

Bariatric Surgery Ratings 2014 Methodology

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Introduction

Bariatric surgery is weight-loss surgery that can help morbidly obese people achieve significant weight loss. Other benefits include resolution of diseases associated with obesity, including type 2 diabetes, and a lower risk of heart disease.

To help consumers evaluate and compare hospital performance in bariatric surgery, Healthgrades analyzed patient outcome data for all patients (all-payer data, inpatient only) provided by 17 individual states for years 2010 through 2012. 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 Source

Healthgrades purchased the initial patient-level data for all states that made their data available. The data represent three years of discharges (2010 – 2012). These data were chosen because they represent virtually all discharges for the associated states; however, patient volumes may differ due to data masking by state agencies to protect patient privacy. The 17 all-payer states evaluated were as follows:

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

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.

Examples of excluded patient records were:

- 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 an invalid gender.
- Patients with an invalid age.

Multivariate Logistic Regression-Based Ratings

The initial analysis of the data utilized 17 states of all-payer data from 2010 through 2012. Bariatric surgery patients were identified by their ICD-9 principal procedure of a bariatric surgical procedure and a principal diagnosis of obesity/morbid obesity (see *Appendix A*). Patients under the age of 18 were excluded.

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

- 1 Potential risk factors were defined as all clinically relevant co-morbid conditions and procedures. In addition, patient demographic factors such as age and gender 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 through a review of peer-reviewed research and input from clinical and coding experts. While complications sometimes occur during a patient's hospital stay, Healthgrades pinpoints complications that should not occur with a typical patient. Many of these complications are preventable and usually cause a prolonged hospital stay, additional and costly medical treatments, harm, and sometimes even death

In some cases, an ICD-9 code can be either a risk or a complication. In these cases, 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 bariatric surgery complications.

Developing Healthgrades Bariatric Surgery Ratings

Developing the Healthgrades Bariatric Surgery ratings involved four steps.

- 1 The predicted value (predicted complications) was obtained using a logistic regression model discussed in the next section.
- 2 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 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 Hospital performance was categorized into one of three performance categories based upon the outcome of the statistical test.

The following performance categories were used:

- ★★★★★ **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 Bariatric Surgery Excellence Award™ recipients. For details on the Bariatric Surgery Excellence Award™ methodology, see the Healthgrades Specialty Excellence Award and America's 100 Best Hospitals for Specialty Care™ 2014 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 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 Risk Factors*.)

The statistical model was checked for validity and finalized. The final model was highly significant, with a C-statistic of 0.675. 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.

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

Bariatric Surgery

Inclusions

Principal Procedures: 43.7, 43.82, 43.89, 44.31, 44.38, 44.39, 44.68, 44.69 or 44.95; OR 45.51 as the principal procedure and both 43.89 and 45.91 as secondary procedures

OR 45.91 as the principal procedure and both 43.89 and 45.51 as secondary procedures

Principal Diagnoses: 278.00, 278.01

Exclusions

Procedures: 44.5, 44.94, 44.96, 44.97

Diagnoses: (Primary or Secondary): 141.9, 150.0, 150.1, 150.2, 150.3, 150.4, 150.5, 150.8, 150.9, 151.0, 151.1, 151.2, 151.3, 151.4, 151.5, 151.6, 151.8, 151.9, 152.0, 152.1, 152.2, 152.3, 152.8, 152.9, 153.0, 153.1, 153.2, 153.3, 153.4, 153.5, 153.6, 153.7, 153.8, 153.9, 154.0, 154.1, 154.2, 154.3, 154.8, 155.0, 155.1, 155.2, 156.0, 156.1, 156.2, 156.8, 156.9, 157.0, 157.1, 157.2, 157.3, 157.4, 157.8, 157.9, 158.0, 158.8, 158.9, 159.0, 159.1, 159.8, 159.9, 161.9, 162.9, 171.5, 171.8, 195.0, 195.2, 196.0, 196.1, 196.2, 196.3, 196.5, 196.6, 196.8, 196.9, 197.0, 197.1, 197.2, 197.3, 197.4, 197.5, 197.6, 197.7, 197.8, 198.0, 198.1, 198.2, 198.3, 198.4, 198.5, 198.6, 198.7, 198.81, 198.82, 198.89, 199.0, 200.00, 200.03, 200.08, 202.00, 202.01, 202.03, 202.05, 202.80, 202.83, 203.00, 203.02, 203.12, 203.80, 203.82, 204.02, 204.12, 204.22, 204.82, 204.92, 205.02, 205.10, 205.12, 205.22, 205.82, 205.92, 206.02, 206.12, 206.22, 206.82, 206.92, 207.02, 207.12, 207.22, 207.82, 208.02, 208.12, 208.22, 208.82, 208.92, 211.1, 211.2, 211.3, 211.5, 211.6, 211.8, 211.9, 214.3, 215.5, 228.04, 228.1, 230.2, 230.7, 230.9, 235.2, 235.4, 235.5, 238.1, 239.0, 239.2, 239.8, 530.83, 530.84, 530.86, 530.87, 531.00, 531.01, 531.10, 531.11, 531.20, 531.21, 531.31, 531.40, 531.41, 531.50, 531.51, 531.60, 531.61, 531.71, 531.91, 532.00, 532.01, 532.10, 532.11, 532.20, 532.21, 532.31, 532.40, 532.41, 532.50, 532.51, 532.60, 532.61, 532.71, 532.91, 533.00, 533.01, 533.10, 533.11, 533.20, 533.21, 533.31, 533.40, 533.41, 533.50, 533.51, 533.60, 533.61, 533.71, 533.91, 534.00, 534.01, 534.10, 534.11, 534.20, 534.21, 534.31, 534.40, 534.41, 534.50, 534.51, 534.60, 534.61, 534.71, 534.91, 535.0, 535.00, 535.01, 535.1, 535.10, 535.11, 535.20, 535.21, 535.30, 535.31, 535.40, 535.41, 535.50, 535.51, 535.60, 535.61, 536.0, 536.1, 536.2, 536.40, 536.41, 536.42, 536.49, 536.8, 536.9, 537.0, 537.1, 537.2, 537.3, 537.4, 537.5, 537.6, 537.81, 537.82, 537.83, 537.84, 537.89, 537.9, 555.0, 555.1, 555.2, 555.9, 558.1, 558.2, 558.3, 558.9, 562.02, 562.03, 564.81, 564.89, 564.9, 569.5, 569.81, 569.82, 569.83, 569.84, 569.85, 569.86, 569.89, 569.9, 751.0, 751.1, 751.2, 751.3, 751.4, 751.5, 751.60, 751.61, 751.62, 751.69, 751.7, 751.8, 751.9, 996.8, 996.80, 996.81, 996.82, 996.83, 996.84, 996.85, 996.86, 996.87, 996.89, V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9

Appendix B. Bariatric Surgery Complications

Independent complications are conditions that are clearly hospital-acquired or by the coding definition are defined as postoperative. These conditions were not counted as complications if the POA indicator was "Yes" or "Clinically Undetermined."

Bariatric Surgery – Independent Complications

- 038.0 STREPTOCOCCAL SEPTICEMIA
- 038.10 STAPHYLOCOCCAL SEPTICEMIA, UNSPECIFIED
- 038.11 METHICILLIN SUSCEPTIBLE STAPHYLOCOCCUS AUREUS SEPTICEMIA
- 038.12 METHICILLIN RESISTANT STAPHYLOCOCCUS AUREUS SEPTICEMIA
- 038.19 OTHER STAPHYLOCOCCAL SEPTICEMIA
- 038.2 PNEUMOCOCCAL SEPTICEMIA
- 038.3 SEPTICEMIA DUE TO ANAEROBES
- 038.40 SEPTICEMIA DUE TO GRAM-NEGATIVE ORGANISM, UNSPECIFIED
- 038.41 SEPTICEMIA DUE TO HEMOPHILUS INFLUENZAE [H. INFLUENZAE]
- 038.42 SEPTICEMIA DUE TO ESCHERICHIA COLI [E. COLI]
- 038.43 SEPTICEMIA DUE TO PSEUDOMONAS
- 038.44 SEPTICEMIA DUE TO SERRATIA
- 038.49 OTHER SEPTICEMIA DUE TO GRAM-NEGATIVE ORGANISMS
- 038.8 OTHER SPECIFIED SEPTICEMIAS
- 038.9 UNSPECIFIED SEPTICEMIA
- 041.00 BACTERIAL INFECTION DUE TO UNSPECIFIED STREPTOCOCCUS
- 041.4 ESCHERICHIA COLI [E. COLI] INFECTION IN CONDITIONS CLASSIFIED ELSEWHERE AND OF UNSPECIFIED SITE
- 041.9 BACTERIAL INFECTION, UNSPECIFIED, IN CONDITIONS CLASSIFIED ELSEWHERE AND OF UNSPECIFIED SITE
- 286.6 DEFIBRATION SYNDROME
- 292.12 DRUG INDUCED PSYCHOTIC DISORDER WITH HALLUCINATIONS
- 292.81 DRUG INDUCED DELIRIUM
- 293.0 DELIRIUM DUE TO CONDITIONS CLASSIFIED ELSEWHERE
- 293.1 SUBACUTE DELIRIUM
- 298.9 UNSPECIFIED PSYCHOSIS
- 31.1 TEMPORARY TRACHEOSTOMY
- 31.29 OTHER PERMANENT TRACHEOSTOMY
- 342.90 UNSPECIFIED HEMIPLEGIA AFFECTING UNSPECIFIED SIDE
- 348.30 ENCEPHALOPATHY, UNSPECIFIED
- 348.31 METABOLIC ENCEPHALOPATHY
- 348.39 OTHER ENCEPHALOPATHY
- 349.82 TOXIC ENCEPHALOPATHY
- 354.3 LESION OF RADIAL NERVE
- 38.95 VENOUS CATHETERIZATION FOR RENAL DIALYSIS
- 39.95 HEMODIALYSIS
- 41.2 SPLENOTOMY
- 41.43 PARTIAL SPLENECTOMY
- 41.5 TOTAL SPLENECTOMY
- 41.95 REPAIR AND PLASTIC OPERATIONS ON SPLEEN
- 410.01 ACUTE MYOCARDIAL INFARCTION, OF ANTEROLATERAL WALL, INITIAL EPISODE OF CARE
- 410.11 ACUTE MYOCARDIAL INFARCTION, OF OTHER ANTERIOR WALL, INITIAL EPISODE OF CARE
- 410.21 ACUTE MYOCARDIAL INFARCTION, OF INFEROLATERAL WALL, INITIAL EPISODE OF CARE
- 410.31 ACUTE MYOCARDIAL INFARCTION, OF INFEROPOSTERIOR WALL, INITIAL EPISODE OF CARE
- 410.41 ACUTE MYOCARDIAL INFARCTION, OF OTHER INFERIOR WALL, INITIAL EPISODE OF CARE
- 410.51 ACUTE MYOCARDIAL INFARCTION, OF OTHER LATERAL WALL, INITIAL EPISODE OF CARE

410.61 ACUTE MYOCARDIAL INFARCTION, TRUE POSTERIOR WALL INFARCTION, INITIAL EPISODE OF CARE
410.70 ACUTE MYOCARDIAL INFARCTION, SUBENDOCARDIAL INFARCTION, EPISODE OF CARE UNSPECIFIED
410.71 ACUTE MYOCARDIAL INFARCTION, SUBENDOCARDIAL INFARCTION, INITIAL EPISODE OF CARE
410.81 ACUTE MYOCARDIAL INFARCTION, OF OTHER SPECIFIED SITES, INITIAL EPISODE OF CARE
410.91 ACUTE MYOCARDIAL INFARCTION, UNSPECIFIED SITE, INITIAL EPISODE OF CARE
415.11 IATROGENIC PULMONARY EMBOLISM AND INFARCTION
415.12 SEPTIC PULMONARY EMBOLISM
423.3 CARDIAC TAMPONADE
426.4 RIGHT BUNDLE BRANCH BLOCK
427.41 VENTRICULAR FIBRILLATION
427.5 CARDIAC ARREST
431 INTRACEREBRAL HEMORRHAGE
433.01 OCCLUSION AND STENOSIS OF BASILAR ARTERY WITH CEREBRAL INFARCTION
433.11 OCCLUSION AND STENOSIS OF CAROTID ARTERY WITH CEREBRAL INFARCTION
433.21 OCCLUSION AND STENOSIS OF VERTEBRAL ARTERY WITH CEREBRAL INFARCTION
433.31 OCCLUSION AND STENOSIS OF MULTIPLE AND BILATERAL PRECEREBRAL ARTERIES WITH CEREBRAL INFARCTION
433.81 OCCLUSION AND STENOSIS OF OTHER SPECIFIED PRECEREBRAL ARTERY WITH CEREBRAL INFARCTION
433.91 OCCLUSION AND STENOSIS OF UNSPECIFIED PRECEREBRAL ARTERY WITH CEREBRAL INFARCTION
434.00 CEREBRAL THROMBOSIS WITHOUT MENTION OF CEREBRAL INFARCTION
434.01 CEREBRAL THROMBOSIS WITH CEREBRAL INFARCTION
434.10 CEREBRAL EMBOLISM WITHOUT MENTION OF CEREBRAL INFARCTION
434.11 CEREBRAL EMBOLISM WITH CEREBRAL INFARCTION
434.90 UNSPECIFIED CEREBRAL ARTERY OCCLUSION WITHOUT MENTION OF CEREBRAL INFARCTION
434.91 UNSPECIFIED CEREBRAL ARTERY OCCLUSION WITH CEREBRAL INFARCTION
44.61 SUTURE OF LACERATION OF STOMACH
444.22 ARTERIAL EMBOLISM AND THROMBOSIS OF LOWER EXTREMITY
449 SEPTIC ARTERIAL EMBOLISM
453.41 ACUTE VENOUS EMBOLISM AND THROMBOSIS OF DEEP VESSELS OF PROXIMAL LOWER EXTREMITY
453.8 ACUTE VENOUS EMBOLISM AND THROMBOSIS OF OTHER SPECIFIED VEINS
453.82 ACUTE VENOUS EMBOLISM AND THROMBOSIS OF DEEP VEINS OF UPPER EXTREMITIES
453.83 ACUTE VENOUS EMBOLISM AND THROMBOSIS OF UPPER EXTREMITIES, UNSPECIFIED
453.84 ACUTE VENOUS EMBOLISM AND THROMBOSIS OF AXILLARY VEINS
453.85 ACUTE VENOUS EMBOLISM AND THROMBOSIS OF SUBCLAVIAN VEINS
453.86 ACUTE VENOUS EMBOLISM AND THROMBOSIS OF INTERNAL JUGULAR VEINS
453.87 ACUTE VENOUS EMBOLISM AND THROMBOSIS OF OTHER THORACIC VEINS
453.89 ACUTE VENOUS EMBOLISM AND THROMBOSIS OF OTHER SPECIFIED VEINS
458.29 OTHER IATROGENIC HYPOTENSION
459.0 HEMORRHAGE, UNSPECIFIED
480.0 PNEUMONIA DUE TO ADENOVIRUS
480.1 PNEUMONIA DUE TO RESPIRATORY SYNCYTIAL VIRUS
480.2 PNEUMONIA DUE TO PARAINFLUENZA VIRUS
480.3 PNEUMONIA DUE TO SARS-ASSOCIATED CORONAVIRUS
480.8 PNEUMONIA DUE TO OTHER VIRUS NOT ELSEWHERE CLASSIFIED
481 PNEUMOCOCCAL PNEUMONIA [STREPTOCOCCUS PNEUMONIAE PNEUMONIA]
482.0 PNEUMONIA DUE TO KLEBSIELLA PNEUMONIAE
482.1 PNEUMONIA DUE TO PSEUDOMONAS
482.2 PNEUMONIA DUE TO HEMOPHILUS INFLUENZAE [H. INFLUENZAE]
482.30 PNEUMONIA DUE TO UNSPECIFIED STREPTOCOCCUS
482.31 PNEUMONIA DUE TO STREPTOCOCCUS, GROUP A
482.32 PNEUMONIA DUE TO STREPTOCOCCUS, GROUP B
482.39 PNEUMONIA DUE TO OTHER STREPTOCOCCUS
482.40 PNEUMONIA DUE TO STAPHYLOCOCCUS, UNSPECIFIED
482.41 METHICILLIN SUSCEPTIBLE PNEUMONIA DUE TO STAPHYLOCOCCUS AUREUS

482.42 METHICILLIN RESISTANT PNEUMONIA DUE TO STAPHYLOCOCCUS AUREUS
482.49 OTHER STAPHYLOCOCCUS PNEUMONIA
482.81 PNEUMONIA DUE TO ANAEROBES
482.82 PNEUMONIA DUE TO ESCHERICHIA COLI [E. COLI]
482.83 PNEUMONIA DUE TO OTHER GRAM-NEGATIVE BACTERIA
482.84 LEGIONNAIRES' DISEASE
482.89 PNEUMONIA DUE TO OTHER SPECIFIED BACTERIA
482.9 BACTERIAL PNEUMONIA, UNSPECIFIED
483.0 PNEUMONIA DUE TO MYCOPLASMA PNEUMONIAE
483.1 PNEUMONIA DUE TO CHLAMYDIA
483.8 PNEUMONIA DUE TO OTHER SPECIFIED ORGANISM
484.1 PNEUMONIA IN CYTOMEGALIC INCLUSION DISEASE
484.3 PNEUMONIA IN WHOOPING COUGH
485 BRONCHOPNEUMONIA, ORGANISM UNSPECIFIED
486 PNEUMONIA, ORGANISM UNSPECIFIED
495.9 UNSPECIFIED ALLERGIC ALVEOLITIS AND PNEUMONITIS
507.0 PNEUMONITIS DUE TO INHALATION OF FOOD OR VOMITUS
512.1 IATROGENIC PNEUMOTHORAX
518.51 ACUTE RESPIRATORY FAILURE FOLLOWING TRAUMA AND SURGERY
518.53 ACUTE AND CHRONIC RESPIRATORY FAILURE FOLLOWING TRAUMA AND SURGERY
518.7 TRANSFUSION RELATED ACUTE LUNG INJURY [TRALI]
519.09 OTHER TRACHEOSTOMY COMPLICATIONS
539.01 INFECTION DUE TO GASTRIC BAND PROCEDURE
539.09 OTHER COMPLICATIONS OF GASTRIC BAND PROCEDURE
539.81 INFECTION DUE TO OTHER BARIATRIC PROCEDURE
539.89 OTHER COMPLICATIONS OF OTHER BARIATRIC PROCEDURE
54.12 REOPENING OF RECENT LAPAROTOMY SITE
54.61 RECLOSURE OF POSTOPERATIVE DISRUPTION OF ABDOMINAL WALL
54.91 PERCUTANEOUS ABDOMINAL DRAINAGE
54.92 REMOVAL OF FOREIGN BODY FROM PERITONEAL CAVITY
560.0 INTUSSUSCEPTION
560.2 VOLVULUS
560.30 IMPACTION OF INTESTINE, UNSPECIFIED
560.39 OTHER IMPACTION OF INTESTINE
560.89 OTHER SPECIFIED INTESTINAL OBSTRUCTION
560.9 UNSPECIFIED INTESTINAL OBSTRUCTION
567.29 OTHER SUPPURATIVE PERITONITIS
567.38 OTHER RETROPERITONEAL ABSCESS
567.89 OTHER SPECIFIED PERITONITIS
567.9 UNSPECIFIED PERITONITIS
569.79 OTHER COMPLICATIONS OF INTESTINAL POUCH
570 ACUTE AND SUBACUTE NECROSIS OF LIVER
578.9 HEMORRHAGE OF GASTROINTESTINAL TRACT, UNSPECIFIED
584.5 ACUTE KIDNEY FAILURE WITH LESION OF TUBULAR NECROSIS
584.8 ACUTE KIDNEY FAILURE WITH OTHER SPECIFIED PATHOLOGICAL LESION IN KIDNEY
584.9 ACUTE KIDNEY FAILURE, UNSPECIFIED
707.25 PRESSURE ULCER, UNSTAGEABLE
780.2 SYNCOPE AND COLLAPSE
785.4 GANGRENE
785.50 SHOCK, UNSPECIFIED
785.51 CARDIOGENIC SHOCK
799.01 ASPHYXIA
799.1 RESPIRATORY ARREST
863.29 INJURY TO OTHER SITE OF SMALL INTESTINE WITHOUT OPEN WOUND INTO CAVITY

- 864.02 LACERATION OF LIVER, MINOR, WITHOUT MENTION OF OPEN WOUND INTO CAVITY
- 864.09 OTHER INJURY TO LIVER WITHOUT MENTION OF OPEN WOUND INTO CAVITY
- 865.02 CAPSULAR TEARS TO SPLEEN, WITHOUT MAJOR DISRUPTION OF PARENCHYMA, WITHOUT MENTION OF OPEN WOUND INTO CAVITY
- 867.1 INJURY TO BLADDER AND URETHRA WITH OPEN WOUND INTO CAVITY
- 933.1 FOREIGN BODY IN LARYNX
- 934.0 FOREIGN BODY IN TRACHEA
- 934.1 FOREIGN BODY IN MAIN BRONCHUS
- 934.9 FOREIGN BODY IN RESPIRATORY TREE, UNSPECIFIED
- 935.1 FOREIGN BODY IN ESOPHAGUS
- 947.3 BURN OF GASTROINTESTINAL TRACT
- 955.1 INJURY TO MEDIAN NERVE
- 959.09 INJURY OF FACE AND NECK
- 995.92 SEVERE SEPSIS
- 996.1 MECHANICAL COMPLICATION OF OTHER VASCULAR DEVICE, IMPLANT, AND GRAFT
- 996.64 INFECTION AND INFLAMMATORY REACTION DUE TO INDWELLING URINARY CATHETER
- 996.76 OTHER COMPLICATIONS DUE TO GENITOURINARY DEVICE, IMPLANT, AND GRAFT
- 997.01 CENTRAL NERVOUS SYSTEM COMPLICATION
- 997.02 IATROGENIC CEREBROVASCULAR INFARCTION OR HEMORRHAGE
- 997.09 OTHER NERVOUS SYSTEM COMPLICATIONS
- 997.1 CARDIAC COMPLICATIONS
- 997.2 PERIPHERAL VASCULAR COMPLICATIONS
- 997.3 RESPIRATORY COMPLICATIONS
- 997.31 VENTILATOR ASSOCIATED PNEUMONIA
- 997.32 POSTPROCEDURAL ASPIRATION PNEUMONIA
- 997.39 OTHER RESPIRATORY COMPLICATIONS
- 997.4 DIGESTIVE SYSTEM COMPLICATION
- 997.49 OTHER DIGESTIVE SYSTEM COMPLICATIONS
- 997.5 URINARY COMPLICATIONS
- 997.79 VASCULAR COMPLICATIONS OF OTHER VESSELS
- 997.91 COMPLICATIONS AFFECTING OTHER SPECIFIED BODY SYSTEMS, HYPERTENSION
- 997.99 OTHER COMPLICATIONS AFFECTING OTHER SPECIFIED BODY SYSTEMS
- 998.0 POSTOPERATIVE SHOCK
- 998.00 POSTOPERATIVE SHOCK, UNSPECIFIED
- 998.01 POSTOPERATIVE SHOCK, CARDIOGENIC
- 998.02 POSTOPERATIVE SHOCK, SEPTIC
- 998.09 POSTOPERATIVE SHOCK, OTHER
- 998.11 HEMORRHAGE COMPLICATING A PROCEDURE
- 998.12 HEMATOMA COMPLICATING A PROCEDURE
- 998.2 ACCIDENTAL PUNCTURE OR LACERATION DURING A PROCEDURE
- 998.30 DISRUPTION OF WOUND, UNSPECIFIED
- 998.31 DISRUPTION OF INTERNAL OPERATION (SURGICAL) WOUND
- 998.32 DISRUPTION OF EXTERNAL OPERATION (SURGICAL) WOUND
- 998.4 FOREIGN BODY ACCIDENTALLY LEFT DURING A PROCEDURE
- 998.51 INFECTED POSTOPERATIVE SEROMA
- 998.59 OTHER POSTOPERATIVE INFECTION
- 998.6 PERSISTENT POSTOPERATIVE FISTULA
- 998.7 ACUTE REACTION TO FOREIGN SUBSTANCE ACCIDENTALLY LEFT DURING A PROCEDURE
- 998.89 OTHER SPECIFIED COMPLICATIONS OF PROCEDURES
- 999.31 OTHER AND UNSPECIFIED INFECTION DUE TO CENTRAL VENOUS CATHETER
- 999.32 BLOODSTREAM INFECTION DUE TO CENTRAL VENOUS CATHETER
- 999.34 ACUTE INFECTION FOLLOWING TRANSFUSION, INFUSION, OR INJECTION OF BLOOD AND BLOOD PRODUCTS
- 999.39 INFECTION FOLLOWING OTHER INFUSION, INJECTION, TRANSFUSION, OR VACCINATION

- 999.80 TRANSFUSION REACTION, UNSPECIFIED
- 999.83 HEMOLYTIC TRANSFUSION REACTION, INCOMPATIBILITY UNSPECIFIED
- 999.84 ACUTE HEMOLYTIC TRANSFUSION REACTION, INCOMPATIBILITY UNSPECIFIED
- 999.85 DELAYED HEMOLYTIC TRANSFUSION REACTION, INCOMPATIBILITY UNSPECIFIED
- E878.6 REMOVAL OF OTHER ORGAN (PARTIAL) (TOTAL) CAUSING ABNORMAL PATIENT REACTION, OR LATER COMPLICATION, WITHOUT MENTION OF MISADVENTURE AT TIME OF OPERATION
- E935.2 OTHER OPIATES AND RELATED NARCOTICS CAUSING ADVERSE EFFECTS IN THERAPEUTIC USE

Bariatric 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

- 427.0 PAROXYSMAL SUPRAVENTRICULAR TACHYCARDIA
- 427.1 PAROXYSMAL VENTRICULAR TACHYCARDIA
- 427.31 ATRIAL FIBRILLATION
- 428.0 CONGESTIVE HEART FAILURE, UNSPECIFIED
- 428.1 LEFT HEART FAILURE
- 428.21 ACUTE SYSTOLIC HEART FAILURE
- 428.31 ACUTE DIASTOLIC HEART FAILURE
- 428.41 ACUTE COMBINED SYSTOLIC AND DIASTOLIC HEART FAILURE

Must occur with 997.3 RESPIRATORY COMPLICATIONS or 997.39 OTHER RESPIRATORY COMPLICATIONS

- 415.19 OTHER PULMONARY EMBOLISM AND INFARCTION
- 484.6 PNEUMONIA IN ASPERGILLOSIS
- 484.7 PNEUMONIA IN OTHER SYSTEMIC MYCOSES
- 518.81 ACUTE RESPIRATORY FAILURE
- 518.84 ACUTE AND CHRONIC RESPIRATORY FAILURE

Must occur with 997.4 DIGESTIVE SYSTEM COMPLICATION OR 997.49 OTHER DIGESTIVE SYSTEM COMPLICATIONS

- 560.81 INTESTINAL OR PERITONEAL ADHESIONS WITH OBSTRUCTION (POSTOPERATIVE) (POSTINFECTION)

Must occur with 998.11 HEMORRHAGE COMPLICATING A PROCEDURE or 998.2 ACCIDENTAL PUNCTURE OR LACERATION DURING A PROCEDURE

- 568.81 HEMOPERITONEUM (NONTRAUMATIC)

Must occur with 998.59 OTHER POSTOPERATIVE INFECTION

- 682.2 CELLULITIS AND ABSCESS OF TRUNK
- 785.52 SEPTIC SHOCK
- 790.7 BACTEREMIA

Appendix C. Top Five Risk Factors

ICD-9	
Diagnosis or Procedure Code	Description
Diag 518.0	PULMONARY COLLAPSE
Proc 43.19	OTHER GASTROSTOMY
OTHER REPAIR OF STOMACH	OTHER REPAIR OF STOMACH
Proc 44.39	OTHER GASTROENTEROSTOMY WITHOUT GASTRECTOMY
Proc 46.79	OTHER REPAIR OF INTESTINE

Appendix D. Methodology Enhancements for 2014 Ratings Models

A new ICD-9 code specific to Bariatric Surgery was available for 2012:

- 43.82 LAPAROSCOPIC VERTICAL (SLEEVE) GASTRECTOMY.

This code was added to the inclusion definition and used in the risk-adjustment process for the 2014 Bariatric Surgery ratings.