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Gynecologic Surgery Ratings 2013 Methodology

Contents

Introduction

To help consumers evaluate and compare hospital performance in gynecologic surgery, Healthgrades analyzed patient outcome data for all patients (all-payer data) provided by 18 individual states for years 2009 through 2011. Ratings were based on Healthgrades risk-adjustment methodology, and the Healthgrades ratings are available at www.healthgrades.com.

Gynecologic Surgery refers to surgery on the female reproductive system and includes surgeries for benign conditions, cancer, infertility, incontinence, and various other conditions. A list of surgeries included in Gynecologic Surgery ratings is in *Appendix A*.

Data Source

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 18 states evaluated were as follows:

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

Determining Gynecologic Surgery Ratings

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 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.

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 due to miscoding or missing data or other reasons as listed below.

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 18 states of all-payer data from 2009 through 2011. 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 thorough 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 postoperative 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 complications either present or not. Mortality is considered a complication. *Appendix B* lists the 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, hospital performance was stratified into one of three performance categories as listed below:

★ ★ ★ ★ ★   **Better than Expected** – Actual performance was better than predicted and the difference was statistically significant.

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

★   **Worse than Expected** – Actual performance was worse than predicted and the difference was statistically significant.

The top 10% of hospitals were selected as Healthgrades Gynecologic Surgery Excellence Award™ recipients. For details on the Gynecologic Surgery Excellence Award™ methodology, see the Healthgrades Specialty Excellence Award and America's 100 Best Hospitals for Specialty Care™ 2013 Methodology at www.Healthgrades.com.

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

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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. 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 Analysis

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

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

Please note that a high ranking for a particular hospital is not a recommendation or endorsement by Health Grades, Inc. 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 under a single provider ID, Healthgrades analyzed patient outcome 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

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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, 65.01, 65.25, 65.31, 65.39, 65.41, 65.49, 65.51, 65.52, 65.53, 65.54, 65.64, 65.81, 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

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Appendix B. Gynecologic Surgery Complications

Gynecologic Surgery – Independent Complications

410.71	SUBEND INFARCT-INITIAL
415.11	IATRO PULM EMBOL/INFARCT
458.29	IATROGEN HYPOTENSION NEC
480.0	ADENOVIRAL PNEUMONIA
480.1	RSV PNEUMONIA
480.2	PARAINFLUENZA VIR PNEUM
480.3	SARS PNEUMONIA
480.8	VIRAL PNEUMONIA NEC
481	PNEUMOCOCCAL PNEUMONIA
482.0	K. PNEUMONIAE PNEUMONIA
482.1	PSEUDOMONAL PNEUMONIA
482.2	H. INFLUENZAE PNEUMONIA
482.30	STREP PNEUMONIA NOS
482.31	GROUP A STREP PNEUMONIA
482.32	GROUP B STREP PNEUMONIA
482.39	STREP PNEUMONIA NEC
482.40	STAPH PNEUMONIA NOS
482.41	MSSA PNEUMONIA
482.42	MRSA PNEUMONIA
482.49	STAPH PNEUMONIA NEC
482.81	PNEUMONIA D/T ANAEROBES
482.82	E. COLI PNEUMONIA
482.83	GRAM-NEG PNEUMONIA NEC
482.84	LEGIONNAIRES' DISEASE
482.89	BACTERIAL PNEUMONIA NEC
482.9	BACTERIAL PNEUMONIA NOS
483.0	M. PNEUMONIAE PNEUMONIA
483.1	CHLAMYDIAL PNEUMONIA
483.8	PNEUMONIA D/T ORG NEC
484.1	PNEUMONIA IN CMV DISEASE
484.3	PNEUMONIA IN WHOOP COUGH
486	PNEUMONIA ORGANISM NOS
507.0	FOOD/VOMIT PNEUMONITIS
512.1	IATROGENIC PNEUMOTHORAX
560.1	PARALYTIC ILEUS

867.1	BLAD/URETHRA INJURY-OPEN
996.64	INFECT D/T URETHRAL CATH
997.01	CNS SURG COMP
997.02	IATROGEN CV INFARCT/HEM
997.1	SURG COMP-HEART
997.3	SURG COMP-RESP NEC
997.31	VENT ASSOC PNEUMONIA
997.32	POSTPX ASP PNEUMONIA
997.39	OTH SURG COMP-RESP
997.4	SURG COMP-DIGESTIVE
997.5	SURG COMP-URINARY NEC
998.0	POSTOPERATIVE SHOCK
998.00	POSTOP SHOCK NOS
998.01	POSTOP CARDIOGENIC SHOCK
998.02	POSTOP SEPTIC SHOCK
998.09	POSTOP SHOCK NEC
998.11	HEMORRHAGE COMP PX
998.12	HEMATOMA COMPLICATING PX
998.2	ACCIDENTAL OP LACERATION
998.30	DISRUPTION WOUND NOS
998.31	DISRUPT INTERNAL OP WND
998.32	DISRUPT EXTERNAL OP WND
998.4	FB LEFT DURING PROCEDURE
998.51	INFECTED POSTOP SEROMA
998.59	POSTOP INFECTION NEC
998.7	POSTOP FOREIGN SUBST RXN
999.31	INFECT NEC & NOS D/T CVC
999.32	BLOODSTREAM INF D/T CVC
999.34	AC INF POST TRANSFUSION
999.39	INFECT COMP MED CARE NEC
999.80	TRANSFUSION REACTION NOS
999.83	HTR INCOMPATIBILITY NOS
999.84	AHTR INCOMPATIBILITY NOS
999.85	DHTR INCOMPATIBILITY NOS

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 postoperative complication code present in the patient record.

Must occur with 997.1 Cardiac Complications, Not Elsewhere Classified

427.31	ATRIAL FIBRILLATION		428.31	ACUTE DIASTOLIC HF
428.0	CHF NOS		428.33	AC & CHR DIASTOLIC HF
428.21	ACUTE SYSTOLIC HF		428.41	AC SYS & DIASTOLIC HF
428.23	AC & CHR 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

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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

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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
Diag 785.0	TACHYCARDIA, UNSPECIFIED

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