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Hospital Report Card™ Gynecologic Surgery Methodology 2012 (2008-2010 Data)

Contents

To help consumers evaluate and compare hospital performance in gynecologic surgery, HealthGrades analyzed patient outcome data for all patients (all-payer data) provided by 19 individual states for years 2008 through 2010. Ratings were based on HealthGrades risk-adjustment methodology, and the HealthGrades ratings are available on the Internet at www.healthgrades.com.

The purpose of risk adjustment is to obtain fair statistical comparisons among disparate populations or groups. Significant differences in demographic and clinical risk factors are found among patients treated in different hospitals. Risk adjustment of the data is needed to make accurate and valid comparisons of clinical outcomes at different hospitals.

Data Acquisition

For the gynecologic surgery hospital ratings, all-payer state data were used in those states where state data are available. These data were chosen because they represent virtually all discharges (all ages) for the associated states; however, patient volumes may differ due to data masking by state agencies to protect patient privacy. The data represent three years of discharges. The 19 states evaluated were as follows:

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

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Methodology for Rating Hospitals

Fair and valid comparisons between hospital providers can be made only to the extent that the risk-adjustment methodology considers important differences in patient demographic and clinical characteristics. The risk-adjustment methodology used by HealthGrades defines risk factors as those clinical and demographic variables that influence patient outcomes in significant and systematic ways. Risk factors may include age, gender, specific procedure performed, and comorbid conditions such as hypertension, chronic renal failure, heart failure, and diabetes. The methodology is disease-specific and outcome-specific. This means that individual risk models are constructed and tailored for each clinical condition or procedure using multivariate logistic regression.

For multivariate logistic regression-based ratings (see below), HealthGrades conducted a series of data quality checks to preserve the integrity of the ratings. Based on the results of these checks, we excluded a limited number of cases because they were inappropriate for inclusion in the database or miscoded.

The following patient records were excluded:

- Patients who left the hospital against medical advice or who were transferred to another acute care hospital.
- Patients who were still in the hospital when the claim was filed.
- Patients with male gender.
- Patients under the age of 18.

Multivariate Logistic Regression-Based Ratings

The initial analysis of the data utilized 19 states of all-payer data from 2008 through 2010. Gynecologic surgery patients were identified by their ICD-9 principal procedure of a gynecologic procedure (see *Appendix A).*

For this population, potential risk factors and the outcome measure (complications) were then defined.

1. Potential risk factors were defined as all clinically relevant diagnoses occurring in more than 0.5 percent of the patients. In addition, patient demographic factors such as age and gender and the specific procedure performed on the patient were also considered. Some diagnosis codes were merged together (e.g., primary and secondary pulmonary hypertension) to minimize the impact of coding variations.

2. Complications were identified using previous peer-reviewed research and through input from clinical and coding experts.

In some cases, an ICD-9 code can be either a risk or a complication. In these cases, if Present on Admission information is not available, a code is differentiated by the presence or absence of a 900 post-operative complication code. For example, in the case where a patient record contains “427.31 Atrial Fibrillation,” that code is considered a risk if it occurs by itself and a complication if there is a corresponding “997.1 Cardiac Complications NEC” code also present in the patient record. Outcomes were binary, with documented major complications either present or not. Mortality is considered a major complication. *Appendix B* lists the major complications for gynecologic surgery.

Developing HealthGrades Gynecologic Surgery Ratings

Developing the HealthGrades Gynecologic Surgery ratings involved four steps.

1. First, the predicted value (predicted complications) was obtained using a logistic regression model discussed in the next section.
2. Second, the predicted value was compared with the actual or observed number of complications. Only hospitals with at least 30 cases across three years of data and at least five cases in the most current year were included.
3. Third, a test was conducted to determine whether the difference between the predicted and actual values was statistically significant. This test was performed to make sure that differences were very unlikely to be caused by chance alone.
4. Fourth, a star rating was assigned based upon the outcome of the statistical test.

The following rating system was applied to the data for all procedures and diagnoses:

★★★★★ Best – Actual performance was better than predicted and the difference was statistically significant.

★★★ As Expected – Actual performance was not significantly different from what was predicted.

★ Poor – Actual performance was worse than predicted and the difference was statistically significant.

Statistical Models

Using the list of potential risk factors described above, we used logistic regression to determine to what extent each one was correlated with the quality measure (complications). A risk factor stayed in the model if it had an odds ratio greater than one (except clinically relevant procedures, cohort defining principal diagnoses, and some protective factors as documented in the medical literature were allowed to have an odds ratio less than one) and was also statistically significant (p <0.05).

Complications were *not* counted as risk factors as they were considered a result of care received during the admission. Risk factors are those diagnoses that are the most highly correlated with the outcomes studied (complications). The most highly correlated risk factors are not necessarily those with the highest volume. (See *Appendix C* for the Top Five Diagnosis/Procedure Risk Factors.)

The statistical model was checked for validity and finalized. The final model was highly significant, with a C-statistic of 0.665. This model was then used to estimate the probability of a complication for each patient in the cohort. Patients were then aggregated for each hospital to obtain the predicted number of complications for each hospital. Statistical significance tests were performed to identify, by hospital, whether the actual and predicted rates were significantly different.

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–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 using its methodology, no techniques are infallible, and therefore some information may be missing, outdated or incorrect.

Please note that a high ranking for a particular hospital is not a recommendation or endorsement by HealthGrades of a particular hospital; it means that the data associated with a particular hospital has met the foregoing qualifications. Only individual patients can decide whether a particular hospital is suited for their unique needs.

Also note that if more than one hospital reported to CMS under a single provider ID, HealthGrades analyzed patient outcomes 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.

Appendix A. Patient Cohorts and Related ICD-9-CM Codes

Cohort	Inclusions	Exclusions
Gynecologic Surgery Principal Procedure	• Hysterectomies • Oophorectomies • Fallopian tube procedures • Cystocele, rectocele and vaginal suspension procedures • Pelvic eviscerations • Vulvectomies • Fistulas • Urinary incontinence procedures (bladder suspension procedures)	• History of organ transplant

Gynecologic Surgery	
	Inclusions
	Principal Procedure: 59.5, 59.71, 59.79, 65.31, 65.39, 65.41, 65.49, 65.51, 65.52, 65.53, 65.54, 65.95, 66.01, 66.02, 66.21, 66.22, 66.4, 66.61, 66.62, 66.63, 66.69, 68.31, 68.39, 68.41, 68.49, 68.51, 68.59, 68.61, 68.69, 68.71, 68.79, 68.8, 70.4, 70.50, 70.51, 70.52, 70.53, 70.54, 70.55, 70.71, 70.72, 70.73, 70.74, 70.75, 70.77, 70.78, 70.8, 71.5, 71.61, 71.62
	Exclusions
	Diagnoses (Primary or Secondary): V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9

Appendix B. Major Complications

Independent complications are conditions that are clearly hospital-acquired or by the coding definition are defined as post-operative. For 2008 or later these conditions were not counted as complications if the POA indicator was "Yes" or "Clinically Undetermined."

Gynecologic Surgery – Independent Complications

410.71	SUBEND INFARCT-INITIAL	518.53	A&C RESP FAIL TRAUM/SURG
415.11	IATRO PULM EMBOL/INFARCT	560.1	PARALYTIC ILEUS
458.29	IATROGEN HYPOTENSION NEC	867.1	BLAD/URETHRA INJURY-OPEN
480.0	ADENOVIRAL PNEUMONIA	996.64	INFECT D/T URETHRAL CATH
480.1	RSV PNEUMONIA	997.01	CNS SURG COMP
480.2	PARAINFLUENZA VIR PNEUM	997.02	IATROGEN CV INFARCT/HEM
480.3	SARS PNEUMONIA	997.1	SURG COMP-HEART
480.8	VIRAL PNEUMONIA NEC	997.3	SURG COMP-RESP NEC
481	PNEUMOCOCCAL PNEUMONIA	997.31	VENT ASSOC PNEUMONIA
482.0	K. PNEUMONIAE PNEUMONIA	997.32	POSTPX ASP PNEUMONIA
482.1	PSEUDOMONAL PNEUMONIA	997.39	OTH SURG COMP-RESP
482.2	H. INFLUENZAE PNEUMONIA	997.4	SURG COMP-DIGESTIVE
482.30	STREP PNEUMONIA NOS	997.5	SURG COMP-URINARY NEC
482.31	GROUP A STREP PNEUMONIA	998.0	POSTOPERATIVE SHOCK
482.32	GROUP B STREP PNEUMONIA	998.00	POSTOP SHOCK NOS
482.39	STREP PNEUMONIA NEC	998.01	POSTOP CARDIOGENIC SHOCK
482.40	STAPH PNEUMONIA NOS	998.02	POSTOP SEPTIC SHOCK
482.41	MSSA PNEUMONIA	998.09	POSTOP SHOCK NEC
482.42	MRSA PNEUMONIA	998.11	HEMORRHAGE COMP PX
482.49	STAPH PNEUMONIA NEC	998.12	HEMATOMA COMPLICATING PX
482.81	PNEUMONIA D/T ANAEROBES	998.2	ACCIDENTAL OP LACERATION
482.82	E. COLI PNEUMONIA	998.30	DISRUPTION WOUND NOS
482.83	GRAM-NEG PNEUMONIA NEC	998.31	DISRUPT INTERNAL OP WND
482.84	LEGIONNAIRES' DISEASE	998.32	DISRUPT EXTERNAL OP WND
482.89	BACTERIAL PNEUMONIA NEC	998.4	FB LEFT DURING PROCEDURE
482.9	BACTERIAL PNEUMONIA NOS	998.51	INFECTED POSTOP SEROMA
483.0	M. PNEUMONIAE PNEUMONIA	998.59	POSTOP INFECTION NEC
483.1	CHLAMYDIAL PNEUMONIA	998.7	POSTOP FOREIGN SUBST RXN
483.8	PNEUMONIA D/T ORG NEC	999.31	INFECT NEC & NOS D/T CVC
484.1	PNEUMONIA IN CMV DISEASE	999.32	BLOODSTREAM INF D/T CVC
484.3	PNEUMONIA IN WHOOP COUGH	999.34	AC INF POST TRANSFUSION
486	PNEUMONIA ORGANISM NOS	999.39	INFECT COMP MED CARE NEC
507.0	FOOD/VOMIT PNEUMONITIS	999.80	TRANSFUSION REACTION NOS
512.1	IATROGENIC PNEUMOTHORAX	999.83	HTR INCOMPATIBILITY NOS
518.5	PI FOLLOW TRAUMA & SURG	999.84	AHTR INCOMPATIBILITY NOS
518.51	AC RESP FAIL TRAUM/SURG	999.85	DHTR INCOMPATIBILITY NOS
518.52	PI NEC FOLLOW TRAUM/SURG		A

Gynecologic Surgery - Dependent Complications

Dependent complications are conditions that must either have the POA indicator set to "No", or if the POA indicator is set to "Unknown" or is missing, there must also be the listed 900 post-operative complication code present in the patient record.

Must occur with 997.1 Cardiac Complications, Not Elsewhere Classified

427.31	ATRIAL FIBRILLATION	428.23	AC & CHR SYSTOLIC HF
427.89	OTH CARDIAC DYSRHYTHMIAS	428.31	ACUTE DIASTOLIC HF
427.9	CARDIAC DYSRHYTHMIA NOS	428.33	AC & CHR DIASTOLIC HF
428.0	CHF NOS	428.41	AC SYS & DIASTOLIC HF
428.21	ACUTE SYSTOLIC HF	428.43	ACCHR SYS & DIASTOLIC HF

Must occur with 997.3 Respiratory Complications or 997.39 Other Respiratory Complications

511.9	PLEURAL EFFUSION NOS
518.0	PULMONARY COLLAPSE
518.81	AC RESPIRATORY FAILURE

Must occur with 997.5 Urinary Complications, Not Elsewhere Classified

584.5	AC KF W TUBULAR NEPHR	599.0	URINARY TRACT INF NOS
584.8	ACUTE KIDNEY FAILURE NEC	788.20	RETENTION OF URINE NOS
584.9	ACUTE KIDNEY FAILURE NOS	788.29	RETENTION OF URINE NEC

Must occur with 998.0 Postoperative Shock, Not Elsewhere Classified

458.8	HYPOTENSION NEC
458.9	HYPOTENSION NOS
799.02	HYPOXEMIA

Must occur with 998.59 Other Postoperative Infection

038.0	STREPTOCOCCAL SEPTICEMIA	038.9	SEPTICEMIA NOS
038.10	STAPH SEPTICEMIA NOS	041.02	GROUP B STREP INFECTION
038.11	MSSA SEPTICEMIA	041.04	GROUP D STREP INFECTION
038.12	MRSA SEPTICEMIA	041.09	STREP INFECTION NEC
038.19	STAPH SEPTICEMIA NEC	041.19	OTHER STAPH INFECTION
038.2	PNEUMOCOCCAL SEPTICEMIA	041.2	PNEUMOCOCCUS INFECT NOS
038.3	ANAEROBIC SEPTICEMIA	041.3	K. PNEUMONIAE INFECT
038.40	GRAM-NEG SEPTICEMIA NOS	041.4	E. COLI INFECT NOS
038.41	H. INFLUENZAE SEPTICEMIA	041.85	GRAM-NEG BACT INFECT NEC
038.42	E. COLI SEPTICEMIA	567.22	PERITONEAL ABSCESS
038.43	PSEUDOMONAS SEPTICEMIA	785.52	SEPTIC SHOCK
038.44	SERRATIA SEPTICEMIA	790.7	BACTEREMIA
038.49	GRAM-NEG SEPTICEMIA NEC	995.91	SEPSIS
038.8	SEPTICEMIA NEC	995.92	SEVERE SEPSIS

Appendix C: Top Five Risk Factors

ICD-9 Diagnosis or Procedure Code	Description
Proc 68.8	PELVIC EVISCERATION
Proc 70.74	REPAIR OF OTHER VAGINOENTERIC FISTULA
Proc 70.72	REPAIR OF COLOVAGINAL FISTULA
Proc 68.69	OTHER AND UNSPECIFIED RADICAL ABDOMINAL HYSTERECTOMY
Proc 65.52	OTHER REMOVAL OF REMAINING OVARY

Appendix D. Policy on Hospital Ratings and Awards Removal

HealthGrades rates the nation's nearly 5,000 hospitals using several data sources including data submitted by hospitals to the Centers for Medicare and Medicaid Services (CMS), All-payer data submitted by hospitals to their States, and HCAPS data.

Regardless of the data set utilized, HealthGrades ratings are not voluntary and our objective ratings methodology is applied to every hospital in the same manner.

On rare occasions, HealthGrades identifies new information that impacts its assessment of a hospital. HealthGrades policy is to remove certain hospitals' ratings and/or awards from its website in the following situations:

- A revocation of a hospital's Medicare license by CMS
- Federal indictment of a hospital for Medicare fraud
- Egregious issues with the integrity of data submitted by a hospital to CMS or to the state in which the hospital resides

In these rare circumstances, the hospital's CEO will be notified in writing of the reason for the ratings removal. The ratings and awards are removed at the discretion of HealthGrades based on which ratings and awards are impacted by the erroneous data and/or fraudulent activities.

Under no circumstances will HealthGrades accept data directly from a hospital, nor will HealthGrades manipulate or change a hospital's rating or data in any way. It is the hospital's responsibility to resubmit the data to CMS or to its state. To have a hospital's ratings re-posted, HealthGrades must receive corrected data directly from CMS or from the state during its annual ratings update.

Rankings and Awards

Using the HealthGrades star ratings, hospitals are rank ordered nationally to determine Specialty Excellence Awards™ and within their state for overall service lines and service line subspecialties. Ranking is done on an annual basis. In the case that a hospital's ratings are removed, it is HealthGrades policy NOT to re-rank hospitals. No hospital shall move up or down at the time when a hospital's ratings are removed. Rankings are conducted annually.