HEALTHGRADES®
GUIDING AMERICA TO BETTER HEALTHCARE®

The First Annual HealthGrades Pediatric Patient Safety in American Hospitals Study

August 2010

Author: Kristin Reed, M.P.H.; Co-author: Rick May, M.D.
Major Contributors: Carol Nicholas, M.S.T.C., writing, editing and publishing
Harold Taylor, Ph.D. and Alex Brown, statistical analysis

Health Grades, Inc., 500 Golden Ridge Road, Suite 100, Golden, Colorado 80401

HEALTHGRADES®

The First Annual HealthGrades Pediatric Patient Safety in American Hospitals Study August 2010

HEALTHGRADES®
GUIDING AMERICA TO BETTER HEALTHCARE®

HEALTHGRADES®

The First Annual HealthGrades Pediatric Patient Safety in American Hospitals Study August 2010

Author: Kristin Reed, M.P.H.; Co-author: Rick May, M.D.
Major Contributors: Carol Nicholas, M.S.T.C., writing, editing and publishing;
Harold Taylor, Ph.D. and Alex Brown, statistical analysis
Health Grades, Inc., 500 Golden Ridge Road, Suite 100, Golden, Colorado 80401

In this first annual study, HealthGrades identifies pediatric patient safety incidence rates among pediatric patients at children's hospitals using three years of data (2006 through 2008) from 19 all-payer states where data are publicly available. Additionally, HealthGrades identifies the best-performing hospitals to establish a best-practice benchmark against which other hospitals can be evaluated (Appendix A lists these best-performing hospitals). This study also examines trends in important pediatric patient safety issues among hospitals and compares overall results by state. Specific results for each of the nonfederal hospitals in these 19 states can be found at www.healthgrades.com.

Executive Summary

Children account for over six million U.S. hospitalizations annually.[1] Compared to adults, children represent a unique patient population. According to the U.S. Department of Health and Human Services, over 40% of pediatric hospitalizations begin in the emergency department.[2] Additionally, children are relatively healthy until they present to a hospital, and most children are not typically managing multiple diseases at the time of admission.

Thus, patients, their families, and even health care providers may be unfamiliar with the magnitude of medical errors among pediatric hospitalized patients. A study of patient safety among hospitalized pediatric patients in 2000 concluded that patient safety problems occurred frequently and with substantial impacts to our health care industry.[3] Despite these significant findings and the subsequent release of pediatric-specific patient safety indicators by the Agency for Healthcare Research and Quality (AHRQ) in 2006, pediatric hospitals and programs have largely been excluded from hospital quality reporting and initiatives that have taken shape over the last ten years.

Since 1999, HealthGrades has been evaluating the quality and safety of care at U.S. hospitals and making that information available to consumers at www.healthgrades.com. In this first study of pediatric patient safety, HealthGrades used pediatric patient safety indicators from the AHRQ[4] to identify the pediatric patient safety incidence rates for hospitals in the 19 all-payer states where data are publicly available using three years of data (2006 through 2008). AHRQ specifically defined these patient safety events as those potentially avoidable complications and adverse events following surgeries and procedures within the pediatric population. Using the rates of pediatric patient safety events, HealthGrades created a composite score to identify the best-performing hospitals in the U.S. from 2006 through 2008. These hospitals are recognized with the HealthGrades 2010 Pediatric Patient Safety Excellence Award™.

The Joint Commission, the AHRQ and other organizations have developed patient safety resources for parents including tools and tips for preventing medical errors in their children as well as advice on improving communication with health care providers.[5,6] This HealthGrades study is intended to provide patients, their families, and health care providers an additional resource to prevent pediatric patient safety events. Specifically, HealthGrades research provides awareness about the scope of the problem and quantifies the differences between the best-performing hospitals and all others as a benchmark for hospitals and providers to prioritize safety initiatives within the hospital setting.

Summary of Findings

From 2006 through 2008 in the 19 states studied:

- One in 208 children hospitalized experienced a potentially preventable patient safety event.
  - Of the over five million pediatric hospitalizations studied, 23,812 pediatric patients experienced one or more of the eight pediatric patient safety events (*Appendix B*).
  - A total of 25,367 pediatric patient safety events occurred from 2006 through 2008, among 23,812 pediatric patients (*Appendix B*).
  - Within this three-year period, 1,465 inhospital deaths occurred among children who experienced one or more pediatric patient safety events (*Appendix B*). This means that pediatric patients who experienced one or more pediatric patient safety events had approximately a one-in-sixteen chance of dying or a 6.15% mortality rate.
  - Pediatric patient safety events were associated with over $1.3 billion of excess cost (*Appendix D*).

Pediatric patients who experienced one or more patient safety events had approximately a one-in-sixteen chance of dying.

- The highest incidence rates were associated with four pediatric patient safety indicators (below). The event rates per 1,000 patients are also noted (*Appendix B*).
  1) Postoperative sepsis (24.05)
  2) Postoperative respiratory failure (18.62)
  3) Pressure ulcer (3.72)
  4) Selected infections due to medical care (2.41)

Pediatric patients treated at Pediatric Patient Safety Excellence Award hospitals had on average a 29.48% lower risk of experiencing one of the eight pediatric patient safety events studied.

- Four indicators showed improvement, while four worsened.
  - The indicators showing improvement over the course of the study were: selected infections due to medical care, postoperative hemorrhage or hematoma, postoperative respiratory failure, and postoperative abdominal wound dehiscence (*Appendix B*).
  - Conversely, the four indicators that worsened over the course of the study were: iatrogenic pneumothorax, pressure ulcer, postoperative sepsis, and accidental puncture or laceration (*Appendix B*).
- Wide and highly significant gaps in individual pediatric patient safety indicators and overall performance exist between the 97 hospitals that were recognized with a HealthGrades Pediatric Patient Safety Excellence Award and all other hospitals.
  - Pediatric patients treated at hospitals recognized with a HealthGrades Pediatric Patient Safety Excellence Award had, on average, a 29.48% lower risk of experiencing one or more of the eight pediatric patient safety events studied compared to patients treated at all other hospitals.
  - If all hospitals performed at the level of the Pediatric Patient Safety Excellence Award hospitals, approximately 6,532 pediatric patient safety events could potentially have been avoided, saving the U.S. health care system nearly $335 million from 2006 through 2008 in the 19 states studied (*Appendix C*).

If all hospitals performed at the level of Pediatric Patient Safety Excellence Award hospitals, approximately 6,532 pediatric patient safety events could potentially have been avoided, saving the U.S. health care system nearly $335 million from 2006 through 2008.

- Sixteen of 19 states studied have one or more hospitals that have been recognized with a HealthGrades Pediatric Patient Safety Excellence Award.
- The states with the best overall pediatric patient safety performance were: California, Florida, Iowa, Oregon, Utah and Wisconsin (*Table 2*).

Methodology Brief

To evaluate hospital pediatric patient safety, HealthGrades used all-payer state data and Patient Safety Indicator software (version 3.2 for Windows) from the Agency for Healthcare Research and Quality (AHRQ). The following eight pediatric patient safety indicators (PDI) were used in the evaluation. These are types of preventable hospital complications.

Patient Safety Indicator	Meaning…
Accidental Puncture or Laceration (PDI 1)	Avoidance of unintended punctures or lacerations
Pressure Ulcer (PDI 2)	Lack of pressure sores or bed sores acquired in the hospital
Iatrogenic Pneumothorax (PDI 5)	Avoidance of collapsed lung due to a procedure or surgery in or around the chest
Postoperative Hemorrhage or Hematoma (PDI 8)	Avoidance of excessive bruising or bleeding as a consequence of a procedure or surgery
Postoperative Respiratory Failure (PDI 9)	Avoidance of respiratory failure following surgery
Postoperative Sepsis (PDI 10)	Avoidance of severe infection following surgery
Postoperative Wound Dehiscence (PDI 11)	Lack of surgical wound site breakdown
Selected Infections Due to Medical Care (PDI 12) (also known as: Central Venous Catheter-related Bloodstream Infections)	Lack of infections acquired at the hospital

These eight indicators were utilized in agreement with the March 2008 study by the AHRQ Pediatric Quality Indicators Composite Measure Workgroup.[4]

For the pediatric patient safety analysis, all-payer state data were used for those states where state data are available. These data were chosen because they represent virtually all discharges for all ages for the associated states. The data represent three years of discharges (2006 through 2008). The 19 states evaluated were:

- Arizona
- California
- Colorado
- Florida
- Iowa
- Maine
- Maryland
- Massachusetts
- New Jersey
- New York
- North Carolina
- Oregon
- Pennsylvania
- Rhode Island
- Texas
- Utah
- Virginia
- Washington
- Wisconsin

To be eligible for a pediatric patient safety score, a hospital must have had patients considered for six of the eight pediatric patient safety indicators and they must have had at least 30 cases considered for the accidental puncture or laceration indicator in the most recent data year (2008).

To determine the overall pediatric patient safety score by hospital, HealthGrades statistically compared the **actual** rate to the **predicted** rate produced by the AHRQ software for each individual pediatric patient safety indicator to produce a score for each pediatric patient safety indicator. The **overall pediatric patient safety score** was then calculated as the average of the eight individual pediatric patient safety scores; the overall pediatric patient safety score was then used to determine the hospital's ranking.

Of the 2,080 hospitals in the 19 states, 97 had pediatric patient safety scores that were statistically better than all other hospitals. These hospitals were recognized with a HealthGrades Pediatric Patient Safety Excellence Award.

Detailed Findings

Pediatric Patient Safety Events Have Significant Impact on the U.S. Health Care System

One in 208 hospitalized children experienced a potentially preventable patient safety event over the three years studied.

One in 208 hospitalized children experienced a potentially preventable patient safety event over the three years studied. HealthGrades identified a total of 25,367 pediatric patient safety events that occurred in over five million acute care pediatric hospitalizations in 19 states from 2006 through 2008. These events occurred among 23,812 unique patients. This means that among hospitalized pediatric patients in 19 states, 0.48% experienced one or more of the eight pediatric patient safety events during their hospitalization.

Of the 25,367 events, the highest volume events were: selected infections due to medical care, accidental puncture or laceration, postoperative sepsis, and postoperative respiratory failure. These four events represent 84.70% of all events (*Table 1*).

From 2006 through 2008, 1,465 pediatric inhospital patients who experienced one or more patient safety events died.

While the above events represented the highest volume of events, postoperative sepsis, postoperative respiratory failure, pressure ulcer, and selected infections due to medical care had the highest incidence rates per 1,000 (24.05, 18.62, 3.72 and 2.41 per 1,000 respectively) (*Appendix B*).

Pediatric Patient Safety Events Cost Lives and Dollars

From 2006 to 2008, there were 1,465 actual inhospital deaths that occurred among children who experienced one or more of the eight pediatric patient safety events. This means that pediatric patients who experienced one or more pediatric patient safety events had approximately a one-in-sixteen chance of dying or a 6.15% mortality rate (*Appendix B)*.

Of the 1,465 pediatric mortalities, approximately 70.44% were associated with hospital-acquired infections: postoperative sepsis and selected infections due to medical care (561 and 471 deaths respectively) (*Appendix B*).

Of the 1,465 pediatric mortalities, approximately 70.44% were associated with hospital-acquired infections.

Not only do pediatric patient safety events cost lives, they also have a large financial impact to the health care system. Based on charge and cost number estimates associated with pediatric patient safety indicators from previous research,[7] the eight pediatric patient safety indicators studied cost the U.S. health care system over $1.3 billion from 2006 through 2008 (*Appendix D*). One indicator – selected infections due to medical care – accounted for over 40% ($579.52 million or 44.23%) of this $1.3 billion.

Table 1. Most Commonly Occurring Pediatric Patient Safety Events

Pediatric Patient Safety Indicator (PDI)	Number of Events	Percentage of Total Number of Events	Incidence Rate per 1,000 At-risk Hospitalizations	Excess Cost Attributable to PDI (Million)
Selected Infections Due to Medical Care	9,578	37.76%	2.407	$579.52
Accidental Puncture or Laceration	4,190	16.52%	0.837	$86.32
Postoperative Sepsis	4,026	15.87%	24.049	$237.16
Postoperative Respiratory Failure	3,693	14.56%	18.263	$259.45

Four of Eight Indicators Showed Improvement

The four patient safety indicators that showed improvement accounted for 55.07% of the total patient safety events.

Four of the eight pediatric patient safety indicators studied showed improvement from 2006 through 2008. Selected infections due to medical care, postoperative hemorrhage or hematoma, postoperative respiratory failure, and postoperative wound dehiscence improved, on average, 10.38% over the study period (range: 4.12% to 16.38%). These four indicators accounted 13,970 or 55.07% of the total pediatric patient safety events. Selected infections due to medical care and postoperative hemorrhage or hematoma had the greatest improvements in 2008 compared to 2006 (*Appendix B*).

The incidence rates of the remaining events increased during the study period. These four indicators (accidental puncture and laceration, pressure ulcer, iatrogenic pneumothorax, and postoperative sepsis) worsened from 2006 to 2008 an average of 20.26% (range: -8.34% to -43.38%) (*Appendix B*).

Large Safety Gaps Identified Between the Best-performing Hospitals and All Others

The goals of this study were two-fold: HealthGrades wanted to examine the overall impact of eight pediatric patient safety indicators across the hospitals in the 19 states, and identify the best-performing hospitals to establish a best-practice benchmark against which other hospitals could be evaluated. Best-performing hospitals were identified as the top 5% of hospitals in the 19 states based on their superior performance and were recognized with the HealthGrades 2010 Pediatric Patient Safety Excellence Award.

If all hospitals had performed at the level of Pediatric Patient Safety Excellence Award hospitals, approximately 6,532 pediatric patient safety events could potentially have been avoided, saving nearly $334.68 million from 2006 through 2008.

We found that there were wide, highly significant gaps in individual pediatric patient safety indicator rates and overall performance between the 97 hospitals recognized with the HealthGrades 2010 Pediatric Patient Safety Excellence Award and all other hospitals. Specifically, we found that Pediatric Patient Safety Excellence Award hospitals, as a group, significantly outperformed all other hospitals on every pediatric patient safety indicator. We also found that these top-performing hospitals, as a group, had an overall patient safety performance equating to, on average, a 29.48% lower risk of experiencing one or more patient safety events compared to all other hospitals. The increase in performance was consistent across all eight pediatric patient safety indicators studied (range: 15.38% to 42.96% relative risk decrease) (*Appendix C*).

Pediatric Patient Safety Excellence Award Hospitals Associated with Significantly Fewer Safety Events and Associated Cost

If all hospitals had performed at the level of Pediatric Patient Safety Excellence Award hospitals, approximately 6,532 pediatric patient safety events could potentially have been avoided saving nearly $334.68 million from 2006 through 2008 (*Appendix C*). The largest gap between the Pediatric Patient Safety Excellence Award hospitals and all others was in selected infections due to medical care. On average, a typical pediatric patient had a 42.96% lower risk of a hospital-acquired catheter or line infection at the top-performing hospitals. Just closing the gap on this one indicator could have potentially prevented 3,362 events and saved the health care system over $203 million.

Closing the performance gap for just one indicator—selected infections due to medical care—could have potentially prevented 3,362 events and saved the health care system over $203 million.

Pediatric Patient Safety Performance Varies by State

From 2006 through 2008, HealthGrades analyzed the rates of pediatric patient safety across 19 states.

- The states that had the lowest risk-adjusted rates of potentially preventable pediatric patient safety events were: California, Florida, Iowa, Oregon, Utah and Wisconsin. The hospitals in these six states performed at a level that was significantly better than the national average (*Better than Expected,* see *Table 2*).

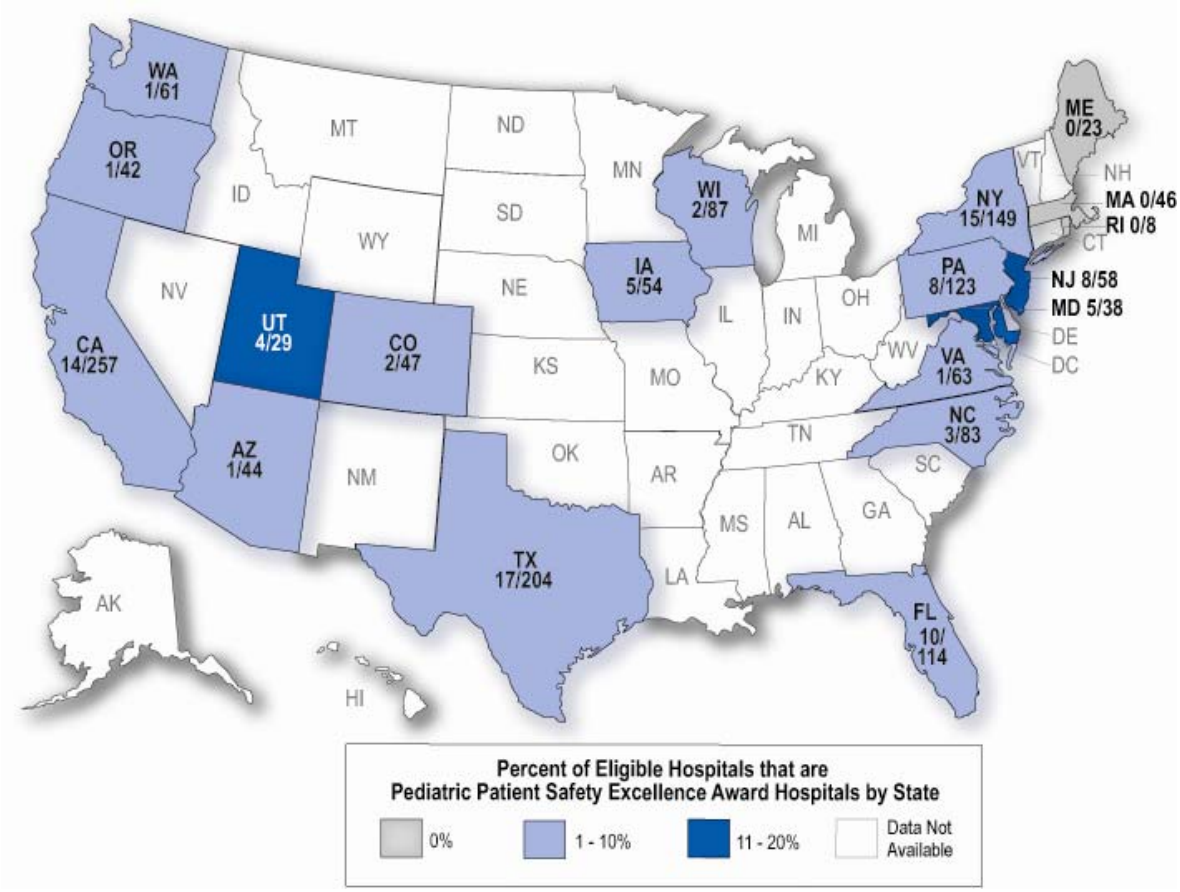
- Conversely, the states that had the highest risk-adjusted rates of potentially preventable pediatric patient safety events were: Arizona, New Jersey, New York, Pennsylvania and Rhode Island (*Worse than Expected,* see *Table 2*).

Sixteen States have One or More Pediatric Patient Safety Excellence Hospitals

In the 19 states studied, 2,080 hospitals were evaluated for their rates of pediatric patient safety events. Ultimately, 97 were recognized as recipients of the HealthGrades 2010 Pediatric Patient Safety Excellence Award; these award recipients represent approximately 5% of all pediatric programs in the 19 states. (See *Appendix A* for a list of award recipients.)

- Nearly half (47.42%) of the 97 Pediatric Patient Excellence Award hospitals are in three states: Texas (17), New York (15) and California (14) (*Table 2* and *Figure 1*).
- While New Jersey had some of the worst incidence rates overall, 13.79% of their pediatric hospitals and programs had rates among the best in the country. Utah also had the highest percentage of their eligible hospitals recognized as a Pediatric Patient Safety Excellence Award hospital (13.79%), followed by Maryland (13.16%) (*Table 2* and *Figure 1*).

Figure 1. Pediatric Patient Safety Excellence Hospitals by Eligible Hospitals by State



Nearly half (47.42%) of the 97 Pediatric Patient Safety Excellence Award hospitals are in three states: Texas, New York and California.

Table 2. Pediatric Patient Safety Excellence Award Hospitals Distribution by State

Nearly one-half (46 hospitals or 47.42%) of the 97 Pediatric Patient Excellence Award hospitals are in three states—California, New York and Texas—shaded below.

State / Abbreviation		Eligible Hospitals	Pediatric Patient Safety Excellence Award Hospitals	% of Eligible Hospitals that are Pediatric Patient Safety Excellence Award Hospitals	% of All Pediatric Patient Safety Excellence Award Hospitals	State Overall Combined*
Arizona	AZ	44	1	2.27%	1.03%	Worse than Expected
California	CA	257	14	5.45%	14.43%	Better than Expected
Colorado	CO	47	2	4.26%	2.06%	As Expected
Florida	FL	114	10	8.77%	10.31%	Better than Expected
Iowa	IA	54	5	9.26%	5.15%	Better than Expected
Maine	ME	23	0	0.00%	0.00%	As Expected
Maryland	MD	38	5	13.16%	5.15%	As Expected
Massachusetts	MA	46	0	0.00%	0.00%	As Expected
New Jersey	NJ	58	8	13.79%	8.25%	Worse than Expected
New York	NY	149	15	10.07%	15.46%	Worse than Expected
North Carolina	NC	83	3	3.61%	3.09%	As Expected
Oregon	OR	42	1	2.38%	1.03%	Better than Expected
Pennsylvania	PA	123	8	6.50%	8.25%	Worse than Expected
Rhode Island	RI	8	0	0.00%	0.00%	Worse than Expected
Texas	TX	204	17	8.33%	17.53%	As Expected
Utah	UT	29	4	13.79%	4.12%	Better than Expected
Virginia	VA	63	1	1.59%	1.03%	As Expected
Washington	WA	61	1	1.64%	1.03%	As Expected
Wisconsin	WI	87	2	2.30%	2.06%	Better than Expected
Total		1,530	97	6.34%		

*State Overall Combined status was based on the statistical significance of the overall z-score comparing observed versus predicted events across all eight indicators.

Interpretation of Results

In 2006, the Agency for Healthcare Research and Quality released the Pediatric Patient Safety Indicators. Research on the utility of the indicators found that the indicators have the potential to drive quality improvement efforts at the national and the regional level.[8] For this study, HealthGrades evaluated the state of pediatric patient safety in 19 states from 2006 through 2008 using these pediatric-specific indicators.

We found that pediatric patient safety events occurred in less than one percent of pediatric hospitalizations from 2006 through 2008. One patient in 208 pediatric hospitalizations experienced a potentially preventable patient safety event. While these numbers at face value seem low, several things must be considered. First, this study evaluated only eight potential patient safety events. Therefore the actual number can be assumed to be much higher. Second, just in the 19 states studied, 1,465 deaths occurred among patients who experienced one or more inhospital patient safety events. This means that when a pediatric patient safety event does occur, there is a six percent mortality rate. Given that these are medical errors among children, any number should be considered unacceptable.

We also found that the incidence rates for four of the eight indicators increased over the three-year study period. This is a concerning trend for patients and their families. While national efforts have focused on improving the quality of care and measuring hospital quality, pediatric hospitals and programs have not been an area of focus. Some suggest that the lack of pediatric measures is the result of the government's focus on Medicare and the lack of government support for pediatric measures at this time.

Finally, we found that the largest area of variation in pediatric patient safety was in selected infections due to medical care. For this indicator, there was, on average, a 42.96% relative risk reduction between the top-performing hospitals and all other hospitals. This one indicator accounted for 60.78% of the estimated excess cost if the gap between the best-performing and all other pediatric facilities could be closed.

The good news for patients and their families is that despite the lack of governmental drivers, many pediatric collaborations are taking shape to address quality and patient safety issues in the pediatric hospitals and programs. For example, the Pediatric Data Quality Systems Collaborative was established in 2002 to develop comparative quality measures specific to the pediatric population.[9] Additionally, the National Association of Children's Hospitals and Related Institutions has saved more than 130 lives and prevented 1,085 infections through its Catheter-Associated Blood Stream Infections Collaborative, launched in 2006 and is exploring additional quality collaborative opportunities.[10]

Although publicly available pediatric quality measures are not readily accessible, this first *HealthGrades Pediatric Patient Safety in American Hospitals Study* identifies the 97 hospitals in 19 states with the lowest risk-adjusted pediatric patient safety events and recognizes them as the 2010 HealthGrades Pediatric Patient Safety Excellence Award recipients. We are hopeful that our first publication of quality data on pediatric facilities will set the stage for additional publicly available data to assist patients and their families, while giving providers momentum to improve.

Keeping Your Child Safe in the Hospital

The Joint Commission, the AHRQ and other organizations have developed patient safety resources for parents including tools and tips for preventing medical errors in their children as well as advice on improving communication with health care providers. Here are quick links to three such resources.

- *20 Tips to Help Prevent Medical Errors in Children*. Available at www.ahrq.gov/consumer/20tipkid.htm
- *Speak Up: Prevent Errors in Your Child's Care*. Available at www.jointcommission.org/PatientSafety/SpeakUp/sp_peds.htm
- Josie King Foundation. Numerous topics on *Creating a Culture of Patient Safety, Together.* Available at www.josieking.org/page.cfm?pageID=79

Acknowledgements

Health Grades, Inc., 500 Golden Ridge Road, Suite 100, Golden, Colorado 80401. 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.

We thank the following people for their significant contributions to the study: Christine Warga, quality assurance reviews; and Lisa Esch, Lauren Galloway, Ashley Lemon, Susan McBratney, Ph.D., and Lynda Phouminh for their helpful suggestions and reviews.

References

1 Owens P., et al. *Care of Children and Adolescents in U.S. Hospitals*. HCUP Fact Book No. 4. AHRQ Publication No. 04-0004, October 2003. Rockville, MD. Available at: www.ahrq.gov/data/hcup/factbk4/

2 Irene Fraser, Ph.D. U.S. Department of Health & Human Services. Agency for Healthcare Research and Quality (AHRQ). 5/19/2010 Available at: www.ahrq.gov/data/hcup/factbk1/fctbk1.htm#age

3 Miller MR and Zhan C. *Pediatric Patient Safety in Hospitals: A National Picture in 2000.* Pediatrics. Vol. 113; No 6, June 2004.

4 Agency for Healthcare Research and Quality. *Agency for HealthCare Research and Quality Pediatric Quality Indicators Composite Measure Working Group Final Report* March 2008. Available at: www.qualityindicators.ahrq.gov/downloads/pdi/AHRQ_PDI_Workgroup_Final.pdf Accessed April 26, 2010.

5 Agency for Healthcare Research and Quality. *20 Tips to Help Prevent Medical Errors in Children*. Available at www.ahrq.gov/consumer/20tipkid.htm Accessed June 23, 2010.

6 The Joint Commission. Facts about Speak Up™ Initiatives. Available at www.jointcommission.org/GeneralPublic/Speak+Up/about_speakup.htm Accessed June 23, 2010.

7 Zhan C, and Miller MR. *Excess Length of Stay, Charges, and Mortality Attributable to Medical Injuries during Hospitalization*. JAMA. 2003; 290(14):1868-74.

8 McDonald, et al. *Preliminary Assessment of Pediatric Healthcare Quality and Patient Safety in the United States Using Readily Available Administrative Data*. Pediatrics. Volume 122, Number 2, August 2008.

9 Schwalenstocker et al. *Closing the Gap in Children's Quality Measures: A Collaborative Model*. Available at www.nahq.org/journal/ce/article.html?article_id=296 Accessed June 23, 2010.

10 National Association of Children's Hospitals and Related Institutions. *NACHRI Quality Transformation Collaboratives*. Available at www.childrenshospitals.net/AM/Template.cfm?Section=Collaboratives1&Template=/CM/HTMLDisplay.cfm&ContentID=52249 Accessed June 23, 2010.

Appendix A: HealthGrades 2010 Pediatric Patient Safety Excellence Award™ Recipients

The following hospitals are recipients of the HealthGrades Pediatric Patient Safety Excellence Award* in 2010.

- Some of the Pediatric 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.
- The following list of hospitals and associated facilities was generated as of July 15, 2010.

HealthGrades 2010 Pediatric Patient Safety Excellence Award™ Recipients*	City
Alabama	
Data not available for this state.	
Alaska	
Data not available for this state.	
Arizona	
Yuma Regional Medical Center	Yuma
Arkansas	
Data not available for this state.	
California	
Antelope Valley Hospital	Lancaster
Children's Hospital and Research Center at Oakland	Oakland
Children's Hospital Central California	Madera
Childrens Hospital Los Angeles	Los Angeles
Community Memorial Hospital	Ventura
Kaiser Permanente Hayward Medical Center	Hayward
including: Kaiser Permanente Fremont Medical Center	Fremont
Los Robles Hospital and Medical Center	Thousand Oaks
Miller Children's Hospital	Long Beach
Olive View - UCLA Medical Center	Sylmar
Rideout Memorial Hospital	Marysville
including: Fremont Medical Center	Yuba City
Ronald Reagan UCLA Medical Center	Los Angeles
including: Mattel Children's Hospital UCLA	Los Angeles
Salinas Valley Memorial Healthcare System	Salinas
Southwest Healthcare System - Rancho Springs Medical Center	Murrieta
including: Southwest Healthcare System - Inland Valley Medical Center	Wildomar
UCSF Medical Center	San Francisco

* Distinction cannot be used without a Licensing Agreement from Health Grades, Inc. Continued....

HealthGrades 2010 Pediatric Patient Safety Excellence Award™ Recipients*	City
Colorado	
The Children's Hospital	Aurora
including: The Children's Hospital at Saint Joseph's Hospital	Denver
The Medical Center of Aurora	Aurora
Connecticut	
Data not available for this state.	
Delaware	
Data not available for this state.	
District of Columbia	
Data not available for this state.	
Florida	
All Children's Hospital	Saint Petersburg
Baptist Hospital of Miami	Miami
including: Baptist Children's Hospital	Miami
Baptist Medical Center	Jacksonville
including: Baptist Medical Center – South	Jacksonville
Wolfson Children's Hospital	Jacksonville
Halifax Health	Daytona Beach
including: Atlantic Medical Center	Daytona Beach
Halifax Medical Center - Port Orange	Port Orange
Holmes Regional Medical Center	Melbourne
including: Palm Bay Community Hospital	Palm Bay
Lawnwood Regional Medical Center and Heart Institute	Fort Pierce
Memorial Regional Hospital	Hollywood
including: Memorial Regional Hospital South	Hollywood
Joe DiMaggio Children's Hospital	Hollywood
Miami Children's Hospital	Miami
Orlando Regional Medical Center	Orlando
including: South Seminole Hospital	Longwood
Orlando Regional Medical Center - Lucerne Pavilion	Orlando
Arnold Palmer Hospital for Children	Orlando
Dr. P. Phillips Hospital	Orlando
Palms West Hospital	Loxahatchee
including: The Children's Hospital at Palms West	Loxahatchee
Georgia	
Data not available for this state.	
Hawaii	
Data not available for this state.	

* Distinction cannot be used without a Licensing Agreement from Health Grades, Inc.

Continued....

HealthGrades 2010 Pediatric Patient Safety Excellence Award™ Recipients*	City
Idaho	
Data not available for this state.	
Illinois	
Data not available for this state.	
Indiana	
Data not available for this state.	
Iowa	
Allen Memorial Hospital	Waterloo
Covenant Medical Center	Waterloo
Mercy Medical Center - Des Moines	Des Moines
Mercy Medical Center - Dubuque	Dubuque
University of Iowa Hospital and Clinics	Iowa City
Kansas	
Data not available for this state.	
Kentucky	
Data not available for this state.	
Louisiana	
Data not available for this state.	
Maine	
There are no recipients of this award in this state.	
Maryland	
Anne Arundel Medical Center	Annapolis
Harbor Hospital	Baltimore
Holy Cross Hospital	Silver Spring
Mercy Medical Center	Baltimore
Southern Maryland Hospital Center	Clinton
Massachusetts	
There are no recipients of this award in this state.	
Michigan	
Data not available for this state.	
Minnesota	
Data not available for this state.	
Mississippi	
Data not available for this state.	
Missouri	
Data not available for this state.	

* Distinction cannot be used without a Licensing Agreement from Health Grades, Inc.

Continued....

HealthGrades 2010 Pediatric Patient Safety Excellence Award™ Recipients*	City
Montana	
Data not available for this state.	
Nebraska	
Data not available for this state.	
Nevada	
Data not available for this state.	
New Hampshire	
Data not available for this state.	
New Jersey	
AtlantiCare Regional Medical Center - Atlantic City	Atlantic City
including: AtlantiCare Regional Medical Center - Mainland	Pomona
Holy Name Hospital	Teaneck
JFK Medical Center	Edison
Overlook Hospital	Summit
including: Goryeb Children's Center at Overlook Hospital	Summit
Saint Joseph's Regional Medical Center	Paterson
including: Saint Joseph's Children Hospital	Paterson
Saint Peter's University Hospital	New Brunswick
including: The Children's Hospital at Saint Peter's University Hospital	New Brunswick
Somerset Medical Center	Somerville
South Jersey Healthcare Regional Medical Center	Vineland
New Mexico	
Data not available for this state.	
New York	
Albany Medical Center Hospital	Albany
including: The Children's Hospital at Albany Medical Center	Albany
Arnot Ogden Medical Center	Elmira
Good Samaritan Hospital Medical Center	West Islip
Hospital for Special Surgery	New York
Huntington Hospital	Huntington
Lenox Hill Hospital	New York
Mercy Hospital	Buffalo
Richmond University Medical Center	Staten Island
Saint Barnabas Hospital	Bronx
Sisters of Charity Hospital	Buffalo
South Nassau Communities Hospital	Oceanside

* Distinction cannot be used without a Licensing Agreement from Health Grades, Inc.

Continued....

HealthGrades 2010 Pediatric Patient Safety Excellence Award™ Recipients*	City
New York (continued)	
UHS - Wilson Medical Center	Johnson City
including: UHS - Binghampton General Hospital	Binghampton
Westchester Medical Center	Valhalla
including: Maria Fareri Children's Hospital at Westchester Medical Center	Valhalla
White Plains Hospital Center	White Plains
Wyckoff Heights Medical Center	Brooklyn
North Carolina	
Mission Hospitals	Asheville
Onslow Memorial Hospital	Jacksonville
Wake Forest University Baptist Medical Center	Winston Salem
including: Brenner Children's Hospital	Winston Salem
North Dakota	
Data not available for this state.	
Ohio	
Data not available for this state.	
Oklahoma	
Data not available for this state.	
Oregon	
OHSU Hospital	Portland
including: Doernbecher Children's Hospital	Portland
Pennsylvania	
Bryn Mawr Hospital	Bryn Mawr
Chester County Hospital	West Chester
Crozer - Chester Medical Center	Upland
including: Springfield Hospital	Springfield
Ephrata Community Hospital	Ephrata
Holy Redeemer Hospital & Medical Center	Meadowbrook
Saint Christopher's Hospital for Children	Philadelphia
St. Luke's Hospital – Bethlehem Campus	Bethlehem
including: St. Luke's Hospital - Allentown Campus	Allentown
The Reading Hospital and Medical Center	Reading
Rhode Island	
There are no recipients of this award in this state.	
South Carolina	
Data not available for this state.	

* Distinction cannot be used without a Licensing Agreement from Health Grades, Inc.

Continued....

HealthGrades 2010 Pediatric Patient Safety Excellence Award™ Recipients*	City
South Dakota	
Data not available for this state.	
Tennessee	
Data not available for this state.	
Texas	
Children's Medical Center of Dallas	Dallas
including: Children's Medical Center at Legacy	Plano
CHRISTUS Saint Michael Health System	Texarkana
Cook Children's Medical Center	Fort Worth
Detar Hospital Navarro	Victoria
including: Detar Hospital North	Victoria
Driscoll Children's Hospital	Corpus Christi
Good Shepherd Medical Center	Longview
Hillcrest Baptist Medical Center	Waco
Knapp Medical Center	Weslaco
Laredo Medical Center	Laredo
Memorial Hermann Baptist Beaumont Hospital	Beaumont
Mother Frances Hospital - Tyler	Tyler
Saint David's North Austin Medical Center	Austin
Seton Medical Center Austin	Austin
Texas Health Presbyterian Hospital Dallas	Dallas
Texas Orthopedic Hospital	Houston
The Womans Hospital of Texas	Houston
United Regional	Wichita Falls
including: United Regional Children's Center	Wichita Falls
Utah	
McKay - Dee Hospital Center	Ogden
Ogden Regional Medical Center	Ogden
Primary Children's Medical Center	Salt Lake City
University of Utah Health Care	Salt Lake City
including: University Orthopaedic Center	Salt Lake City
Vermont	
Data not available for this state.	
Virginia	
Inova Alexandria Hospital	Alexandria

* Distinction cannot be used without a Licensing Agreement from Health Grades, Inc.

Continued....

HealthGrades 2010 Pediatric Patient Safety Excellence Award™ Recipients*	City
Washington	
Kennewick General Hospital	Kennewick
West Virginia	
Data not available for this state.	
Wisconsin	
Saint Josephs Hospital	Marshfield
including: Saint Joseph's Children Hospital	Marshfield
University of Wisconsin Hospitals and Clinics	Madison
including: American Family Children's Hospital	Madison
Wyoming	
Data not available for this state.	

* Distinction cannot be used without a Licensing Agreement from Health Grades, Inc.

Appendix B: Pediatric Patient Safety Incidence Rates and Associated Mortality

Pediatric Patient Safety Indicator	Year	Number of Events	Total Cases Evaluated	Rate per 1,000	Associated Mortality*	% Improvement in Rate (2006 – 2008)
Accidental Puncture or Laceration	2006	1,571	1,875,637	0.838	54	-8.34%
	2007	1,384	1,768,623	0.783	50	
	2008	1,235	1,361,027	0.907	38	
	2006-2008	4,190	5,005,287	0.837	142	
Pressure Ulcer	2006	663	195,976	3.383	20	-19.25%
	2007	709	184,405	3.845	24	
	2008	552	136,829	4.034	24	
	2006-2008	1,924	517,210	3.720	68	
Iatrogenic Pneumothorax	2006	413	1,835,037	0.225	44	-43.38%
	2007	415	1,729,405	0.240	35	
	2008	429	1,329,449	0.323	43	
	2006-2008	1,257	4,893,891	0.257	122	
Postoperative Hemorrhage or Hematoma	2006	208	82,183	2.531	8	12.64%
	2007	162	78,907	2.053	14	
	2008	163	73,721	2.211	4	
	2006-2008	533	234,811	2.270	26	
Postoperative Respiratory Failure	2006	1,310	69,703	18.794	91	8.38%
	2007	1,313	66,460	19.756	88	
	2008	1,070	62,138	17.220	76	
	2006-2008	3,693	198,301	18.623	255	
Postoperative Sepsis	2006	1,390	59,872	23.216	178	-10.07%
	2007	1,348	57,135	23.593	195	
	2008	1,288	50,401	25.555	188	
	2006-2008	4,026	167,408	24.049	561	
Postoperative Wound Dehiscence	2006	60	48,573	1.235	3	4.12%
	2007	62	45,731	1.356	0	
	2008	44	37,151	1.184	5	
	2006-2008	166	131,455	1.263	8	
Selected Infections Due to Medical Care	2006	3,709	1,470,603	2.522	176	16.38%
	2007	3,527	1,398,187	2.523	180	
	2008	2,342	1,110,549	2.109	115	
	2006-2008	9,578	3,979,339	2.407	471	
Total		25,367			1,653	
Less Double Counts		23,812	5,005,287	4.757	1,465	

* The mortality reported is all-cause inhospital mortality among patients that experienced one or more pediatric patient safety events in the 19 states from 2006 through 2008.

Appendix C: Comparing Different Performance Categories (2006 – 2008)

Pediatric Patient Safety Indicator	Hospitals Recognized with Pediatric Patient Safety Excellence Award O/E Ratios (95% CI)	All Other Hospitals O/E Ratios	Relative Risk Decrease Associated with Pediatric Patient Safety Excellence Hospitals Compared to All Other Hospitals	# of Excess Pediatric Patient Safety Events** Among All Non-Patient Safety Excellence Award Hospitals	Estimated Charge Associated with Pediatric Patient Safety Event	Excess Charge^ (Millions) Associated with Excess Pediatric Patient Safety Events Among All Non Pediatric Patient Safety Excellence Award Hospitals	Excess Cost^^ (Millions) Associated with Excess Pediatric Patient Safety Events Among All Non Pediatric Patient Safety Excellence Award Hospitals
Accidental Puncture or Laceration	.751 (0.705-0.797)	1.075	30.14%	1,028	$41,204	$42.36	$21.18
Pressure Ulcer	.823 (0.754-0.892)	1.058	22.24%	329	$85,344	$28.08	$14.04
Iatrogenic Pneumothorax	.652 (0.574-0.731)	1.104	40.95%	431	$61,991	$26.72	$13.36
Postoperative Hemorrhage or Hematoma	.754 (0.631-0.877)	1.085	30.51%	128	$75,932	$9.72	$4.86
Postoperative Respiratory Failure	.885 (0.837-0.933)	1.046	15.38%	417	$140,507	$58.59	$29.30
Postoperative Sepsis	.799 (0.754-0.843)	1.077	25.82%	799	$117,815	$94.13	$47.07
Postoperative Wound Dehiscence	.769 (0.530-1.008)	1.065	27.82%	38	$76,737	$2.92	$1.46
Selected Infections Due to Medical Care	.645 (0.619-0.671)	1.131	42.96%	3,362	$121,010	$406.84	$203.42
Average relative risk increase in and number of potentially avoidable pediatric patient safety events, charge and cost associated with All Other hospitals compared to Award hospitals.			29.48%	6,532		$669.35	$334.68

** Excess events are determined by calculating: Other hospitals observed events (O/E ratio for Award hospitals multiplied by other hospitals expected number of events).

^ Based on previous research done by Miller MR and Zhan C. *Pediatric Patient Safety in Hospitals: A National Picture in 2000.* Pediatrics. Vol. 113; No 6, June 2004.

^^ 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 D: Pediatric Patient Safety Events and Excess Cost by Patient Safety Indicator (2006 – 2008)

Pediatric Patient Safety Indicator (PDI)	Actual Number of Events	Percentage of Total Number of Events	Attributable Charge**	Excess Charge Attributable to PDI** (Millions)	Excess Cost Attributable to PDI ^^ (Millions)
Selected Infections Due to Medical Care	9,578	37.76%	$121,010	$1,159.03	$579.52
Accidental Puncture or Laceration	4,190	16.52%	$41,204	$172.64	$86.32
Postoperative Sepsis	4,026	15.87%	$117,815	$474.32	$237.16
Postoperative Respiratory Failure	3,693	14.56%	$140,507	$518.89	$259.45
Pressure Ulcer	1,924	7.58%	$85,344	$164.20	$82.10
Iatrogenic Pneumothorax	1,257	4.96%	$61,991	$77.92	$38.96
Postoperative Hemorrhage or Hematoma	533	2.10%	$75,932	$40.47	$20.24
Postoperative Wound Dehiscence	166	0.65%	$76,737	$12.74	$6.37
Totals	25,367			$2,620.23	$1,310.11

** Based on previous research done by Zhan C and Miller MR. *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 E: HealthGrades Pediatric Patient Safety Methodology 2010

The Pediatric Patient Safety Excellence Award™ recognizes pediatric centers that have the lowest rates of potentially avoidable complications and adverse events following surgeries and procedures for pediatric patients. To help consumers evaluate and compare pediatric patient safety at hospitals, HealthGrades analyzed pediatric patient outcome data for all pediatric patients (all-payer data) provided by 19 individual states for years 2006 through 2008. This methodology describes how HealthGrades:

- Calculated a pediatric patient safety score for each hospital
- Designated Pediatric Patient Safety Excellence Award recipients based on the pediatric patient safety score

To evaluate hospital pediatric patient safety, HealthGrades used all-payer state date and Patient Safety Indicator software (version 3.2 for Windows) from the Agency for Healthcare Research and Quality (AHRQ) to analyze the following eight pediatric patient safety indicators (PDI) which are types of preventable hospital complications.

Patient Safety Indicator	Meaning…
Accidental Puncture or Laceration (PDI 1)	Avoidance of unintended punctures or lacerations
Pressure Ulcer (PDI 2)	Lack of pressure sores or bed sores acquired in the hospital
Iatrogenic Pneumothorax (PDI 5)	Avoidance of collapsed lung due to a procedure or surgery in or around the chest
Postoperative Hemorrhage or Hematoma (PDI 8)	Avoidance of excessive bruising or bleeding as a consequence of a procedure or surgery
Postoperative Respiratory Failure (PDI 9)	Avoidance of respiratory failure following surgery
Postoperative Sepsis (PDI 10)	Avoidance of severe infection following surgery
Postoperative Wound Dehiscence (PDI 11)	Lack of surgical wound site breakdown
Selected Infections Due to Medical Care (PDI 12) (also known as: Central Venous Catheter-related Bloodstream Infections)	Lack of infections acquired at the hospital

These eight indicators were utilized in agreement with the March 2008 study by the AHRQ Pediatric Quality Indicators Composite Measure Workgroup.[1]

For most indicators, the AHRQ software uses advanced statistical algorithms that can predict the number of pediatric patient safety incidences that are likely to occur at a hospital based on the types of patients treated at that hospital. This information is used, in part, to determine a HealthGrades overall pediatric patient safety score for a hospital.

Data Acquisition

For the pediatric patient safety analysis, all-payer state data were used for those states where state data are available. These data were chosen because they represent virtually all discharges (all ages) for the associated states. The data represent three years of discharges (2006 through 2008). The 19 states evaluated were:

- Arizona
- California
- Colorado
- Florida
- Iowa
- Maine
- Maryland
- Massachusetts
- New Jersey
- New York
- North Carolina
- Oregon
- Pennsylvania
- Rhode Island
- Texas
- Utah
- Virginia
- Washington
- Wisconsin

Determining the Overall Pediatric Patient Safety Score and Award Recipients

To be eligible for an overall pediatric patient safety score, and the Pediatric Patient Safety Excellence Award, a hospital must have had:

- Patients that were considered for at least six of the eight pediatric patient safety indicators, and
- At least 30 cases considered for the accidental puncture or laceration indicator in the most recent data year (2008).

To determine the overall pediatric patient safety score by hospital, HealthGrades statistically compared the actual rate to the predicted rate for each individual pediatric patient safety indicator to produce a score for each pediatric patient safety indicator. The overall pediatric patient safety score was then calculated as the average of the eight individual pediatric patient safety scores; the overall pediatric patient safety score was then used to determine the hospital's ranking.

The following is a detailed description of the steps HealthGrades performed to determine the overall patient safety score and Pediatric Patient Safety Excellence Award recipients.

1. HealthGrades used the AHRQ software to calculate observed and expected rates for each hospital and each pediatric patient safety indicator, provided that the pediatric patient safety indicator had at least one case.
2. Since HealthGrades identified significant bias in the expected rates for larger hospitals and hospitals with a pediatric heart surgery program (which had consistently higher observed rates than expected); HealthGrades performed further risk adjustment using the heart surgery volume and Pediatric Case Mix Index (PCMI). The case mix index is a hospital-level indicator of the seriousness of the cases seen at a hospital—higher PCMI values indicate more seriously ill pediatric patients are seen at the hospital. Expected rates were adjusted to equal observed rates within four potential strata along with data year:

Strata	Pediatric Heart Surgery Volume	Pediatric Case Mix Index
1	0 to 29	< 1.25
2	0 to 29	>1.25
3	30+	<1.50
4	30+	>1.50

The pediatric case mix index/heart surgery volume adjustment compensates for the fact that within a given DRG (diagnosis-related group) the most severely ill will probably be clustered at children's hospitals which perform the more complex procedures.

Due to low event counts in some PDIs, not all possible stratifications were used. For example, postoperative wound dehiscence, an extremely rare event, was only stratified by data year. The following illustrates the strata applied to each indicator.

Pediatric Patient Safety Indicator (PDI)	Stratification Used
Accidental Puncture or Laceration (PDI 1)	Year, Heart Surgery Volume, PCMI
Pressure Ulcer (PDI 2)	Year, PCMI
Iatrogenic Pneumothorax (PDI 5)	Year, Heart Surgery Volume, PCMI
Postoperative Hemorrhage or Hematoma (PDI 8)	Year, Heart Surgery Volume
Postoperative Respiratory Failure (PDI 9)	Year, Heart Surgery Volume
Postoperative Sepsis (PDI 10)	Year, Heart Surgery Volume, PCMI
Postoperative Wound Dehiscence (PDI 11)	Year
Selected Infections Due to Medical Care (PDI 12)	Year, Heart Surgery Volume, PCMI

3. Once the expected rates were adjusted according to strata, HealthGrades statistically compared the observed rate to the expected rate to produce a z-score for each pediatric patient safety indicator. To equalize the effect of the eight indicators, these z-scores were rescaled to a mean of zero and standard deviation of one. The overall pediatric patient safety score was then calculated as the average of the eight resulting scores.
4. Because of the small number of pediatric patient safety events, an additional requirement was imposed that the combined events must be statistically significant. For each hospital, the total number of events and the total expected events across eight pediatric patient safety indicators was calculated, and an overall z-score was calculated as follows:

   Overall z-score = (expected event minus the observed events) / standard deviation.
5. The best-performing hospitals were then identified by evaluating both the pediatric patient safety score and the overall z-score. A hospital is designated as a Pediatric Patient Safety Excellence Award recipient when its overall z-score is greater than 1.645, and its overall pediatric patient safety score is in the top 20% of hospitals that qualify for a pediatric patient safety ranking.

Of the 2,080 hospitals in the 19 states studied, 97 had pediatric patient safety scores that were statistically better than all other hospitals. These hospitals were recognized with a HealthGrades Pediatric Patient Safety Excellence Award.

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 used in the AHRQ software 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; and 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.

Methodology References

1 Agency for HealthCare Quality and Research. *Agency for HealthCare Research and Quality Pediatric Quality Indicators Composite Measure Working Group Final Report.* March 2008. Available at: www.qualityindicators.ahrq.gov/downloads/pdi/AHRQ_PDI_Workgroup_Final.pdf. Accessed April 26th, 2010.