saint Luke's Hospital	Cedar Rapids	IA	Teaching
The Finley Hospital	Dubuque	IA	Non-teaching
University of Iowa Hospital and Clinics	Iowa City	IA	Teaching
Des Moines-Ames, IA			
Iowa Methodist Medical Center	Des Moines	IA	Teaching
Trinity Regional Medical Center	Fort Dodge	IA	Teaching
Sioux City, IA			
Faith Regional Health Services	Norfolk	NE	Non-teaching
<i>including:</i> Faith Regional Health Services - East	Norfolk	NE	Non-teaching
Davenport, IA-IL			
Genesis Medical Center - Davenport	Davenport	IA	Teaching
Great River Medical Center	West Burlington	IA	Non-teaching
Mercy Medical Center - Clinton	Clinton	IA	Non-teaching
Trinity Medical Center - West	Rock Island	IL	Non-teaching
<i>including:</i> Trinity Medical Center - East	Moline	IL	Non-teaching

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Patient Safety Excellence Award Recipients 2011* by Designated Market Area	City	State	Teaching Status
Chicago, IL			
Advocate Good Samaritan Hospital	Downers Grove	IL	Non-teaching
Advocate Good Shepherd Hospital	Barrington	IL	Non-teaching
Centegra Hospital - McHenry	McHenry	IL	Non-teaching
Centegra Memorial Medical Center	Woodstock	IL	Non-teaching
Central DuPage Hospital	Winfield	IL	Non-teaching
Elmhurst Memorial Hospital	Elmhurst	IL	Non-teaching
Illinois Valley Community Hospital	Peru	IL	Non-teaching
Northwest Community Hospital	Arlington Heights	IL	Non-teaching
Palos Community Hospital	Palos Heights	IL	Non-teaching
Community Hospital	Munster	IN	Non-teaching
Rockford, IL			
Rockford Memorial Hospital	Rockford	IL	Non-teaching
Indianapolis, IN			
Ball Memorial Hospital	Muncie	IN	Teaching
Hendricks Regional Health	Danville	IN	Non-teaching
Reid Hospital and Health Care Services	Richmond	IN	Non-teaching
Saint Francis Hospital and Health Centers	Beech Grove	IN	Teaching
South Bend-Elkhart, IN			
Memorial Hospital of South Bend	South Bend	IN	Teaching
Saint Joseph Regional Medical Center	Mishawaka	IN	Teaching
Wichita, KS			
Via Christi Regional Medical Center	Wichita	KS	Teaching
Bowling Green, KY			
Greenview Regional Hospital	Bowling Green	KY	Non-teaching
Lexington, KY			
Frankfort Regional Medical Center	Frankfort	KY	Non-teaching
Saint Joseph - London	London	KY	Non-teaching
New Orleans, LA			
Thibodaux Regional Medical Center	Thibodaux	LA	Non-teaching
Shreveport, LA			
Willis Knighton Medical Center	Shreveport	LA	Teaching
CHRISTUS Saint Michael Health System	Texarkana	TX	Teaching
Monroe-El Dorado, LA-AR			
Saint Francis Medical Center	Monroe	LA	Non-teaching
Springfield-Holyoke, MA			
Baystate Medical Center	Springfield	MA	Teaching
Cooley Dickinson Hospital	Northampton	MA	Non-teaching

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Patient Safety Excellence Award Recipients 2011* by Designated Market Area	City	State	Teaching Status
Boston, MA-NH			
Anna Jaques Hospital	Newburyport	MA	Non-teaching
Brigham and Women's Hospital	Boston	MA	Teaching
Cape Cod Hospital	Hyannis	MA	Teaching
Caritas Norwood Hospital	Norwood	MA	Non-teaching
Massachusetts General Hospital	Boston	MA	Teaching
Metrowest Medical Center - Framingham Union Hospital	Framingham	MA	Teaching
<i>including:</i> Leonard Morse Hospital	Natick	MA	Teaching
North Shore Medical Center - Salem Hospital	Salem	MA	Teaching
<i>including:</i> North Shore Medical Center - Union Hospital	Lynn	MA	Teaching
The Salem Hospital Corporation	Salem	MA	Teaching
Saint Vincent Hospital	Worcester	MA	Teaching
Winchester Hospital	Winchester	MA	Teaching
Cheshire Medical Center	Keene	NH	Non-teaching
Baltimore, MD			
Carroll Hospital Center	Westminster	MD	Non-teaching
Saint Joseph Medical Center	Towson	MD	Non-teaching
Alpena, MI			
Alpena Regional Medical Center	Alpena	MI	Non-teaching
Detroit, MI			
Crittenton Hospital Medical Center	Rochester	MI	Teaching
Oakwood Heritage Hospital	Taylor	MI	Teaching
Port Huron Hospital	Port Huron	MI	Non-teaching
Saint Joseph Mercy Hospital	Ypsilanti	MI	Teaching
Grand Rapids, MI			
Bronson Methodist Hospital	Kalamazoo	MI	Teaching
Spectrum Health Butterworth Hospital	Grand Rapids	MI	Teaching
<i>including:</i> Spectrum Health Blodgett Hospital	Grand Rapids	MI	Teaching
Lansing, MI			
Allegiance Health	Jackson	MI	Non-teaching
Traverse City, MI			
Munson Medical Center	Traverse City	MI	Teaching
Mankato, MN			
Immanuel - Saint Josephs - Mayo Health System	Mankato	MN	Teaching

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Patient Safety Excellence Award Recipients 2011* by Designated Market Area	City	State	Teaching Status
Minneapolis-St. Paul, MN			
Abbott Northwestern Hospital	Minneapolis	MN	Teaching
Fairview Ridges Hospital	Burnsville	MN	Non-teaching
Fairview Southdale Hospital	Edina	MN	Non-teaching
Lakeview Hospital	Stillwater	MN	Non-teaching
Mercy Hospital	Coon Rapids	MN	Teaching
North Memorial	Robbinsdale	MN	Teaching
Park Nicollet Methodist Hospital	Minneapolis	MN	Teaching
Saint Cloud Hospital	Saint Cloud	MN	Teaching
Saint Joseph's Hospital	Saint Paul	MN	Teaching
Duluth-Superior, MN-WI			
Saint Luke's Hospital	Duluth	MN	Teaching
St. Mary's Medical Center	Duluth	MN	Teaching
Columbia, MO			
Audrain Medical Center	Mexico	MO	Non-teaching
Boone Hospital Center	Columbia	MO	Non-teaching
St. Joseph, MO			
Heartland Regional Medical Center	Saint Joseph	MO	Non-teaching
St. Louis, MO			
Missouri Baptist Medical Center	Saint Louis	MO	Teaching
Kansas City, MO-KS			
Saint Luke's South	Overland Park	KS	Non-teaching
North Kansas City Hospital	North Kansas City	MO	Non-teaching
Saint Luke's Hospital of Kansas City	Kansas City	MO	Teaching
Columbus, MS			
North Mississippi Medical Center	Tupelo	MS	Teaching
Billings, MT			
Billings Clinic	Billings	MT	Teaching
Saint Vincent Healthcare	Billings	MT	Teaching
Missoula, MT			
Community Medical Center	Missoula	MT	Non-teaching
Kalispell Regional Medical Center	Kalispell	MT	Non-teaching
Saint Patrick Hospital and Health Sciences Center	Missoula	MT	Non-teaching
Charlotte, NC			
Carolinas Medical Center - Northeast	Concord	NC	Teaching
Iredell Memorial Hospital	Statesville	NC	Non-teaching
Raleigh, NC			
Rex Hospital	Raleigh	NC	Non-teaching

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Patient Safety Excellence Award Recipients 2011* by Designated Market Area	City	State	Teaching Status
Wilmington, NC			
New Hanover Regional Medical Center	Wilmington	NC	Teaching
<i>including:</i> Cape Fear Hospital	Wilmington	NC	Teaching
Minot, ND			
Saint Alexius Medical Center	Bismarck	ND	Teaching
Omaha, NE			
Alegent Health Mercy Hospital	Council Bluffs	IA	Non-teaching
Alegent Health - Bergan Mercy Medical Center	Omaha	NE	Teaching
Fremont Area Medical Center	Fremont	NE	Non-teaching
The Nebraska Methodist Hospital	Omaha	NE	Teaching
Albany, NY			
Saint Peter's Hospital	Albany	NY	Teaching
Elmira, NY			
Arnot Ogden Medical Center	Elmira	NY	Non-teaching
New York, NY			
Danbury Hospital	Danbury	CT	Teaching
Englewood Hospital & Medical Center	Englewood	NJ	Teaching
Hackettstown Regional Medical Center	Hackettstown	NJ	Non-teaching
Jersey Shore University Medical Center	Neptune	NJ	Teaching
Morristown Memorial Hospital	Morristown	NJ	Teaching
Benedictine Hospital	Kingston	NY	Teaching
John T. Mather Memorial Hospital	Port Jefferson	NY	Non-teaching
Lenox Hill Hospital	New York	NY	Teaching
Saint Francis Hospital Roslyn	Roslyn	NY	Teaching
St. Luke's Cornwall Hospital	Newburgh	NY	Non-teaching
Cincinnati, OH			
Mercy Hospital - Western Hills	Cincinnati	OH	Non-teaching
Cleveland, OH			
Community Health Partners of Ohio - West	Lorain	OH	Teaching
EMH Regional Medical Center	Elyria	OH	Non-teaching
Firelands Regional Medical Center	Sandusky	OH	Teaching
Lake Health	Concord Township	OH	Teaching
Mercy Medical Center	Canton	OH	Teaching
Parma Community General Hospital	Parma	OH	Non-teaching
Southwest General Health Center	Middleburg Heights	OH	Teaching
Summa Akron City and St. Thomas Hospitals	Akron	OH	Teaching
Union Hospital	Dover	OH	Non-teaching
Columbus, OH			
Riverside Methodist Hospital	Columbus	OH	Teaching

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Patient Safety Excellence Award Recipients 2011* by Designated Market Area	City	State	Teaching Status
Dayton, OH			
Kettering Medical Center	Kettering	OH	Teaching
Toledo, OH			
Bixby Medical Center	Adrian	MI	Non-teaching
Blanchard Valley Hospital	Findlay	OH	Non-teaching
St. Luke's Hospital	Maumee	OH	Teaching
The Toledo Hospital	Toledo	OH	Teaching
Zanesville, OH			
Genesis Healthcare System	Zanesville	OH	Non-teaching
Oklahoma City, OK			
Midwest Regional Medical Center	Midwest City	OK	Non-teaching
Saint Anthony Hospital	Oklahoma City	OK	Teaching
<i>including:</i> Saint Michael Hospital	Oklahoma City	OK	Teaching
Bend, OR			
Saint Charles Medical Center - Bend	Bend	OR	Teaching
Eugene, OR			
Sacred Heart Medical Center at Riverbend	Springfield	OR	Non-teaching
<i>including:</i> Sacred Heart Medical Center - University District	Eugene	OR	Non-teaching
Medford, OR			
Rogue Valley Medical Center	Medford	OR	Non-teaching
Portland, OR			
Adventist Medical Center	Portland	OR	Non-teaching
Kaiser Sunnyside Medical Center	Clackamas	OR	Teaching
Providence Saint Vincent Medical Center	Portland	OR	Teaching
Erie, PA			
Hamot Medical Center	Erie	PA	Teaching
Harrisburg, PA			
Lancaster General Hospital	Lancaster	PA	Teaching
Milton S. Hershey Medical Center	Hershey	PA	Teaching
Johnstown-Altoona, PA			
Clearfield Hospital	Clearfield	PA	Non-teaching
DuBois Regional Medical Center	Du Bois	PA	Non-teaching

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Patient Safety Excellence Award Recipients 2011* by Designated Market Area	City	State	Teaching Status
Philadelphia, PA			
Bayhealth Medical Center - Kent General Hospital	Dover	DE	Non-teaching
<i>including.</i> Bayhealth Medical Center Milford Memorial	Milford	DE	Non-teaching
Bryn Mawr Hospital	Bryn Mawr	PA	Teaching
Chester County Hospital	West Chester	PA	Non-teaching
Doylestown Hospital	Doylestown	PA	Non-teaching
Grand View Hospital	Sellersville	PA	Non-teaching
Lankenau Hospital	Wynnewood	PA	Teaching
Lehigh Valley Hospital	Allentown	PA	Teaching
Montgomery Hospital	Norristown	PA	Teaching
Paoli Hospital	Paoli	PA	Non-teaching
Pittsburgh, PA			
Allegheny General Hospital	Pittsburgh	PA	Teaching
<i>including.</i> Allegheny General Hospital Suburban Campus	Pittsburgh	PA	Teaching
Butler Memorial Hospital	Butler	PA	Non-teaching
Excelsa Health Latrobe Hospital	Latrobe	PA	Teaching
Indiana Regional Medical Center	Indiana	PA	Non-teaching
Jefferson Regional Medical Center	Pittsburgh	PA	Non-teaching
Saint Clair Hospital	Pittsburgh	PA	Non-teaching
The Washington Hospital	Washington	PA	Teaching
The Western Pennsylvania Hospital - Forbes Regional Campus	Monroeville	PA	Teaching
UPMC Northwest	Seneca	PA	Non-teaching
Westmoreland Hospital	Greensburg	PA	Non-teaching
<i>including.</i> Westmoreland Hospital at Jeannette	Jeannette	PA	Non-teaching
Wilkes Barre, PA			
Community Medical Center	Scranton	PA	Teaching
Evangelical Community Hospital	Lewisburg	PA	Non-teaching
Hazleton General Hospital	Hazleton	PA	Non-teaching
Mercy Hospital Scranton	Scranton	PA	Teaching
Robert Packer Hospital	Sayre	PA	Teaching
Schuylkill Medical Center East Norwegian Street	Pottsville	PA	Non-teaching
Providence, RI-MA			
Southcoast Hospitals Group - Charlton Memorial	Fall River	MA	Non-teaching
<i>including.</i>			
Southcoast Hospitals Group - Saint Luke's Hospital	New Bedford	MA	Non-teaching
Southcoast Hospitals Group - Tobey Hospital	Wareham	MA	Non-teaching
Landmark Medical Center	Woonsocket	RI	Non-teaching
Columbia, SC			
Sisters of Charity Providence Hospitals	Columbia	SC	Non-teaching

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Patient Safety Excellence Award Recipients 2011* by Designated Market Area	City	State	Teaching Status
Myrtle Beach, SC			
Scotland Memorial Hospital	Laurinburg	NC	Non-teaching
Grand Strand Regional Medical Center	Myrtle Beach	SC	Non-teaching
McLeod Regional Medical Center	Florence	SC	Teaching
Greenville, SC-NC			
Margaret R. Pardee Memorial Hospital	Hendersonville	NC	Teaching
Mission Hospitals	Asheville	NC	Teaching
AnMed Health	Anderson	SC	Teaching
Sioux Falls, SD			
Sanford USD Medical Center	Sioux Falls	SD	Teaching
Chattanooga, TN			
Memorial Healthcare System	Chattanooga	TN	Non-teaching
Nashville, TN			
Saint Thomas Hospital	Nashville	TN	Teaching
Tri-Cities, TN-VA			
Holston Valley Medical Center	Kingsport	TN	Teaching
Amarillo, TX			
Baptist Saint Anthony's Health System	Amarillo	TX	Teaching
Corpus Christi, TX			
CHRISTUS Spohn Hospital Corpus Christi - Memorial <i>including:</i>	Corpus Christi	TX	Teaching
CHRISTUS Spohn Hospital Corpus Christi - Shoreline	Corpus Christi	TX	Teaching
CHRISTUS Spohn Hospital Corpus Christi - South	Corpus Christi	TX	Teaching
Dallas-Ft. Worth, TX			
East Texas Medical Center Athens	Athens	TX	Non-teaching
Texas Health Presbyterian Hospital of Plano	Plano	TX	Non-teaching
Harlingen, TX			
Valley Baptist Medical Center	Harlingen	TX	Teaching
Tyler-Longview, TX			
Good Shepherd Medical Center	Longview	TX	Non-teaching
Mother Frances Hospital - Tyler	Tyler	TX	Teaching
Wichita Falls, TX-OK			
United Regional	Wichita Falls	TX	Teaching
Salt Lake City, UT			
McKay - Dee Hospital Center	Ogden	UT	Teaching
Harrisonburg, VA			
Augusta Health	Fishersville	VA	Non-teaching
Norfolk, VA			
Sentara Williamsburg Regional Medical Center	Williamsburg	VA	Non-teaching

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Patient Safety Excellence Award Recipients 2011* by Designated Market Area	City	State	Teaching Status
Roanoke-Lynchburg, VA			
Lynchburg General Hospital	Lynchburg	VA	Teaching
Burlington, VT-NY			
Fletcher Allen Hospital of Vermont	Burlington	VT	Teaching
Seattle-Tacoma, WA			
Northwest Hospital & Medical Center	Seattle	WA	Non-teaching
Overlake Hospital Medical Center	Bellevue	WA	Non-teaching
PeaceHealth St. Joseph Medical Center	Bellingham	WA	Non-teaching
Providence Regional Medical Center Everett	Everett	WA	Non-teaching
Providence Saint Peter Hospital	Olympia	WA	Teaching
Virginia Mason Medical Center	Seattle	WA	Teaching
Spokane, WA			
Holy Family Hospital	Spokane	WA	Non-teaching
Sacred Heart Medical Center	Spokane	WA	Teaching
Green Bay-Appleton, WI			
Aurora BayCare Medical Center	Green Bay	WI	Non-teaching
Bellin Memorial Hospital	Green Bay	WI	Non-teaching
Mercy Medical Center	Oshkosh	WI	Non-teaching
Saint Mary's Hospital Medical Center	Green Bay	WI	Non-teaching
Theda Clark Medical Center	Neenah	WI	Non-teaching
La Crosse-Eau Claire, WI			
Gundersen Lutheran Medical Center	La Crosse	WI	Teaching
Luther Hospital Mayo Health System	Eau Claire	WI	Teaching
Madison, WI			
Saint Mary's Hospital	Madison	WI	Teaching
Milwaukee, WI			
Aurora Sheboygan Memorial Medical Center	Sheboygan	WI	Non-teaching
Columbia Saint Mary's Hospital Milwaukee	Milwaukee	WI	Teaching
<i>including:</i> Columbia St. Mary's Hospital Columbia	Milwaukee	WI	Teaching
Wausau-Rhineland, WI			
Aspirus Wausau Hospital	Wausau	WI	Teaching
Saint Clare's Hospital of Weston	Weston	WI	Non-teaching

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Appendix B: Patient Safety Indicators Used in this HealthGrades Study

The following 13 patient safety indicators were used in this HealthGrades study.

Patient Safety Indicator	Translated as...
Death in low mortality Diagnostic Related Groupings (DRGs)	Death in procedures where mortality is usually very low
Pressure ulcer (decubitus ulcer)	Pressure sores or bed sores acquired in the hospital
Death among surgical inpatients with serious treatable complications (previously known as "failure to rescue")	Death following a serious complication after surgery
Foreign body left after a procedure	Number of events of foreign objects left in body during a procedure
Iatrogenic pneumothorax	Collapsed lung due to a procedure or surgery in or around the chest
Central venous catheter-related bloodstream infections	Catheter-related bloodstream infections acquired at the hospital
Post-operative hip fracture	Hip fracture following surgery
Post-operative hemorrhage or hematoma	Excessive bruising or bleeding as a consequence of a procedure or surgery
Post-operative physiologic and metabolic derangements	Electrolyte and fluid imbalance following surgery
Post-operative respiratory failure	Respiratory failure following surgery
Post-operative pulmonary embolism or deep vein thrombosis	Deep blood clots in the lungs or legs following surgery
Post-operative sepsis	Bloodstream infection following surgery
Post-operative abdominal wound dehiscence	Breakdown of abdominal incision site

Appendix C: Patient Safety Incidence Rates and Associated Mortality Among Medicare Beneficiaries (2007 – 2009)

Patient Safety Indicator	Number of Events	Total Cases Evaluated	Rate per 1,000	Associated Mortality*
Death in low mortality DRGs	4,103	3,877,557	1.058	4,103
Pressure ulcer (decubitus ulcer)	368,261	13,821,964	26.643	33,981
Death among surgical inpatients with serious treatable complications (previously known as "failure to rescue")	21,773	209,710	103.824	21,773
Foreign body left in during procedure	294	13,678,469	0.021	10
Iatrogenic pneumothorax	20,757	37,902,206	0.548	3,308
Central venous catheter-related bloodstream infections	29,809	26,978,591	1.105	2,648
Post-operative hip fracture	1,921	6,170,457	0.311	184
Post-operative hemorrhage or hematoma	24,749	10,423,703	2.374	1,656
Post-operative physiologic and metabolic derangements	5,750	5,560,048	1.034	1,186
Post-operative respiratory failure	73,136	4,256,368	17.183	15,063
Post-operative pulmonary embolism or deep vein thrombosis	130,927	10,434,788	12.547	10,923
Post-operative sepsis	22,318	1,386,382	16.098	5,466
Post-operative abdominal wound dehiscence	4,844	1,359,436	3.563	623
TOTAL	708,642			100,924
Less Double Counts	667,828[^]			79,670

* The mortality reported is all-cause in-hospital mortality among all U.S. patients that experienced one or more patient safety events during hospitalization from 2007 through 2009.

[^] This is the number of patients with one or more patient safety events.

Appendix D: Comparing Different Performance Categories (2007 – 2009)

Patient Safety Indicator	Observed-to-Expected Ratios (O/E) by PSI and Associated Outcomes				As Compared to the Top 15% Performance			
	Top Hospitals (Hospitals Recognized with Patient Safety Excellence Award) O/E Ratios (95% CI)	Middle Hospitals O/E Ratios	Bottom Hospitals O/E Ratios (95% CI)	Relative Risk Decrease Associated with Patient Safety Excellence Hospitals Compared to Bottom Hospitals	# of Excess Patient Safety Events** Among All Non-Patient Safety Award Hospitals	# Potentially Avoidable Deaths** Associated with Excess Patient Safety Events Among All Non-Patient Safety Award Hospitals	Excess Charge^ (Millions) Associated with Excess Patient Safety Events Among All Non-Patient Safety Award Hospitals	Excess Cost^^ (Millions) Associated with Excess Patient Safety Events Among All Non-Patient Safety Award Hospitals
Death in low mortality DRGs*	.691 (.633- .750)	1.026	1.200 (1.115-1.285)	42.40%	1,266	1,266	NA*	NA*
Pressure ulcer (decubitus ulcer)	.731 (.725- .737)	1.008	1.249 (1.241-1.258)	41.49%	99,070	7,163	\$1,074	\$537
Death among surgical inpatients with serious treatable complications (failure to rescue)*	.808 (.783- .833)	1.005	1.150 (1.122-1.178)	29.74%	4,179	4,179	NA*	NA*
Foreign body left in during procedure	.447 (.286- .607)	.981	1.729 (1.391-2.066)	74.16%	162	3	\$2	\$1
Iatrogenic pneumothorax	.835 (.809- .861)	1.002	1.193 (1.159-1.228)	30.01%	3,421	239	\$59	\$30
Central venous catheter-related bloodstream infections	.693 (.673- .713)	.982	1.459 (1.427-1.490)	52.48%	9,145	394	\$354	\$177
Post-operative hip fracture	.629 (.558- .701)	.988	1.580 (1.446-1.713)	60.15%	711	32	\$10	\$5
Post-operative hemorrhage or hematoma	.825 (.802- .848)	.998	1.219 (1.189-1.250)	32.35%	4,332	130	\$93	\$46
Post-operative physiologic and metabolic derangements	.612 (.574- .651)	.989	1.628 (1.552-1.704)	62.38%	2,228	441	\$122	\$61
Post-operative respiratory failure	.771 (.758- .784)	.988	1.348 (1.328-1.367)	42.81%	16,774	3,663	\$897	\$449
Post-operative pulmonary embolism or deep vein thrombosis	.805 (.795- .815)	.988	1.318 (1.303-1.332)	38.92%	25,554	1,676	\$555	\$277
Post-operative sepsis	.717 (.695- .738)	.979	1.487 (1.450-1.523)	51.80%	6,327	1,387	\$365	\$183
Post-op wound dehiscence in abdominopelvic surgical patients	.754 (.702- .807)	.999	1.317 (1.239-1.395)	42.72%	1,189	115	\$48	\$24
Average relative risk increase in and number of potentially avoidable patient safety events, death, charge and cost associated with All Other hospitals compared to Award hospitals.				46.26%	174,358	20,688	\$3,579	\$1,790

* By definition, all patients with the event died and were excluded from Zhan and Miller's analysis on attributable mortality and cost associated with patient safety events.

** Excess events are determined by applying the Patient Safety Excellence Hospital event rates to all other hospitals and subtracting from their actual event rate.

^ Based on previous research done by Zhan and Miller. *Excess Length of Stay, Charges, and Mortality Attributable to Medical Injuries During Hospitalization*. JAMA. 2003; 290(14):1868-1874.

^^ Assuming an average cost to charge ratio of 0.5 (Friedman, La Mare, Andrews, and McKenzie. *Practical Options for Estimating Cost of Hospital Inpatient Stays*. J Health Care Finance. 2002; 29(1): 1-13).

Appendix E: Patient Safety Events and Their Attributable Mortality and Excess Charge among Medicare Beneficiaries by Patient Safety Indicator (2007 – 2009)

Patient Safety Indicator	Actual Number of National Events	Percentage of Total Number of Events	Attributable Charge**	Excess Charge Attributable to PSI** (Millions)	Excess Cost Attributable to PSI ^^ (Millions)
Pressure ulcer (decubitus ulcer)	368,261	51.97%	\$10,845	\$3,993.79	\$1,996.90
Post-operative pulmonary embolism or deep vein thrombosis	130,927	18.48%	\$21,709	\$2,842.29	\$1,421.15
Post-operative respiratory failure	73,136	10.32%	\$53,502	\$3,912.92	\$1,956.46
Central venous catheter-related bloodstream infections	29,809	4.21%	\$38,656	\$1,152.30	\$576.15
Post-operative hemorrhage or hematoma	24,749	3.49%	\$21,431	\$530.40	\$265.20
Post-operative sepsis	22,318	3.15%	\$57,727	\$1,288.35	\$644.18
Death among surgical inpatients with serious treatable complications (failure to rescue)*	21,773	3.07%	NA*	NA*	NA*
Iatrogenic pneumothorax	20,757	2.93%	\$17,312	\$359.35	\$179.67
Post-operative physiologic and metabolic derangements	5,750	0.81%	\$54,818	\$315.20	\$157.60
Post-operative abdominal wound dehiscence	4,844	0.68%	\$40,323	\$195.32	\$97.66
Death in low mortality DRGs*	4,103	0.58%	NA*	NA*	NA*
Post-operative hip fracture	1,921	0.27%	\$13,441	\$25.82	\$12.91
Foreign body left in during procedure	294	0.04%	\$13,315	\$3.91	\$1.96
Totals	708,642	-	-	\$14,619.66	\$7,309.83

** Based on previous research done by Zhan and Miller. *Excess Length of Stay, Charges, and Mortality Attributable to Medical Injuries During Hospitalization*. JAMA. 2003; 290(14):1868-1874. Insufficient data to estimate attributable mortality rates for Complications of Anesthesia and Transfusion Reaction.

^^ Assuming an average cost to charge ratio of 0.5 (Friedman, La Mare, Andrews, McKenzie, *Practical Options for Estimating Cost of Hospital Inpatient Stays*. J Health Care Finance. 2002; 29(1): 1-13.

Appendix F: Patient Safety Observed-to-Expected Incidence Rate by State

The following table presents patient safety observed-to-expected ratios by patient safety indicator across the 50 states and the District of Columbia; and highlights the top-performing states.

● Best - Top 10 States ◎ Average - Middle 31 States ○ Worst - Bottom 10 States

Patient Safety Indicator	AK	AL	AR	AZ	CA	CO	CT	DC	DE	FL
Overall Average	0.83 ●	1.03 ◎	1.01 ◎	0.95 ◎	1.02 ◎	1.10 ○	1.00 ◎	1.38 ○	0.87 ●	1.01 ◎
Death in low mortality DRGs	1.34 ◎	1.19 ◎	1.22 ◎	0.82 ●	0.97 ◎	0.98 ◎	0.62 ●	0.87 ◎	0.50 ●	0.85 ●
Pressure ulcer (decubitus ulcer)	0.91 ◎	1.01 ◎	1.02 ◎	0.75 ◎	1.22 ○	0.74 ◎	1.02 ○	1.42 ○	0.87 ◎	0.90 ◎
Death among surgical inpatients with serious treatable complications (failure to rescue)	1.14 ◎	1.39 ○	1.14 ◎	0.73 ●	1.02 ◎	0.89 ◎	0.85 ●	1.15 ○	1.00 ◎	0.98 ◎
Foreign body left in during procedure	0.00 ●	0.36 ●	0.00 ●	1.17 ◎	1.38 ◎	1.58 ◎	1.74 ○	0.87 ◎	0.00 ●	1.04 ◎
Iatrogenic pneumothorax	0.34 ●	1.03 ◎	1.17 ○	1.01 ◎	1.01 ◎	1.38 ○	0.96 ◎	1.27 ○	0.94 ◎	1.06 ◎
Central venous catheter-related bloodstream infections	1.31 ○	0.89 ◎	0.81 ◎	1.15 ○	1.11 ◎	1.26 ○	1.12 ◎	1.17 ○	0.96 ◎	1.31 ○
Post-operative hip fracture	0.50 ●	1.06 ◎	1.05 ◎	0.91 ◎	0.91 ◎	1.28 ○	1.12 ◎	1.81 ○	1.42 ○	1.00 ◎
Post-operative hemorrhage or hematoma	1.08 ◎	1.14 ○	1.16 ○	0.89 ●	1.03 ◎	1.22 ○	1.08 ◎	1.03 ◎	0.87 ●	0.96 ◎
Post-operative physiologic and metabolic derangements	0.35 ●	1.25 ◎	1.37 ○	0.87 ◎	1.01 ◎	0.81 ◎	0.61 ◎	1.18 ◎	0.87 ◎	0.98 ◎
Post-operative respiratory failure	0.70 ●	1.12 ◎	1.21 ○	0.96 ◎	0.80 ◎	0.92 ◎	0.92 ◎	1.46 ○	0.92 ◎	1.01 ◎
Post-op pulmonary embolism or deep vein thrombosis	0.91 ◎	0.97 ◎	0.78 ◎	0.98 ◎	0.94 ◎	1.10 ◎	0.99 ◎	1.31 ○	1.14 ○	1.02 ◎
Post-operative sepsis	0.53 ●	0.97 ◎	0.96 ◎	1.12 ○	1.06 ◎	1.01 ◎	1.00 ◎	2.89 ○	0.88 ◎	1.06 ◎
Post-operative abdominal wound dehiscence	1.73 ○	1.02 ◎	1.28 ○	1.02 ◎	0.79 ●	1.08 ◎	0.95 ●	1.53 ○	0.98 ◎	0.92 ●

Continued....

● Best - Top 10 States

◎ Average - Middle 31 States

○ Worst - Bottom 10 States

Patient Safety Indicator	GA	HI	IA	ID	IL	IN	KS	KY	LA	MA
Overall Average	1.02 ◎	0.90 ●	0.80 ●	1.02 ◎	1.01 ◎	0.96 ◎	0.98 ◎	1.12 ○	1.01 ◎	0.89 ●
Death in low mortality DRGs	1.12 ◎	0.79 ●	0.87 ◎	1.84 ○	0.92 ◎	1.08 ◎	1.43 ○	0.95 ◎	1.19 ◎	0.58 ●
Pressure ulcer (decubitus ulcer)	0.98 ◎	0.71 ◎	0.45 ●	0.60 ●	1.09 ○	0.81 ◎	0.78 ◎	1.00 ◎	1.19 ○	0.72 ◎
Death among surgical inpatients with serious treatable complications (failure to rescue)	1.13 ◎	1.47 ○	0.82 ●	0.83 ●	0.88 ◎	0.89 ◎	0.94 ◎	1.01 ◎	1.11 ◎	0.76 ●
Foreign body left in during procedure	0.99 ◎	0.00 ●	0.99 ◎	1.85 ○	0.90 ◎	0.74 ◎	1.36 ◎	0.90 ◎	0.86 ◎	1.34 ◎
Iatrogenic pneumothorax	0.90 ◎	1.15 ○	0.88 ●	1.02 ◎	0.94 ◎	0.81 ●	1.11 ◎	0.97 ◎	0.85 ●	1.20 ○
Central venous catheter-related bloodstream infections	0.85 ◎	0.94 ◎	0.49 ●	0.77 ●	1.01 ◎	0.82 ◎	0.76 ●	0.92 ◎	0.77 ◎	1.11 ◎
Post-operative hip fracture	1.06 ◎	1.21 ◎	0.89 ◎	0.99 ◎	1.09 ◎	0.88 ◎	0.94 ◎	1.33 ○	0.50 ●	0.90 ◎
Post-operative hemorrhage or hematoma	0.95 ◎	1.08 ◎	0.90 ◎	1.18 ○	1.02 ◎	0.89 ●	0.94 ◎	0.97 ◎	1.09 ◎	0.99 ◎
Post-operative physiologic and metabolic derangements	0.96 ◎	0.69 ◎	0.70 ◎	0.95 ◎	1.04 ◎	1.50 ○	1.05 ◎	1.59 ○	1.56 ○	0.61 ●
Post-operative respiratory failure	1.13 ◎	0.90 ◎	0.96 ◎	0.61 ●	1.00 ◎	1.21 ○	0.98 ◎	1.52 ○	1.20 ○	0.79 ◎
Post-op pulmonary embolism or deep vein thrombosis	1.07 ◎	0.72 ●	0.61 ●	0.70 ●	1.25 ○	0.83 ◎	0.77 ◎	0.91 ◎	0.96 ◎	0.89 ◎
Post-operative sepsis	1.10 ○	0.89 ◎	0.75 ●	0.87 ◎	0.99 ◎	1.09 ◎	0.74 ●	1.31 ○	1.01 ◎	0.69 ●
Post-operative abdominal wound dehiscence	0.98 ◎	1.20 ◎	1.05 ◎	0.99 ◎	1.01 ◎	0.99 ◎	0.99 ◎	1.13 ◎	0.81 ●	1.02 ◎

Continued...

● Best - Top 10 States

⊙ Average - Middle 31 States

○ Worst - Bottom 10 States

Patient Safety Indicator	MD	ME	MI	MN	MO	MS	MT	NC	ND	NE
Overall Average	1.08 ○	1.01 ⊙	0.96 ⊙	0.85 ●	1.02 ⊙	1.05 ○	0.97 ⊙	0.97 ⊙	1.04 ○	0.87 ●
Death in low mortality DRGs	0.98 ⊙	1.04 ⊙	0.87 ⊙	0.84 ●	1.03 ⊙	1.58 ○	1.44 ○	1.18 ⊙	1.00 ⊙	1.03 ⊙
Pressure ulcer (decubitus ulcer)	1.56 ○	0.73 ⊙	0.99 ⊙	0.51 ●	0.91 ⊙	1.11 ○	0.59 ●	0.95 ⊙	0.49 ●	0.55 ●
Death among surgical inpatients with serious treatable complications (failure to rescue)	0.94 ⊙	1.20 ○	0.87 ⊙	0.79 ●	1.08 ⊙	1.49 ○	0.93 ⊙	1.14 ○	1.23 ○	0.93 ⊙
Foreign body left in during procedure	0.39 ⊙	1.36 ⊙	0.44 ⊙	1.16 ⊙	0.51 ⊙	0.65 ⊙	3.39 ○	0.83 ⊙	2.87 ○	0.51 ⊙
Iatrogenic pneumothorax	1.01 ⊙	1.23 ○	0.96 ⊙	0.90 ●	1.06 ⊙	0.82 ●	0.83 ●	0.92 ⊙	1.13 ⊙	1.25 ○
Central venous catheter-related bloodstream infections	1.14 ○	1.10 ⊙	0.98 ⊙	0.81 ⊙	1.02 ⊙	0.76 ●	0.74 ●	0.94 ⊙	0.78 ⊙	0.65 ●
Post-operative hip fracture	1.29 ○	1.34 ○	1.10 ⊙	0.78 ●	1.36 ○	0.53 ●	0.32 ●	1.00 ⊙	0.32 ●	1.07 ⊙
Post-operative hemorrhage or hematoma	1.17 ○	1.10 ⊙	1.10 ⊙	1.11 ⊙	1.06 ⊙	0.76 ●	1.14 ○	0.98 ⊙	0.94 ⊙	1.07 ⊙
Post-operative physiologic and metabolic derangements	0.99 ⊙	0.47 ●	0.94 ⊙	0.80 ⊙	1.12 ⊙	1.56 ○	0.41 ●	0.83 ⊙	1.44 ○	0.72 ⊙
Post-operative respiratory failure	0.92 ⊙	0.78 ⊙	0.99 ⊙	0.84 ⊙	1.23 ○	1.18 ○	0.74 ●	1.04 ⊙	0.73 ●	0.83 ⊙
Post-op pulmonary embolism or deep vein thrombosis	1.27 ○	0.82 ⊙	1.13 ○	0.78 ⊙	0.98 ⊙	0.99 ⊙	0.64 ●	0.97 ⊙	0.50 ●	0.82 ⊙
Post-operative sepsis	1.57 ○	0.76 ⊙	1.14 ○	0.76 ⊙	1.10 ○	1.00 ⊙	0.53 ●	0.87 ⊙	0.78 ⊙	0.68 ●
Post-operative abdominal wound dehiscence	0.79 ●	1.14 ⊙	1.01 ⊙	0.91 ●	0.86 ●	1.17 ⊙	0.90 ●	1.01 ⊙	1.36 ○	1.13 ⊙

Continued...

● Best - Top 10 States

⊙ Average - Middle 31 States

○ Worst - Bottom 10 States

Patient Safety Indicator	NH	NJ	NM	NV	NY	OH	OK	OR	PA	RI
Overall Average	0.91 ●	1.03 ⊙	1.22 ○	1.41 ○	1.08 ○	0.96 ⊙	0.97 ⊙	0.94 ⊙	0.94 ⊙	0.92 ●
Death in low mortality DRGs	1.37 ○	1.03 ⊙	0.60 ●	1.37 ○	1.09 ⊙	0.91 ⊙	1.44 ○	1.04 ⊙	0.78 ●	0.69 ●
Pressure ulcer (decubitus ulcer)	0.67 ●	1.16 ○	0.97 ⊙	1.10 ○	1.46 ○	0.83 ⊙	0.92 ⊙	0.71 ⊙	0.89 ⊙	0.82 ⊙
Death among surgical inpatients with serious treatable complications (failure to rescue)	0.80 ●	1.04 ⊙	1.07 ⊙	1.22 ○	1.09 ⊙	0.82 ●	1.12 ⊙	1.26 ○	0.91 ⊙	1.26 ○
Foreign body left in during procedure	0.00 ●	0.36 ●	2.68 ○	2.39 ○	1.31 ⊙	0.58 ⊙	0.77 ⊙	1.27 ⊙	1.32 ⊙	0.00 ●
Iatrogenic pneumothorax	1.25 ○	0.96 ⊙	1.08 ⊙	0.85 ●	1.00 ⊙	0.94 ⊙	1.05 ⊙	1.30 ○	1.03 ⊙	0.95 ⊙
Central venous catheter-related bloodstream infections	1.20 ○	1.52 ○	0.82 ⊙	1.57 ○	1.03 ⊙	0.96 ⊙	0.68 ●	0.67 ●	0.89 ⊙	1.60 ○
Post-operative hip fracture	0.91 ⊙	0.98 ⊙	1.31 ○	1.98 ○	1.00 ⊙	1.13 ⊙	0.86 ⊙	0.99 ⊙	0.82 ⊙	0.45 ●
Post-operative hemorrhage or hematoma	1.32 ○	0.88 ●	1.27 ○	1.07 ⊙	0.94 ⊙	1.04 ⊙	0.95 ⊙	0.99 ⊙	0.94 ⊙	0.87 ●
Post-operative physiologic and metabolic derangements	0.54 ●	1.00 ⊙	0.93 ⊙	1.67 ○	0.91 ⊙	0.93 ⊙	1.35 ○	0.57 ●	0.72 ⊙	1.58 ○
Post-operative respiratory failure	0.93 ⊙	0.99 ⊙	1.16 ⊙	1.21 ○	0.92 ⊙	1.14 ⊙	0.95 ⊙	0.73 ●	0.96 ⊙	0.83 ⊙
Post-op pulmonary embolism or deep vein thrombosis	0.87 ⊙	1.39 ○	1.44 ○	1.31 ○	1.06 ⊙	1.22 ○	0.74 ●	0.86 ⊙	1.12 ⊙	0.89 ⊙
Post-operative sepsis	0.62 ●	1.05 ⊙	1.31 ○	1.05 ⊙	1.09 ⊙	0.91 ⊙	0.92 ⊙	0.83 ⊙	0.82 ⊙	0.78 ⊙
Post-operative abdominal wound dehiscence	1.36 ○	0.99 ⊙	1.21 ○	1.55 ○	1.08 ⊙	1.08 ⊙	0.93 ●	1.00 ⊙	0.99 ⊙	1.27 ○

Continued...

● Best - Top 10 States

◎ Average - Middle 31 States

○ Worst - Bottom 10 States

Patient Safety Indicator	SC	SD	TN	TX	UT	VA	VT	WA	WI	WV	WY
Overall Average	0.97 ◎	0.98 ◎	1.02 ◎	1.01 ◎	0.95 ◎	1.01 ◎	0.83 ●	0.95 ◎	0.96 ◎	1.01 ◎	1.31 ○
Death in low mortality DRGs	1.35 ○	1.73 ○	0.99 ◎	1.10 ◎	1.60 ○	1.12 ◎	1.12 ◎	0.93 ◎	0.91 ◎	1.11 ◎	0.91 ◎
Pressure ulcer (decubitus ulcer)	0.97 ◎	0.51 ●	0.96 ◎	1.01 ◎	0.67 ●	0.99 ◎	0.61 ●	0.77 ◎	0.73 ◎	0.94 ◎	0.76 ◎
Death among surgical inpatients with serious treatable complications (failure to rescue)	1.09 ◎	0.87 ●	1.06 ◎	1.03 ◎	0.85 ●	1.07 ◎	1.05 ◎	1.01 ◎	0.92 ◎	1.12 ◎	0.98 ◎
Foreign body left in during procedure	0.43 ◎	2.30 ○	1.56 ◎	0.70 ◎	1.12 ◎	0.58 ◎	0.00 ●	1.82 ○	1.98 ○	0.00 ●	6.73 ○
Iatrogenic pneumothorax	0.94 ◎	0.71 ●	0.87 ●	1.04 ◎	0.95 ◎	0.97 ◎	0.99 ◎	1.05 ◎	1.03 ◎	1.09 ◎	1.43 ○
Central venous catheter-related bloodstream infections	1.03 ◎	0.60 ●	0.91 ◎	1.00 ◎	0.68 ●	1.00 ◎	0.78 ◎	0.80 ◎	0.86 ◎	0.98 ◎	1.02 ◎
Post-operative hip fracture	1.07 ◎	1.21 ◎	1.06 ◎	0.99 ◎	0.70 ●	1.08 ◎	1.35 ○	0.65 ●	0.89 ◎	1.14 ◎	0.44 ●
Post-operative hemorrhage or hematoma	0.80 ●	0.71 ●	0.82 ●	0.98 ◎	1.21 ○	1.00 ◎	0.97 ◎	1.13 ◎	1.12 ◎	1.13 ○	0.72 ●
Post-operative physiologic and metabolic derangements	0.85 ◎	0.61 ●	0.80 ◎	1.28 ◎	0.53 ●	1.30 ○	0.58 ●	0.66 ◎	0.98 ◎	1.10 ◎	0.34 ●
Post-operative respiratory failure	1.05 ◎	0.71 ●	1.23 ○	1.09 ◎	0.70 ●	1.04 ◎	0.69 ●	0.78 ◎	0.67 ●	1.46 ○	0.69 ●
Post-op pulmonary embolism or deep vein thrombosis	0.96 ◎	0.73 ●	0.86 ◎	0.93 ◎	0.98 ◎	1.16 ○	0.78 ◎	0.76 ●	0.73 ●	0.92 ◎	0.60 ●
Post-operative sepsis	1.03 ◎	0.56 ●	1.10 ○	1.03 ◎	1.15 ○	1.03 ◎	0.87 ◎	0.84 ◎	0.64 ●	1.05 ◎	0.56 ●
Post-operative abdominal wound dehiscence	1.05 ◎	1.56 ○	1.00 ◎	1.00 ◎	1.17 ◎	0.84 ●	1.01 ◎	1.11 ◎	1.02 ◎	1.08 ◎	1.88 ○

Appendix G: Designated Market Area Patient Safety Rank

The following is a list of designated market areas that have a population greater than 1 million, rank and ordered by overall patient safety performance on the 13 indicators combined.

Rank	Designated Market Areas (population greater than 1 million)	Population	Average Observed-to- Expected Ratio
1	Minneapolis-St. Paul, MN	3,589,097	0.88
2	Wichita, KS	1,086,628	0.90
3	Cleveland, OH	3,778,784	0.91
4	Wilkes Barre, PA	1,434,206	0.91
5	Toledo, OH	1,060,533	0.93
6	Boston, MA-NH	5,664,882	0.96
7	Greenville, SC-NC	1,677,663	0.98
8	Honolulu, HI	1,108,229	0.98
9	Charlotte, NC	1,951,191	0.98
10	Oklahoma City, OK	1,495,356	0.99
11	Pittsburgh, PA	2,932,557	0.99
12	Grand Rapids, MI	1,688,555	1.00
13	Harrisburg, PA	1,616,559	1.01
14	Salt Lake City, UT	1,860,995	1.01
15	Providence, RI-MA	1,509,789	1.01
16	Fresno-Visalia, CA	1,361,675	1.01
17	Phoenix, AZ	2,714,182	1.03
18	Seattle-Tacoma, WA	3,523,519	1.03
19	W. Palm Beach, FL	1,234,398	1.04
20	Indianapolis, IN	2,378,108	1.05
21	Miami-Ft. Lauderdale, FL	3,270,606	1.05
22	Kansas City, MO-KS	1,971,428	1.05
23	Tampa, FL	3,144,270	1.06
24	Roanoke-Lynchburg, VA	1,024,180	1.06
25	Portland, OR	2,221,671	1.08
26	Flint-Saginaw, MI	1,169,321	1.08
27	Philadelphia, PA	7,133,153	1.08
28	Raleigh, NC	1,902,798	1.08
29	San Francisco, CA	5,950,829	1.09
30	Mobile, AL-FL	1,109,472	1.09
31	Los Angeles, CA	14,391,003	1.09
32	Orlando, FL	2,249,653	1.09
33	Detroit, MI	4,705,164	1.10
34	Hartford-New Haven, CT	2,459,471	1.10
35	Atlanta, GA	3,788,941	1.11

Continued....

Rank	Designated Market Areas (population greater than 1 million)	Population	Average Observed-to- Expected Ratio
36	Nashville, TN	1,845,450	1.11
37	New York, NY	18,567,049	1.11
38	Little Rock, AR	1,218,031	1.12
39	Jacksonville, FL	1,226,698	1.12
40	San Antonio, TX	1,665,593	1.13
41	Chicago, IL	8,364,125	1.13
42	Richmond-Petersburg, VA	1,103,458	1.13
43	Greensboro, NC	1,328,564	1.13
44	Norfolk, VA	1,635,194	1.13
45	Dallas-Ft. Worth, TX	4,496,697	1.14
46	Cincinnati, OH	2,008,586	1.14
47	Lexington, KY	1,015,370	1.15
48	Memphis, TN	1,539,292	1.16
49	San Diego, CA	2,498,016	1.16
50	Knoxville, TN	1,030,161	1.16
51	Baltimore, MD	2,528,945	1.16
52	Buffalo, NY	1,674,098	1.17
53	St. Louis, MO	2,920,128	1.17
54	Dayton, OH	1,207,681	1.18
55	Charleston, WV	1,236,645	1.19
56	New Orleans, LA	1,667,480	1.19
57	Tulsa, OK	1,137,021	1.20
58	Washington, DC-MD	4,729,542	1.21
59	Birmingham, AL	1,625,013	1.21
60	Columbus, OH	1,874,020	1.22
61	Milwaukee, WI	2,058,583	1.22
62	Albuquerque-Santa Fe, NM	1,401,281	1.23
63	Houston, TX	4,013,896	1.23
64	Albany, NY	1,322,351	1.24
65	Sacramento, CA	2,857,309	1.25
66	Denver, CO	2,658,798	1.26
67	Louisville, KY	1,417,865	1.27
68	Syracuse, NY	1,017,004	1.49

Appendix H: HealthGrades Patient Safety Methodology 2011

To help consumers evaluate and compare hospital patient safety performance, HealthGrades analyzed patient data for virtually every hospital in the country to determine patient safety outcomes.

HealthGrades used the Patient Safety Quality Indicators Software (Windows version 4.2), developed by the AHRQ and downloaded from <http://www.qualityindicators.ahrq.gov/software.htm> to determine the actual number of incidents and to calculate expected rates of the 13 PSIs.

Patient Safety Indicator	Translated as...
Death among surgical inpatients with serious treatable complications (previously known as "Failure to rescue")	Death following a serious complication after surgery
Death in low mortality Diagnostic Related Groupings (DRGs)	Death in procedures where mortality is usually very low
Pressure ulcer (Decubitus ulcer)	Pressure sores or bed sores acquired in the hospital
Iatrogenic pneumothorax	Collapsed lung due to a procedure or surgery in or around the chest
Central venous catheter-related bloodstream infections	Catheter-related bloodstream infections acquired at the hospital
Post-operative hip fracture	Hip fracture following surgery
Post-operative hemorrhage or hematoma	Excessive bruising or bleeding as a consequence of a procedure or surgery
Post-operative physiologic and metabolic derangements	Electrolyte and fluid imbalance following surgery
Post-operative respiratory failure	Respiratory failure following surgery
Post-operative pulmonary embolism or deep vein thrombosis	Deep blood clots in the lungs or legs following surgery
Post-operative sepsis	Bloodstream infection following surgery
Post-operative abdominal wound dehiscence	Breakdown of abdominal incision site
Foreign body left after a procedure	Number of events of foreign objects left in body during a procedure

For most indicators, the AHRQ software uses advanced statistical algorithms that can predict the number of patient safety incidences that are likely to occur at a hospital based on the types of patients treated at that hospital. For indicators that the AHRQ software does not provide predicted results, predicted results were generated by grouping the patient populations according to risk, and assigning average group values to patients in each group. This information is used, in part, to determine a HealthGrades individual patient safety rating for each patient safety indicator and an overall patient safety score for a hospital.

Data Acquisition

HealthGrades uses Medicare inpatient data from the Medicare Provider Analysis and Review (MedPAR) database purchased from the Centers for Medicare and Medicaid Services (CMS) for several reasons.

- The MedPAR data file includes virtually every hospital in the country, with the exception of military and Veterans Administration hospitals.
- Hospitals are required by law to submit complete and accurate information with substantial penalties for those that report inaccurate or incomplete data.
- The Medicare population represents a majority of adult inpatient admissions.

HealthGrades evaluated all short-term acute care hospitals in the MedPAR file for three years (2007 through 2009) with the exception of Foreign Body Left After a Procedure which is calculated using only 2009 data. The Foreign Body Left After a Procedure requires a present on admission (POA) indicator and 2009 is the first MedPAR year with a POA fill rate high enough to evaluate this indicator.

Determining Individual Patient Safety Indicator Scores and Rating

To determine a patient safety indicator score for 12 patient safety indicators for each hospital, HealthGrades statistically compared the **actual** rate of individual patient safety events to the **expected** rate. HealthGrades then displays if the patient safety rating is Best, Average, or Worse.

- Best – Fewer patients were affected than expected.
- Average – About the same number of patients were affected as expected.
- Worse – More patients were affected than expected.

When a hospital is not rated in an individual patient safety indicator, it means the hospital had no patients considered for that indicator.

The 13th indicator, foreign body left after a procedure, is not rated because this is an event that should never happen and therefore there is no expected number of events. Instead of a rating, the number of events in 2009 where a foreign body was left in a patient during a procedure is reported.

Determining the Overall Patient Safety Score

To be eligible for an overall patient safety score, a hospital must have had outcomes in nine of the 13 patient safety indicators. Hospitals with eight or fewer patient safety ratings were not eligible to receive an overall patient safety score, but may have individual patient safety indicator ratings.

The following is a detailed description of the steps HealthGrades performs to determine the overall patient safety score.

1. HealthGrades uses the AHRQ software to calculate observed and expected rates for each hospital and each patient safety indicator, provided that the patient safety indicator had at least one case.
2. For indicators which the AHRQ software does not provide an expected rate, HealthGrades estimates an expected rate from the overall observed rate.
3. Since HealthGrades identified significant bias in the expected rates for larger hospitals (which had consistently higher observed rates than expected), HealthGrades performed further risk adjustment using the Medicare Case Mix Index (CMI). The case mix index adjustment

compensates for the fact that within a given Diagnostic Related Grouping (DRG) the most severely ill will probably be clustered at larger hospitals. The case mix index is a hospital-level indicator of the seriousness of the cases seen at a hospital—higher CMI values indicate more seriously ill patients are seen at the hospital.

To perform the case mix index adjustment and remove the bias, HealthGrades stratified hospitals into one of eight categories according to their case mix index and then adjusted the expected values so that the sum of the expected equaled the sum of the observed for each patient safety indicator for each combination of CMI group and year.

CMI Index	CMI Group
0.00 < 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

- HealthGrades statistically compared the observed rate to the expected rate to produce a z-score for each patient safety indicator. To normalize the effect of the 13 indicators, these z-scores were rescaled to a mean of zero and standard deviation of one. The overall patient safety score was then calculated as the average of the 13 resulting scores, and this score is used to determine a hospital's ranking.

Designating 2011 Patient Safety Excellence Award Recipients

To be considered for a Patient Safety Excellence Award™, hospitals had to be rated in at least 16 of 26 HealthGrades cohorts and have a current overall HealthGrades star rating of at least 2.5. The final data set of hospitals that met these qualifications included 785 teaching hospitals and 855 non-teaching hospitals. Hospitals in each group were then ranked based on their **overall patient safety score** (as explained above).

To identify the teaching peer group, HealthGrades used data from the Medicare Cost Reports (Form CMS-2552-96). A facility was considered a teaching hospital if they answered “yes” to the question: “Does the hospital have a teaching program approved in accordance with CMS publication 15-1, Chapter 4?” As further confirmation, the hospital was required to report either Indirect Medical Education (IME) payments or FTEs for residents on the Cost Report. When the Cost Report data were unavailable or contradictory, IME from the MedPAR file and the COTH (Council of Teaching Hospitals) list were used to determine status.

HealthGrades then identified both teaching and non-teaching hospitals in the top 15% as “best performing” and these hospitals were selected to be HealthGrades Patient Safety Excellence Award recipients. These 268 hospitals represent approximately 5% of the total hospitals evaluated.

Hospital Type	Number of Best Performing Providers
Teaching Hospitals	128
Non-teaching Hospitals	140

The Patient Safety Excellence Award recipients were categorized according to their 2009 case mix index as follows.

Case Mix Index	Case Mix Index Group	# of Award Recipients
0.00 < CMI < 1.25	1	9
1.25 < CMI < 1.35	2	19
1.35 < CMI < 1.45	3	29
1.45 < CMI < 1.55	4	39
1.55 < CMI < 1.65	5	51
1.65 < CMI < 1.75	6	52
1.75 < CMI < 1.90	7	45
CMI > 1.90	8	24

Limitations of the Data Models

It must be understood that while these models 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 models are limited by the following factors:

- Cases may have been coded incorrectly or incompletely by the hospital.
- The 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 with these models.
- Although HealthGrades has taken steps to carefully compile these data, no techniques are infallible; therefore, some information may be missing, outdated or incorrect.

Please 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.