



HealthGrades Quality Study

Fourth Annual  
Patient Safety in American  
Hospitals Study



April 2007



HEALTHGRADES®  
GUIDING AMERICA TO BETTER HEALTHCARE™





HEALTHGRADES®

## **Fourth Annual Patient Safety in American Hospitals Study April 2007**

*In this report, HealthGrades identifies the patient safety incident rates for nearly every hospital in the country using the Agency for Healthcare Research and Quality (AHRQ) Patient Safety Indicator methodology<sup>1</sup> to analyze three years of Medicare data (2003-2005). In addition to this analysis, HealthGrades creates a composite score of the results of the Patient Safety Indicators and identifies the best-performing hospitals to establish a best-practice benchmark against which other hospitals can be evaluated. See Appendix A for list of the best-performing hospitals. This study also identifies trends in important patient safety issues among the nation's hospitals.*

### ***Introduction***

This is the fourth year that HealthGrades has analyzed patient safety among Medicare patients in all U.S. hospitals. During these last four years, much attention has been paid to improving patient safety, evidenced by the proliferation of literature as well as hospitals' advances in patient safety.<sup>2</sup> In addition, quality of care and patient safety knowledge has evolved and, in many cases, is leading to improvements in outcomes. However, recent studies, including the 2006 AHRQ National Healthcare Quality Report (NHQR) assessing the state of hospital quality and patient safety, conclude that the change remains modest and variation in healthcare quality remains high.<sup>3</sup>

Despite these modest improvements, the 2006 NHQR concluded that sustained focus and public reporting, among other things, seem to make a significant difference in the quality of healthcare, especially in the area of patient safety.<sup>3</sup> Because of the positive effects of public reporting and the continued lack of a national cohesive and consistent structure to identify, analyze, report and share critical quality and patient safety information, we believe it is imperative that the development and dissemination of highly visible consumer guides and public performance reporting be a priority for consumers.

For a fourth year, HealthGrades has researched and publicly reported information on hospital patient safety. HealthGrades used AHRQ's Patient Safety Indicators<sup>1</sup> to identify the patient safety incident rates for every non-federal hospital in the country using three years of Medicare data (2003–2005). In addition to identifying the rates of patient safety incidents, HealthGrades created a composite score to identify the best-performing in the U.S. during 2003 to 2005. These hospitals were named the 2007 Distinguished Hospitals for Patient Safety™.

## Summary of Findings

AHRQ's development of the Patient Safety Indicators (PSIs) was based on the Institute of Medicine's (IOM) definition of patient safety— "**freedom from accidental injury due to medical care, or medical errors.**"<sup>5</sup> Medical error is defined as "the failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim...[including] problems in practice, products, procedures, and systems."<sup>6</sup>

In 2002, AHRQ, in collaboration with the University of California-Stanford Evidence-Based Practice Center, identified 20 indicators of potentially preventable patient safety incidents that could be readily identified in hospital discharge data. This tool set of 20 evidence-based PSIs was created and released to the public in 2003 to be used by various healthcare stakeholders to assess and improve patient safety in U.S. hospitals.<sup>1</sup>

HealthGrades used the QI Windows Software, version 3.0a, developed by the AHRQ.<sup>1</sup> Of note, AHRQ made many substantial changes to their PSI methodology (*see Table 1*) and since this is the first HealthGrades study using version 3.0a, we cannot make valid comparisons to past HealthGrades patient safety research findings. In addition to the PSI software application, HealthGrades used previous research by Zhan and Miller,<sup>4</sup> to study the attributable mortality and cost associated with the development of each of 16 PSIs (out of a total 20 patient safety indicators, excluding four PSIs related to obstetrics) among Medicare beneficiaries in the U.S. from 2003 through 2005. The 16 PSIs we studied are listed in *Appendix B*. In addition, using the rates calculated for 13 of the 16 PSIs studied (three are for regional use only, thus excluded from the comparative hospital analysis), we also calculated an overall patient safety composite score for each hospital to identify the best hospitals in the U.S. during 2003 through 2005 (*see Appendices A and C*).

In our study, we found:

- Approximately **1.16 million total patient safety incidents** occurred in over 40 million hospitalizations in the Medicare population, which is almost a three-percent incident rate. These incidents were associated with **\$8.6 billion of excess cost** during 2003 through 2005.
- More than half (10 of 16) of the patient safety incident rates studied worsened from 2003 to 2005. These ten indicators worsened, on average, by over 11.5 percent while the other six indicators improved, on average, by eight percent.
  - The total patient safety incident rate worsened by an additional 2.0 incidents per 1,000 hospitalizations in 2005 compared to 2003.
- The **PSIs with the highest incidence rates** were decubitus ulcer, failure to rescue, and post-operative respiratory failure. Failure to rescue improved six percent during the study period, while both decubitus ulcer and post-operative respiratory failure worsened by almost 10 and 20 percent, respectively.
- Of the **284,798 deaths** that occurred among patients who developed one or more patient safety incidents, **247,662** were **potentially preventable**.
  - Medicare beneficiaries that developed one or more patient safety incidents had a **one-in-four chance of dying** during the hospitalization during 2003 to 2005.
- There were wide, highly significant gaps in individual PSI and overall performance between the Distinguished Hospitals for Patient Safety™ and the bottom ranked hospitals.
  - Medicare patients in the **Distinguished Hospitals for Patient Safety™** had, on average, approximately a **40-percent lower occurrence** of experiencing one or more PSIs compared to patients at the bottom ranked hospitals. This finding was consistent across all 13 PSIs studied.

- If all hospitals performed at the level of **Distinguished Hospitals for Patient Safety™**, approximately **206,286 patient safety incidents** and **34,393 Medicare deaths** could have been avoided while saving the U.S. approximately **\$1.74 billion** during 2003 to 2005.

## Methodology

We used the QI Windows Software, version 3.0a developed by the AHRQ<sup>1</sup> to calculate the national rates for 16 of the 20 patient safety indicators (four of the obstetrics indicators were not used). In order to evaluate *overall* hospital performance and to identify the best-performing hospitals across the U.S., we used the same software to evaluate every hospital in the country on 13 PSIs. To minimize the potential impact of variations in hospital coding of specific E codes when assessing overall hospital performance, we excluded three PSIs (complications of anesthesia, accidental puncture or laceration, transfusion reaction) that included these specific E codes in their numerator definition. We then developed a ranking methodology to evaluate overall patient safety performance for each hospital. Eligible hospitals' (see *Appendix C*) relative performances were determined by calculating the z-score for each patient safety indicator, rescaling the z-scores to mean zero and standard deviation of one, and then averaging the 13 rescaled z-scores. These averaged z-scores by hospital were then rank ordered within their respective peer group (teaching and non-teaching) from most positive (best) to most negative (worst). The top 15 percent of ranked hospitals were identified as Distinguished Hospitals for Patient Safety™. (See *Appendix C* for complete details.)

Mortality and cost attributable to patient safety incidents were extrapolated using attributable charge and mortality associated with development of a PSI from previous PSI research by Zhan and Miller.<sup>4</sup>

Due to methodological changes in the AHRQ's QI Windows Software, version 3.0a software application, comparisons to previous years' studies could not be made. Key changes are summarized in *Table 1*.

**Table 1: Summary of Major Changes to AHRQ Patient Safety Indicators**

Patient Safety Indicator	New Changes in Version 3.0a
Death in low mortality DRGs	<ul style="list-style-type: none"> <li>• Based on the 2003 National Inpatient Sample (previously 1997).</li> <li>• No longer risk-adjusted by AHRQ. HealthGrades applied a risk-adjustment based on age, gender, and DRG.</li> </ul>
Decubitus ulcer	<ul style="list-style-type: none"> <li>• Excludes patients transferred from an acute care facility.</li> <li>• Excludes patients with a procedure for debridement or pedicle graft before or on the same day as the major operating room procedure (surgical cases only).</li> <li>• Excludes patients with a diagnosis code of spina bifida or anoxic brain damage.</li> </ul>
Foreign body left during procedure	<ul style="list-style-type: none"> <li>• No longer risk-adjusted (was previously adjusted for age, gender, DRG and comorbidity categories).</li> </ul>
Iatrogenic pneumothorax	<ul style="list-style-type: none"> <li>• Excludes patients with a diagnosis of diaphragmatic surgery repair and pleural effusion.</li> </ul>
Post-operative physiologic and metabolic derangements	<ul style="list-style-type: none"> <li>• Excludes patients with chronic renal failure.</li> </ul>
Post-operative respiratory failure	<ul style="list-style-type: none"> <li>• Excludes patients with a diagnosis of a neuromuscular disorder.</li> </ul>
Post-operative wound dehiscence	<ul style="list-style-type: none"> <li>• Excludes patients with a length of stay &lt; 2 days.</li> <li>• Excludes patients with a diagnosis for an immunocompromised state.</li> </ul>
Selected infections due to medical care	<ul style="list-style-type: none"> <li>• Excludes patients with a length of stay &lt; 2 days.</li> </ul>

# Findings

## The Burden of Patient Safety Incidents

Using the *Patient Safety Indicator QI Windows Software, version 3.0a* software application developed by AHRQ,<sup>1</sup> HealthGrades identified a total of 1,160,184 patient safety incidents (PSIs) that occurred in 40,564,328 hospitalizations in the Medicare population from 2003 through 2005 (see *Appendix D*). This results in an incident rate of 2.86 percent across all Medicare inpatient hospitalizations from 2003 through 2005. These Patient Safety Incidents were associated with 284,798 inhospital deaths. Using previous research by Zhan and Miller<sup>4</sup>, we identified that 86.96 percent (or 247,662) of the mortalities were potentially attributable to the patient safety incident, and thus potentially preventable (see *Appendices D and E*).

## Common Patient Safety Incidents are Very Costly

The most commonly occurring PSIs are noted in *Table 2* below. These three PSIs accounted for almost 71.87 percent of all patient safety incidents from 2003 through 2005. Failure to rescue rates improved 5.97 percent during the study period. This translates to an absolute improvement of eight per 1,000 fewer deaths from failure to rescue in 2005 as compared to 2003. However, post-operative respiratory failure and decubitus ulcer worsened by 18.70 and 9.03 percent respectively; which translates to an absolute worsening of three and two additional deaths per 1,000, respectively, in 2005 as compared to 2003 (see *Appendix D*). For the incidence rates of all 16 PSIs, see *Appendix D*. For the excess mortality and costs attributable to each PSI, see *Appendix E*.

**Table 2: Most Commonly Occurring Patient Safety Incidents per 1,000 At-risk Hospitalizations**

Patient Safety Indicator	Incident Rate per 1,000 At-risk Hospitalizations	Attributable Cost
Failure to rescue	134	NA
Decubitus ulcer	32	\$2.81B
Post-operative respiratory failure	15	\$1.55B

Some of the most common patient safety incidents were also the most costly. Decubitus ulcer and post-operative respiratory failure accounted for 50.70 percent of all excess attributable costs (\$2.81 billion and \$1.55 billion, respectively) from 2003 through 2005. We identified that a total of \$8.6 billion of excess cost was attributable to the 16 patient safety incidents studied during 2003 through 2005 (see *Appendix E*).

## Most Patient Safety Incidents Worsened

More than half (10 of 16) of the patient safety incident (PSI) rates studied worsened from 2003 to 2005. These ten indicators worsened, on average, by over 11.5 percent. The PSIs with the greatest increases in incident rates from 2003 to 2005 were post-operative sepsis (34.28%), post-operative respiratory failure (18.70%), and selected infections due to medical care (12.32%). Six indicators improved, on average, by eight percent. Two indicators, complications of anesthesia and transfusion reaction, occur so rarely that it is difficult to make a valid conclusion on the associated change. The remaining PSIs with the greatest improvements from 2003 to 2005 were death in low mortality DRG (12.04%), post-operative hip fracture (8.84%), and failure to rescue (5.97%) (see *Appendix D*).

Overall, the 16 total patient safety incident rates studied worsened by an additional 2.03 incidents per 1,000 hospitalizations in 2005 compared to 2003.

The **PSIs with the highest incidence rates** were decubitus ulcer, failure to rescue, and post-operative respiratory failure. Failure to rescue improved 5.97 percent during the study period, while both decubitus ulcer and post-operative respiratory failure worsened by 9.03 and 18.70 percent, respectively (see *Appendix D*).

### **Approximately One in Five Medicare Patients with Patient Safety Incidents Die**

Although mortality attributable to medical errors and injury is relatively rare, and overall mortality rates among Medicare beneficiaries have been declining steadily, we determined that the 16 PSIs studied may still have contributed to 247,662 deaths from 2003 through 2005. This translates to an approximate 21.35 percent mortality rate in Medicare patients and this mortality was potentially attributable to the development of one or more patient safety incidents (see *Appendix E*).

### **Large Safety Gaps Identified Between Top and Bottom Performing Hospitals**

This study also identified 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 15 percent of ranked hospitals based on overall hospital performance and were identified as Distinguished Hospitals for Patient Safety™. To be ranked on overall patient safety performance assessment, hospitals had to be rated in at least 19 of 28 HealthGrades cohorts and have a current overall HealthGrades star rating of at least 2.5. The final ranking set included 752 teaching hospitals and 857 non-teaching hospitals. **The top 15 percent, or 242 hospitals, were identified as Distinguished Hospitals for Patient Safety™. These Distinguished Hospitals represent less than five percent of all U.S. hospitals examined in this study** (see *Appendices A and C*).

We found that there were wide, highly significant gaps in individual PSI and overall performance between the Distinguished Hospitals for Patient Safety™ and the bottom ranked hospitals. More specifically, we found that Distinguished Hospitals, as a group, significantly outperformed the bottom 15 percent hospitals on every PSI. We also found that Distinguished Hospitals, as a group, had an overall patient safety performance equating to, on average, a 40.77 percent lower risk of occurrence of developing one or more patient safety incidents compared to the bottom 15 percent hospitals (see *Appendix F*). This finding was consistent across all 13 PSIs studied (range: 16.78% to 53.60% relative risk decrease) (see *Appendix F*).

### **Distinguished Hospitals for Patient Safety™ Avoid Excess Incidents, Associated Deaths and Cost**

If all hospitals performed at the level of **Distinguished Hospitals for Patient Safety™**, approximately **206,286 patient safety incidents and 34,393 Medicare deaths** could have been avoided while saving the U.S. approximately **\$1.74 billion** from 2003 through 2005.

## *Interpretation of Results*

This is our fourth study evaluating the potentially avoidable patient safety incidents and associated mortality and cost using AHRQ's PSIs<sup>1</sup> across all U.S. hospitals among the most vulnerable patient population—Medicare patients over the age of 65. This study identified that the adverse event rate is approximately three percent and the total number of patient safety incidents has increased since 2003 and is associated with a significant chance of dying.

Despite the flurry of research, publications and process improvement activity that has occurred since the IOM report,<sup>5</sup> there is a growing consensus that not much progress has been made leading to a visible national impact.<sup>7</sup> Our findings support this consensus.

However, our findings also support that progress continues to be made at the top. Distinguished Hospitals for Patient Safety™ continue to lead the nation in providing safer care, by approximately 40 percent more, and resulting in much lower costs to society. We believe that Distinguished Hospitals have deliberately chosen and maintained patient safety as a top priority. Previous studies have identified that barriers to achieving a safe culture include complexity, professional fragmentation, and a tradition of individualism, enhanced by a well-entrenched hierarchical authority structure and diffuse accountability.<sup>6</sup> We believe Distinguished Hospitals for Patient Safety™ have identified successful strategies to overcome these formidable barriers and will continue to lead the nation in reducing patient safety incidents, their associated preventable mortalities and excess cost.

## Appendix A: List of Best-Performing Hospitals for Overall Patient Safety

The following is a list of hospitals that are recipients of this year's HealthGrades Distinguished Hospital Award for Patient Safety™\* in 2007. Some of the recipients of the Distinguished Hospital Award for Patient Safety™ have multiple locations that report under the same Medicare Provider ID. 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.

Distinguished Hospital for Patient Safety™*	City	State
Abbott – Northwestern Hospital Inc	Minneapolis	MN
Adena Regional Medical Center	Chillicothe	OH
Allen Memorial Hospital	Waterloo	IA
Andalusia Regional Hospital	Andalusia	AL
Anmed Health	Anderson	SC
Aspirus Wausau Hospital	Wausau	WI
Athens Regional Medical Center	Athens	GA
Aurora St Lukes Medical Center <i>including St Lukes Medical Center Inc</i>	Milwaukee Cudahy	WI WI
Avera Mckennan Hospital and University Health Center	Sioux Falls	SD
Baptist Hospital East	Louisville	KY
Baptist St Anthony's Health System	Amarillo	TX
Bay Area Medical Center	Marinette	WI
Bay Medical Center	Panama City	FL
Beckley ARH Hospital	Beckley	WV
Bellin Memorial Hospital	Green Bay	WI
Benefis Healthcare	Great Falls	MT
Bethesda North Hospital	Cincinnati	OH
Billings Clinic	Billings	MT
Blake Medical Center	Bradenton	FL
Blanchard Valley Regional Health Center	Findlay	OH
Blessing Hospital <i>including St Mary Hospital Inc</i>	Quincy Quincy	IL IL
Boca Raton Community Hospital Inc	Boca Raton	FL
Boone Hospital Center	Columbia	MO
Botsford General Hospital	Farmington Hills	MI

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Distinguished Hospital for Patient Safety™*	City	State
Brigham and Women's Hospital	Boston	MA
Cape Cod Hospital	Hyannis	MA
Cape Fear Valley Medical Center	Fayetteville	NC
Centennial Medical Center	Nashville	TN
Central Dupage Hospital	Winfield	IL
Central Florida Regional Hospital	Sanford	FL
Charleston Area Medical Center	Charleston	WV
Christus Spohn Hospital Corpus Christi	Corpus Christi	TX
<i>including</i> Christus Spohn Hospital South	Corpus Christi	TX
Dubuis Hospital of Corpus Christi	Corpus Christi	TX
Southside Health Center	Corpus Christi	TX
Citizens Medical Center	Victoria	TX
Cleveland Clinic	Cleveland	OH
Columbia Regional Hospital	Columbia	MO
Community Hospital of the Monterey Peninsula	Monterey	CA
Community Medical Center	Toms River	NJ
Community Medical Center	Scranton	PA
Crittenton Hospital Medical Center	Rochester	MI
Danbury Hospital	Danbury	CT
Davis Memorial Hospital	Elkins	WV
Deaconess Hospital	Evansville	IN
Deaconess Hospital	Cincinnati	OH
<i>including</i> Regency Hospital of Cincinnati, LLC	Cincinnati	OH
Decatur Memorial Hospital	Decatur	IL
Detar Hospital Navarro	Victoria	TX
<i>including</i> Detar Hospital North	Victoria	TX
Dubois Regional Medical Center	Dubois	PA
East Texas Medical Center	Tyler	TX
<i>including</i> East Texas Medical Center Specialty Hospital	Tyler	TX
East Texas Medical Center Athens	Athens	TX
El Centro Regional Medical Center	El Centro	CA
Elkhart General Hospital	Elkhart	IN

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Distinguished Hospital for Patient Safety™*	City	State
Ellis Hospital	Schenectady	NY
EMH Regional Medical Center	Elyria	OH
Ephrata Community Hospital	Ephrata	PA
Evanston Northwestern Healthcare <i>including</i> Glenbrook Hospital Highland Park Hospital	Evanston Glenview Highland Park	IL IL IL
Fairview Park Hospital	Dublin	GA
Fairview Southdale Hospital	Edina	MN
Firsthealth Moore Regional Hospital	Pinehurst	NC
Flagler Hospital	St. Augustine	FL
Florida Hospital	Orlando	FL
Flowers Hospital	Dothan	AL
French Hospital Medical Center	San Luis Obispo	CA
Genesys Regional Medical Center	Grand Blanc	MI
Glendale Memorial Hospital and Health Center	Glendale	CA
Glenwood Regional Medical Center <i>including</i> Louisiana Extended Care Hospital West Monroe	West Monroe West Monroe	LA LA
Good Samaritan Hospital	Lebanon	PA
Good Samaritan Hospital and Rehabilitation Center	Puyallup	WA
Good Samaritan Hospital Medical Center	West Islip	NY
Great River Medical Center	West Burlington	IA
Gulf Coast Medical Center	Panama City	FL
Hackley Hospital	Muskegon	MI
Hardin Memorial Hospital	Elizabethtown	KY
Harlingen Medical Center	Harlingen	TX
Harris Methodist Fort Worth	Fort Worth	TX
Hays Medical Center	Hays	KS
Healtheast St John's Hospital	Maplewood	MN
Heartland Regional Medical Center	Saint Joseph	MO
Hoag Memorial Hospital Presbyterian	Newport Beach	CA
Holland Community Hospital	Holland	MI
Holmes Regional Medical Center	Melbourne	FL

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Distinguished Hospital for Patient Safety™*	City	State
Holy Family Hospital	Spokane	WA
Hospital of St Raphael	New Haven	CT
Houston Medical Center	Warner Robins	GA
Indiana Regional Medical Center	Indiana	PA
Iowa Methodist Medical Center	Des Moines	IA
Jersey Shore University Medical Center	Neptune	NJ
JFK Medical Center	Atlantis	FL
John D. Archbold Memorial Hospital	Thomasville	GA
Lancaster General Hospital	Lancaster	PA
Lawnwood Regional Medical Center and Heart Institute	Fort Pierce	FL
Lee Memorial Hospital	Fort Myers	FL
Leesburg Regional Medical Center	Leesburg	FL
Lutheran Hospital of Indiana	Fort Wayne	IN
Manatee Memorial Hospital	Bradenton	FL
Marion General Hospital <i>including MedCenter Hospital Inc</i>	Marion Marion	OH OH
Marquette General Hospital	Marquette	MI
Martha Jefferson Hospital	Charlottesville	VA
Mary Greeley Medical Center	Ames	IA
Mayo Clinic Hospital	Phoenix	AZ
McLaren Regional Medical Center	Flint	MI
McLeod Regional Medical Center	Florence	SC
Memorial Hospital Burlington	Burlington	WI
Memorial Hospital of South Bend	South Bend	IN
Mercy Franciscan Hospital - Mt. Airy	Cincinnati	OH
Mercy Hospital - Western Hills	Cincinnati	OH
Mercy General Health Partners	Muskegon	MI
Mercy General Hospital	Sacramento	CA
Mercy Hospital	Coon Rapids	MN
Mercy Hospital Anderson	Anderson Township	OH
Mercy Hospital Inc	Miami	FL

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Distinguished Hospital for Patient Safety™*	City	State
Mercy Hospital Scranton	Scranton	PA
Mercy Medical Center	Oshkosh	WI
Mercy Medical Center of Springfield	Springfield	OH
Mercy Medical Center - Clinton	Clinton	IA
Mercy Medical Center - Dubuque	Dubuque	IA
Mercy Medical Center - North Iowa <i>including</i> North Iowa Medical Center	Mason City Mason City	IA IA
Mercy Memorial Health Center <i>including</i> Ardmore Adventist Hospital	Ardmore Ardmore	OK OK
Meriter Hospital <i>including</i> Methodist Hospital	Madison Madison	WI WI
Methodist Hospital	Minneapolis	MN
Middletown Regional Hospital	Middletown	OH
MidMichigan Medical Center - Midland	Midland	MI
Midwest Regional Medical Center	Midwest City	OK
Mission Hospitals Inc	Asheville	NC
Mississippi Baptist Medical Center	Jackson	MS
Monongalia County General Hospital	Morgantown	WV
Morton Plant Hospital	Clearwater	FL
Mother Frances Hospital - Tyler	Tyler	TX
Munroe Regional Medical Center	Ocala	FL
Munson Medical Center	Traverse City	MI
NCH Healthcare System	Naples	FL
Newport Hospital	Newport	RI
North Florida Regional Medical Center	Gainesville	FL
North Shore Medical Center <i>including</i> Atlanticare Medical Center Inc. - Union	Salem Lynn	MA MA
Northwest Hospital	Seattle	WA
Northwest Medical Center UPMC <i>including</i> Northwest Medical Center - Oil City	Seneca Oil City	PA PA
Oakwood Heritage Hospital	Taylor	MI
Oakwood Hospital and Medical Center - Dearborn	Dearborn	MI

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Distinguished Hospital for Patient Safety™*	City	State
Oakwood Hospital and Medical Center - Dearborn	Dearborn	MI
O'Connor Hospital	San Jose	CA
Palm Beach Gardens Medical Center	Palm Beach Garden	FL
Palos Community Hospital	Palos Heights	IL
Parma Community General Hospital	Parma	OH
Peace River Regional Medical Center	Port Charlotte	FL
Pennsylvania Hospital	Philadelphia	PA
Physicians Regional Medical Center	Naples	FL
Piedmont Fayette Hospital	Fayetteville	GA
Piedmont Hospital	Atlanta	GA
Pinnacle Health System	Harrisburg	PA
Poudre Valley Hospital	Fort Collins	CO
Provena Covenant Medical Center - Urbana	Urbana	IL
Providence Everett Medical Center - Colby Campus	Everett	WA
Providence Healthcare Network	Waco	TX
Providence Medford Medical Center	Medford	OR
Providence St Peter Hospital	Olympia	WA
Providence St Vincent Medical Center	Portland	OR
Queen of the Valley	Napa	CA
Rapides Regional Medical Center	Alexandria	LA
Reid Hospital and Health Care Services	Richmond	IN
Rex Hospital	Raleigh	NC
Riverside Medical Center	Kankakee	IL
Riverside Methodist Hospital	Columbus	OH
Rockford Memorial Hospital	Rockford	IL
Rogue Valley Medical Center	Medford	OR
Rowan Regional Medical Center	Salisbury	NC
Sacred Heart Hospital	Cumberland	MD
Sacred Heart Medical Center	Spokane	WA
Saint Joseph Hospital	Chicago	IL
Saint Joseph Medical Center	Towson	MD

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Distinguished Hospital for Patient Safety™*	City	State
Saint Joseph's Hospital of Atlanta	Atlanta	GA
Saint Luke's Hospital of Kansas City <i>including</i> The Cancer Institute	Kansas City Kansas City	MO MO
Saint Thomas Hospital	Nashville	TN
Salina Regional Health Center <i>including</i> St Johns Regional Health Center	Salina Salina	KS KS
San Angelo Community Medical Center	San Angelo	TX
Sarasota Memorial Hospital	Sarasota	FL
Scott and White Memorial Hospital	Temple	TX
Seton Highland Lakes <i>including</i> Seton Medical Center	Burnet Austin	TX TX
Sewickley Valley Hospital	Sewickley	PA
Sharon Regional Health System	Sharon	PA
Sioux Valley Hospital University Medical Center	Sioux Falls	SD
Slidell Memorial Hospital	Slidell	LA
South Austin Hospital	Austin	TX
Southeast Alabama Medical Center <i>including</i> The LTC Hospital at SE Alabama Medical Center	Dothan Dothan	AL AL
Southwest General Health Center	Middleburg Heights	OH
Spectrum Health Hospitals <i>including</i> Ferguson/Blodgett Hospital	Grand Rapids Grand Rapids	MI MI
SSM Depaul Health Center	Bridgeton	MO
SSM St Joseph Health Center <i>including</i> SSM St Joseph Health Center - Wentzville	St. Charles Wentzville	MO MO
St Anthony's Medical Center	St. Louis	MO
St Catherine Hospital	East Chicago	IN
St Charles Medical Center - Bend	Bend	OR
St Cloud Hospital	St. Cloud	MN
St Elizabeth Community Hospital	Red Bluff	CA
St Francis Hospital - Roslyn	Roslyn	NY
St Francis Hospital and Health Center	Blue Island	IL
St Francis Medical Center	Monroe	LA

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Distinguished Hospital for Patient Safety™*	City	State
St John West Shore Hospital	Westlake	OH
St Johns Hospital	Springfield	IL
St Johns Mercy Hospital	Washington	MO
St Joseph Community Hospital	Mishawaka	IN
St Joseph Mercy Hospital	Ypsilanti	MI
St Joseph Regional Medical Center	Lewiston	ID
St Joseph's Hospital	St. Paul	MN
St Jude Medical Center	Fullerton	CA
St Luke's Cornwall Hospital <i>including</i> St Lukes Hospital	Cornwall Newburgh	NY NY
St Lukes Hospital	Duluth	MN
St Luke's Hospital	Jacksonville	FL
St Luke's Hospital	Maumee	OH
St Lukes Regional Medical Center	Boise	ID
St Mary Medical Center	Walla Walla	WA
St Marys Hospital Medical Center	Madison	WI
St Mary's Hospital of Athens	Athens	GA
St Mary's Medical Center - Hobart	Hobart	IN
St Mary's/Duluth Clinic Health Systems	Duluth	MN
St Peter's Hospital	Albany	NY
St Vincent Infirmary Medical Center <i>including</i> St Vincent Doctors Hospital	Little Rock Little Rock	AR AR
St Vincent Mercy Medical Center <i>including</i> Mercy Healthcare Center	Toledo Toledo	OH OH
Stormont-Vail Healthcare	Topeka	KS
T J Samson Community Hospital	Glasgow	KY
Terrebonne General Hospital	Houma	LA
Texoma Medical Center	Denison	TX
The Community Hospital	Munster	IN
The Reading Hospital and Medical Center	West Reading	PA
Trinity Hospitals <i>including</i> Trinity Medical Center	Minot Minot	ND ND

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Distinguished Hospital for Patient Safety™*	City	State
Trinity Medical Center - 7th Street Campus <i>including</i> Moline Public Hospital Trinity Medical Center-East	Rock Island Moline Moline	IL IL IL
Tuomey Healthcare System	Sumter	SC
United Hospitals Inc	St. Paul	MN
United Regional Health Care System	Wichita Falls	TX
UPMC Passavant <i>including</i> UPMC Cranberry	Pittsburgh Cranberry Township	PA PA
UPMC Presbyterian Shadyside <i>including</i> Sempercare Hospital at UPMC UPMC Shadyside	Pittsburgh Pittsburgh Pittsburgh	PA PA PA
Venice Regional Medical Center	Venice	FL
Walls Regional Hospital	Cleburne	TX
Watauga Medical Center	Boone	NC
Waukesha Memorial Hospital	Waukesha	WI
Wesley Medical Center <i>including</i> Select Specialty Hospital Wichita	Wichita Wichita	KS KS
West Allis Memorial Hospital	West Allis	WI
William Beaumont Hospital -Troy	Troy	MI
Willis Knighton Bossier Health Center	Bossier City	LA
Willis Knighton Medical Center	Shreveport	LA
Winchester Medical Center Inc	Winchester	VA
Wooster Community Hospital	Wooster	OH
Wuesthoff Medical Center Rockledge	Rockledge	FL
WVHCS Hospital Inc <i>including</i> Wilkes-Barre General Hospital	Wilkes-Barre Wilkes-Barre	PA PA
Yavapai Regional Medical Center	Prescott	AZ
York Hospital	York	PA
Yuma Regional Medical Center	Yuma	AZ

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*Appendix B:*  
*List of Patient Safety Indicators Used in this HealthGrades Study*

- Accidental puncture or laceration
- Complications of anesthesia
- Death in low mortality DRGs
- Decubitus ulcer
- Failure to rescue
- Foreign body left in during procedure
- Iatrogenic pneumothorax
- Selected infections due to medical care
- Post-operative hemorrhage or hematoma
- Post-operative hip fracture
- Post-operative physiologic and metabolic derangement
- Post-operative pulmonary embolism or deep vein thrombosis
- Post-operative respiratory failure
- Post-operative sepsis
- Post-operative abdominal wound dehiscence
- Transfusion reaction

## *Appendix C:*

### *Overall Patient Safety Indicator Hospital Performance Assessment Methodology (2003 – 2005 MedPAR Data)*

#### **Patient Safety Measurement**

This methodology includes the following Patient Safety Indicators:

- Death in low mortality Diagnostic Related Groupings (DRGs)
- Decubitus ulcer
- Failure to rescue
- Foreign body left in during procedure
- Iatrogenic pneumothorax
- Selected infections due to medical care
- Post-operative hip fracture
- Post-operative hemorrhage or hematoma
- Post-operative physiologic and metabolic derangements
- Post-operative respiratory failure
- Post-operative pulmonary embolism or deep vein thrombosis
- Post-operative sepsis
- Post-operative abdominal wound dehiscence

#### **Data Acquisition**

HealthGrades uses the MedPAR data file from the Centers for Medicare and Medicaid Services (CMS) for several reasons:

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

HealthGrades used the QI Windows Software, version 3.0a, developed by the Agency for Healthcare Research and Quality (AHRQ) and downloaded from [www.qualityindicators.ahrq.gov/winqi\\_download.htm](http://www.qualityindicators.ahrq.gov/winqi_download.htm). Following all AHRQ guidelines for using PSI software, HealthGrades applied it to all short-term acute care hospitals in the MedPAR file for three years (2003 through 2005).

Given that this data set applies mostly to patients over the age of 65, HealthGrades excluded the following PSIs from the analysis:

- Birth trauma – injury to neonate
- Obstetric trauma – cesarean delivery
- Obstetric trauma – vaginal delivery with instrument
- Obstetric trauma – vaginal delivery without instrument

Due to coding variation in the use of E codes, HealthGrades excluded three additional indicators:

- Complications of anesthesia
- Accidental puncture or laceration
- Transfusion reaction

## Data Exclusions

HealthGrades modified the “Failure to rescue” patient group by excluding cancer patients—patients having any ICD-9 code between 140.0 and 208.9 or between 230.0 and 239.9.

HealthGrades also removed hospitals in the U.S. territories and Puerto Rico from the data set.

## Overall Patient Safety Score

To determine the overall patient safety score by hospital, HealthGrades performed the following steps.

1. AHRQ software calculated observed, expected, risk-adjusted and smoothed rates for each hospital and PSI, provided that the PSI had at least three cases. (HealthGrades used a stratification process to calculate expected rates for those PSIs where AHRQ software only provided observed rates.)
2. HealthGrades identified significant bias in the expected rates for larger hospitals (which had consistently higher observed rates than expected). Therefore, 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 DRG the most severely ill will probably be clustered at larger hospitals.

To perform the case mix index adjustment and remove the bias, HealthGrades:

- a) Stratified hospitals by their CMI category. This was done separately for each of the three years (2003–2005) using the corresponding year’s CMI. Therefore, it is possible that a hospital could be in different CMI strata from year to year. (See *CMI Index*, below, for definitions.) CMI < 1.25 was the first level, and so on.
  - b) Adjusted the expected (predicted) counts so that the total observed count was equal to the total expected for each PSI, and for each year-CMI level combination. For example, if CMI level 1 had 2,000 predicted events and 1,800 observed for a given year and PSI, each of the hospitals in this group would have its predicted value reduced by 10 percent. If the CMI level 6 had 3,000 predicted and 4,000 observed, those hospitals would have the predicted values increased by 33 percent.
3. HealthGrades statistically compared the observed rate to the expected rate to produce a z-score for each PSI that had sufficient volume at any hospital. To normalize the effect of the 13 indicators, these z-scores were rescaled to a mean of zero and standard deviation of one. The average of the 13 resulting scores determined a hospital’s ranking.
  4. HealthGrades divided the hospitals into two peer groups: teaching and non-teaching. To identify the teaching peer group, HealthGrades used the data from Medicare Cost Reports (Form CMS-2552-96). A facility was considered a teaching hospital if they answered “yes” to the question: “Is this a teaching hospital or affiliated with a teaching hospital?” Hospitals that received substantial Indirect Medical Education payments in 2004 were also classified as teaching hospitals. Independent verification by phone was used for a few hospitals.
  5. To be considered for the Distinguished Hospital Award for Patient Safety™, hospitals had to be rated in at least 19 of 28 HealthGrades cohorts and have a current overall HealthGrades star rating of at least 2.5. The final data set included 752 teaching hospitals and 857 non-teaching hospitals.

6. From this final data set, HealthGrades identified both teaching and non-teaching hospitals in the top 15 percent as “best performing” and these hospitals are recognized as Distinguished Hospital Award for Patient Safety™ recipients. These 242 hospitals represent less than five percent of the total hospitals evaluated.

Hospital Type	Number of Best Performing Providers
Teaching Hospitals	113
Non-Teaching Hospitals	129

### 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; 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 report, therefore, “hospital” refers to one hospital or a group of hospitals reporting under a single provider ID.

Hospitals were assigned one of eight CMI levels. Hospitals were categorized according to their 2004 index as follows.

### CMI Index

CMI Index	CMI Group	Number of Award Recipients
0.00 < CMI < 1.25	1	17
1.25 < CMI < 1.35	2	33
1.35 < CMI < 1.45	3	38
1.45 < CMI < 1.55	4	51
1.55 < CMI < 1.65	5	39
1.65 < CMI < 1.75	6	29
1.75 < CMI < 1.90	7	21
CMI > 1.90	8	14

**Appendix D:**  
**Patient Safety Incident Rates and Associated Mortality**  
**Among Medicare Beneficiaries – 2003 through 2005**

Patient Safety Incident	Year	Number of Incidents	Total Cases Evaluated	Rate per 1,000	Associated Mortality*	% Change in Rate (2003 - 2005)
Complications of anesthesia	2003	699	3,256,353	0.215	8	- 14.39%
	2004	684	3,361,112	0.204	7	
	2005	631	3,433,616	0.184	5	
	<b>2003-2005</b>	<b>2,014</b>	<b>10,051,081</b>	<b>0.200</b>	<b>20</b>	
Death in low mortality DRGs	2003	3,861	1,938,430	1.992	3,861	- 12.04%
	2004	3,882	2,015,704	1.926	3,882	
	2005	3,478	1,985,255	1.752	3,478	
	<b>2003-2005</b>	<b>11,221</b>	<b>5,939,389</b>	<b>1.889</b>	<b>11,221</b>	
Decubitus ulcer	2003	163,723	5,294,281	30.925	18,940	9.03%
	2004	172,195	5,382,120	31.994	18,987	
	2005	182,374	5,408,865	33.718	19,324	
	<b>2003-2005</b>	<b>518,292</b>	<b>16,085,266</b>	<b>32.222</b>	<b>57,251</b>	
Failure to rescue	2003	61,103	439,988	138.874	61,103	- 5.97%
	2004	64,255	487,139	131.903	64,255	
	2005	70,233	537,852	130.581	70,233	
	<b>2003-2005</b>	<b>195,591</b>	<b>1,464,979</b>	<b>133.511</b>	<b>195,591</b>	
Foreign body left in during procedure	2003	844	13,099,963	0.064	27	- 0.85%
	2004	900	13,467,824	0.067	36	
	2005	870	13,619,154	0.064	41	
	<b>2003-2005</b>	<b>2,614</b>	<b>40,186,941</b>	<b>0.065</b>	<b>104</b>	
Iatrogenic pneumothorax	2003	7,426	12,354,645	0.601	1,383	5.04%
	2004	7,579	12,715,064	0.596	1,301	
	2005	8,116	12,855,212	0.631	1,367	
	<b>2003-2005</b>	<b>23,121</b>	<b>37,924,921</b>	<b>0.610</b>	<b>4,051</b>	
Selected infections due to medical care	2003	19,161	8,610,325	2.225	1,931	12.32%
	2004	19,712	8,796,893	2.241	1,961	
	2005	22,110	8,845,909	2.499	2,220	
	<b>2003-2005</b>	<b>60,983</b>	<b>26,253,127</b>	<b>2.323</b>	<b>6,112</b>	
Post-operative hip fracture	2003	1,141	2,058,131	0.554	120	- 8.84%
	2004	1,149	2,100,896	0.547	115	
	2005	1,073	2,123,135	0.505	104	
	<b>2003-2005</b>	<b>3,363</b>	<b>6,282,162</b>	<b>0.535</b>	<b>339</b>	

Continues...

Legend	Improvement	No Change	Worsening

**Appendix D: Patient Safety Incident Rates and Associated Mortality Among Medicare Beneficiaries – 2003 through 2005 (continued)**

Patient Safety Incident	Year	Number of Incidents	Total Cases Evaluated	Rate per 1,000	Associated Mortality*	% Change in Rate (2003 - 2005)
Post-operative hemorrhage or hematoma	2003	7,401	3,240,956	2.284	391	- 5.79%
	2004	7,143	3,344,701	2.136	333	
	2005	7,349	3,416,060	2.151	403	
	<b>2003-2005</b>	<b>21,893</b>	<b>10,001,717</b>	<b>2.189</b>	<b>1,127</b>	
Post-operative physiologic and metabolic derangements	2003	2,150	1,722,561	1.248	462	5.65%
	2004	2,348	1,783,031	1.317	491	
	2005	2,415	1,831,388	1.319	493	
	<b>2003-2005</b>	<b>6,913</b>	<b>5,336,980</b>	<b>1.295</b>	<b>1,446</b>	
Post-operative respiratory failure	2003	17,635	1,270,619	13.879	4,392	18.70%
	2004	18,179	1,314,086	13.834	4,438	
	2005	22,196	1,347,260	16.475	5,290	
	<b>2003-2005</b>	<b>58,010</b>	<b>3,931,965</b>	<b>14.753</b>	<b>14,120</b>	
Post-operative pulmonary embolism or deep vein thrombosis	2003	37,200	3,216,281	11.566	3,755	9.63%
	2004	39,790	3,316,387	11.998	3,704	
	2005	42,896	3,383,012	12.680	4,098	
	<b>2003-2005</b>	<b>119,886</b>	<b>9,915,680</b>	<b>12.091</b>	<b>11,557</b>	
Post-operative sepsis	2003	5,357	514,663	10.409	1,488	34.28%
	2004	6,005	509,653	11.783	1,555	
	2005	7,056	504,840	13.977	1,892	
	<b>2003-2005</b>	<b>18,418</b>	<b>1,529,156</b>	<b>12.045</b>	<b>4,935</b>	
Post-operative wound dehiscence in abdominopelvic surgical patients	2003	1,666	478,187	3.484	199	8.25%
	2004	1,609	474,694	3.390	174	
	2005	1,753	464,827	3.771	212	
	<b>2003-2005</b>	<b>5,028</b>	<b>1,417,708</b>	<b>3.547</b>	<b>585</b>	
Accidental puncture or laceration	2003	36,671	13,082,882	2.803	2,352	1.43%
	2004	37,305	13,449,524	2.774	2,266	
	2005	38,663	13,598,714	2.843	2,307	
	<b>2003-2005</b>	<b>112,639</b>	<b>40,131,120</b>	<b>2.807</b>	<b>6,925</b>	
Transfusion reaction	2003	65	13,100,122	0.005	7	10.99%
	2004	58	13,467,986	0.004	1	
	2005	75	13,619,305	0.006	3	
	<b>2003-2005</b>	<b>198</b>	<b>40,187,413</b>	<b>0.005</b>	<b>11</b>	
<b>Totals</b>	-	<b>1,160,184</b>	-	-	<b>315,395</b>	
			<b>Less Double Counts</b>		<b>284,798</b>	

Legend	Improvement	
	No Change	
	Worsening	

\* This is all-cause in-hospital mortality among all U.S. patients that developed one or more patient safety incidents during hospitalization from 2003 through 2005.

**Appendix E.**  
**Patient Safety Incidents and Their Attributable Mortality and Excess Charge Among Medicare Beneficiaries by PSI – 2003 through 2005**

Patient Safety Indicator	Actual Number of National Incidents	Percentage of Total Number of Incidents	Attributable Mortality Rates**	Number of Deaths Attributable to a PSI (Attributable Mortality**)	Attributable Charge **	Excess Charge Attributable to a PSI** In Millions	Excess Cost Attributable to a PSI ^^ In Millions
Decubitus ulcer	518,292	44.68%	7.23%	37,473	\$10,845	\$5,620.88	\$2,810.44
Failure to rescue*	195,591	16.86%	NA*	195,591	NA*	NA*	NA*
Post-op pulmonary embolism or deep vein thrombosis	119,886	10.34%	6.56%	7,865	\$21,709	\$2,602.61	\$1,301.30
Accidental puncture or laceration	112,639	9.71%	2.16%	2,433	\$8,271	\$931.64	\$465.82
Selected infections due to medical care	60,983	5.26%	4.31%	2,628	\$38,656	\$2,357.36	\$1,178.68
Iatrogenic pneumothorax	23,121	1.99%	6.99%	1,616	\$17,312	\$400.27	\$200.14
Post-op respiratory failure	58,010	5.00%	21.84%	12,669	\$53,502	\$3,103.65	\$1,551.83
Post-op hemorrhage or hematoma	21,893	1.89%	3.01%	659	\$21,431	\$469.19	\$234.59
Post-op hip fracture	3,363	0.29%	4.52%	152	\$13,441	\$45.20	\$22.60
Post-op sepsis	18,418	1.59%	21.92%	4,037	\$57,727	\$1,063.22	\$531.61
Death in low mortality DRGs*	11,221	0.97%	NA*	11,221	NA*	NA*	NA*
Post-op physiologic and metabolic derangements	6,913	0.60%	19.81%	1,369	\$54,818	\$378.96	\$189.48
Post-op abdominal wound dehiscence	5,028	0.43%	9.63%	484	\$40,323	\$202.74	\$101.37
Foreign body left in during procedure	2,614	0.23%	2.14%	56	\$13,315	\$34.81	\$17.40
Complications of anesthesia	2,014	0.17%	0.24%	5	\$1,598	\$3.22	\$1.61
Transfusion reaction	198	0.02%	0%	0	\$18,929	\$3.75	\$1.87
<b>Totals</b>	<b>1,160,184</b>	<b>-</b>	<b>-</b>	<b>278,259</b>	<b>-</b>	<b>\$17,217.48</b>	<b>\$8,608.74</b>
<b>Less Double Counts</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>247,662</b>	<b>-</b>	<b>-</b>	<b>-</b>

\* By definition, all patients with the event died and were excluded from Zhan and Miller's analysis on attributable mortality and cost associated with PSI incidents. Also, 0.5% of total deaths associated with Death in Low Mortality DRGs were excluded from the total.

\*\* Based on previous research done by Zhan C., and Miller M. R. "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 B., La Mare J., Andrews R., and McKenzie D. "Practical Options for Estimating Cost of Hospital Inpatient Stays." *J Health Care Finance*. 2002; 29(1): 1-13.

**Appendix F:**  
**Comparisons Between Different Performance Categories – 2003 through 2005**

Patient Safety Indicator	ALL	Observed-to-Expected Ratios (O/E) by PSI and Associated Outcomes				As Compared to the Top 15% Performance			
		Distinguished Hospitals for Patient Safety™ O/E Ratios (95% CI)	Middle 70% O/E Ratios	Bottom 15% Hospitals O/E Ratios (95% CI)	Relative Risk Decrease Associated with Distinguished Hospitals Compared to Bottom Hospitals	# of Excess Patient Safety Incidents Among All Non-Distinguished Hospitals	# Potentially Avoidable Deaths** Associated with Excess Patient Safety Incidents Among All Non-Distinguished Hospitals	Excess Charge** (millions) Associated with Excess Patient Safety Incidents Among All Non-Distinguished Hospitals	Excess Cost^^ (millions) Associated with Excess Patient Safety Incidents Among All Non-Distinguished Hospitals
Death in low mortality DRGs	0.971	0.719 (0.684-0.753)	0.982	1.248 (1.194-1.302)	42.42%	2,707	2,707	NA*	NA*
Decubitus ulcer	0.966	0.702 (0.697-0.708)	0.968	1.247 (1.239-1.254)	43.69%	126,954	9,179	\$1,377	\$688
Failure to rescue	0.994	0.877 (0.867-0.887)	1.005	1.054 (1.043-1.065)	16.78%	16,533	16,533	NA*	NA*
Foreign body left in during procedure	1.014	0.669 (0.605-0.734)	1.030	1.384 (1.277-1.490)	51.61%	874	19	\$12	\$6
Iatrogenic pneumothorax	1.021	0.818 (0.794-0.842)	1.028	1.255 (1.220-1.290)	34.82%	4,498	314	\$78	\$39
Selected infections due to medical care	0.943	0.684 (0.670-0.697)	0.932	1.334 (1.312-1.356)	48.75%	14,942	644	\$578	\$289
Post-op hip fracture	1.007	0.763 (0.703-0.823)	1.014	1.325 (1.230-1.420)	42.44%	791	36	\$11	\$5
Post-op hemorrhage or hematoma	1.003	0.817 (0.793-0.841)	1.012	1.211 (1.177-1.245)	32.51%	4,010	121	\$86	\$43
Post-op physiologic and metabolic derangements	0.969	0.669 (0.632-0.707)	0.952	1.442 (1.379-1.506)	53.60%	2,012	399	\$110	\$55

Continues...



Appendix F: Comparisons Between Different Performance Categories – 2003 through 2005 (continued)

Patient Safety Indicator	ALL	Distinguished Hospitals for Patient Safety™ O/E Ratios (95% CI)	Middle 70% O/E Ratios	Bottom 15% Hospitals O/E Ratios (95% CI)	Relative Risk Decrease Associated with Distinguished Hospitals Compared to Bottom Hospitals	# of Excess Patient Safety Incidents Among All Non-Distinguished Hospitals	# Potentially Avoidable Deaths** Associated with Excess Patient Safety Incidents Among All Non-Distinguished Hospitals	Excess Charge** (millions) Associated with Excess Patient Safety Incidents Among All Non-Distinguished Hospitals	Excess Cost^^ (millions) Associated with Excess Patient Safety Incidents Among All Non-Distinguished Hospitals
Post-op respiratory failure	1.005	0.809 (0.794-0.824)	0.995	1.304 (1.282-1.325)	37.95%	11,115	2,428	\$595	\$297
Post-op pulmonary embolism or deep vein thrombosis	0.995	0.852 (0.841-0.862)	0.967	1.330 (1.315-1.345)	35.96%	16,848	1,105	\$366	\$183
Post-op sepsis	0.965	0.767 (0.741-0.793)	0.950	1.297 (1.259-1.335)	40.89%	3,481	763	\$201	\$100
Post-op wound dehiscence in abdominopelvic surgical patients	1.002	0.697 (0.647-0.746)	1.012	1.354 (1.274-1.434)	48.55%	1,521	146	\$61	\$31
Average relative risk increase in and number of potentially avoidable patient safety incidents, death, charge and cost associated with All Non-Distinguished Hospitals compared to Distinguished Hospitals.					40.77%	206,286	34,393	\$3,473	\$1,737

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

\*\* Based on previous research done by Zhan C., and Miller M. R. "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 B., La Mare J., Andrews R., and McKenzie D. "Practical Options for Estimating Cost of Hospital Inpatient Stays." *J Health Care Finance*. 2002; 29(1): 1-13).

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