



The Ninth Annual  
HealthGrades Hospital  
Quality in America Study



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### **Executive Summary**

The only way to know that the quality of care is improving is to measure performance. Since 1998, HealthGrades has studied and measured the quality of care at the nation's 5,000 plus hospitals and published the results of its annual research on the Web to assist consumers in choosing a hospital. For the first part of the *Ninth Annual HealthGrades Hospital Quality in America Study*, millions of Medicare discharges from every U.S. hospital from 2003 through 2005 were analyzed. Risk-adjusted mortality and complication rates were calculated and hospitals were assigned a 1-star (poor), 3-star (as expected), or 5-star (best) quality rating for 28 diagnoses and procedures from heart failure to hip replacement to pneumonia. Individual hospital quality results from this study are available at [www.healthgrades.com](http://www.healthgrades.com).

Since 2003, mortality rates among Medicare beneficiaries have steadily declined. However, consistent with other studies, this study demonstrates that considerable variation in quality continues to persist, and in some cases worsen among the nation's hospitals. This underscores that hospitals are in fact not the same, and thus, the value and importance of this information being readily available to prospective patients when making decisions about where to get their medical treatments.

For the second part of this study, HealthGrades analyzed the in-hospital mortality rates associated with 18 diagnoses and procedures to assess quality differences between 1-, 3-, and 5-star rated hospitals. This analysis compared in-hospital risk-adjusted mortality rates for Medicare patients from 2003 through 2005 and found that these rates have improved, but vary widely across hospitals, diagnoses and procedures. The diagnoses and procedures covered by the second part of this study include:

Abdominal Aortic Aneurysm Repair	Gastrointestinal (GI) Bleed
Acute Myocardial Infarction – Heart Attack	Gastrointestinal (GI) Procedures and Surgeries
Atrial Fibrillation	Heart Failure
Bowel Obstruction	Pancreatitis
Chronic Obstructive Pulmonary Disease	Pulmonary Embolus
Community Acquired Pneumonia	Respiratory Failure
Coronary Bypass Surgery	Sepsis
Coronary Interventional Procedures	Stroke
Diabetic Acidosis and Coma	Valve Replacement Surgery

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## Summary of Findings

Key findings of this study include:

- 1 Since the *Eighth Annual HealthGrades Hospital Quality in America Study*, observed and risk-adjusted mortality rates declined.
  - The nation's in-hospital risk-adjusted mortality rate improved, on average, 8 percent from 2003 to 2005, but the degree of improvement varied widely by procedure and diagnosis studied (range: -19.60% to 24.72%).
  - Five-star rated hospitals had significantly lower risk-adjusted mortality rates across all three years studied and improved 19 percent more than the U.S. hospital average and 57 percent more than 1-star rated hospitals.
- 2 Previously documented large gaps persisted and widened between the "best" and the "worst" hospitals across most diagnoses and procedures studied.
  - A typical patient would have, on average, an approximate 69 percent lower chance of dying in a 5-star rated hospital compared to a 1-star rated hospital. This represents an approximate 5 percent increase from last year's study.
  - A typical patient would have, on average, an approximate 49 percent lower chance of dying in a 5-star rated hospital compared to the U.S. hospital average. This represents an approximate 7 percent increase from last year's study.
- 3 If all hospitals performed at the level of a 5-star rated hospital across the 18 procedures and diagnoses studied, **302,403 Medicare lives could have potentially been saved** from 2003 to 2005.
  - Fifty percent (149,789) of the potentially preventable deaths were associated with just four diagnoses:

1) Heart Failure (33,543)	3) Sepsis (38,560)
2) Community Acquired Pneumonia (37,593)	4) Respiratory Failure (40,093)

## Introduction

The past decade has seen an unprecedented level of concern and action focused on improving the quality of American healthcare. Organizations, professional associations, payers, regulators, accrediting bodies, and consumer groups have begun to make significant changes in their respective agendas and investments, all designed to achieve better safety, effectiveness, patient-centeredness, timeliness, efficiency, and equity—the six aims for quality improvement specified in the Quality Chasm report. Initiatives undertaken include quality improvement collaboratives and other change programs; explorations of pay for performance; the development of early formats for public reporting on performance; and, most important, efforts to devise better ways to measure quality in nearly all of its dimensions.<sup>1</sup>

Despite these investments, however, progress continues to be slow and lessons learned are fragmented. In short, the quality chasm in healthcare remains wide. At 16 percent of gross domestic product (GDP), U.S. health spending is double the median of industrialized countries, and since 2000 has been growing more rapidly than before.<sup>2</sup> On average, adults in the United States fail to receive almost half of the clinical services from which they would likely benefit.<sup>3</sup> On multiple indicators, the United States would need to improve its performance by 50 percent or more to reach benchmark countries, regions, states, hospitals, health plans, or targets.<sup>4</sup> And while per capita healthcare spending in the United States greatly exceeds that in other industrialized countries, cross-national comparisons of healthcare quality reveal that other countries achieve better performance on many measures.<sup>5,6</sup>

HealthGrades' annual research has found significant variation in the quality of care provided by the nation's hospitals that has persisted over the last eight years despite numerous quality initiatives at the hospital, local, state and federal level. As such, it is imperative for patients to gather easy-to-use information and learn as much about their healthcare and prospective providers as possible.

HealthGrades' star rating system tells consumers whether a particular hospital's performance has been "best" (5-star), "as expected" (3-star), or "poor" (1-star) on a particular procedure or diagnosis. Hospital ratings are based on patient outcomes, specifically, risk-adjusted mortality or complications. Because no two hospitals or their patients' risk profiles are alike, HealthGrades has developed extensive risk-adjustment algorithms to ensure that it is making fair, apples-to-apples comparisons.

The *Ninth Annual HealthGrades Hospital Quality in America Study* objective is to identify, quantify and report trends in the quality of more than 5,000 hospitals nationwide by measuring risk-adjusted in-hospital mortality, and simplifying the reporting of hospital performance across 18 diagnoses and procedures by using a star rating system that can be easily interpreted by users.

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## **Methods Part I: The Ninth Annual Hospital Quality Ratings Methods**

HealthGrades rated nearly 5,000 hospitals in the following categories (ratings for specific hospitals are available at [www.healthgrades.com](http://www.healthgrades.com)):

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|--|---|
| 1 Abdominal Aortic Aneurysm Repair (AAA)         | 15 Gastrointestinal (GI) Procedures and Surgeries |
| 2 Acute Myocardial Infarction (AMI)–Heart Attack | 16 Heart Failure                                  |
| 3 Atrial Fibrillation (AFIB)                     | 17 Hip Fracture Repair                            |
| 4 Back and Neck Surgery (except Spinal Fusion)   | 18 Pancreatitis                                   |
| 5 Back and Neck Surgery (Spinal Fusion)          | 19 Partial Hip Replacement                        |
| 6 Bowel Obstruction                              | 20 Peripheral Vascular Bypass                     |
| 7 Carotid Endarterectomy                         | 21 Prostatectomy                                  |
| 8 Cholecystectomy (gallbladder surgery)          | 22 Pulmonary Embolus (PE)                         |
| 9 Chronic Obstructive Pulmonary Disease (COPD)   | 23 Respiratory Failure                            |
| 10 Community Acquired Pneumonia (CAP)            | 24 Sepsis   |
| 11 Coronary Bypass Surgery (CABG)                | 25 Stroke   |
| 12 Coronary Interventional Procedures            | 26 Total Hip Replacement                          |
| 13 Diabetic Acidosis and Coma                    | 27 Total Knee Replacement                         |
| 14 Gastrointestinal (GI) Bleed                   | 28 Valve Replacement Surgery                      |

HealthGrades analyzed patient outcome data for virtually every hospital in the country using initial data purchased from the Centers for Medicare and Medicaid Services (CMS). The Medicare data (MedPAR file) from CMS contained the inpatient records for Medicare patients.

Each set of ratings was based upon one of two different risk-adjustment methodologies.

- For 26 medical issues, the risk adjustment was based upon the HealthGrades methodology described in the *Multivariate Logistic Regression-Based Ratings* section of this study.
- For Respiratory Failure and Gastrointestinal Procedures and Surgeries, the risk adjustment was based upon APR-DRG methodology developed by 3M™ Corporation. APR-DRG stands for All Patient Refined Diagnosis Related Group. (All copyrights in and to APR-DRGs are owned by 3M™. All rights reserved.) This methodology is described in the APR-DRG-Based Ratings section of this study.

The purpose of risk adjustment is to obtain fair statistical comparisons between 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 necessary to make accurate and valid comparisons of clinical outcomes at different hospitals.

## **Data Acquisition**

The MedPAR data was selected for several reasons. First, it included virtually every hospital in the country, with the exception of military and Veterans Administration hospitals. Second, hospitals were required by law to submit complete and accurate information with substantial penalties for those that report inaccurate or incomplete data. Third, the Medicare population represented a majority of the patients for all of the clinical categories studied, with approximately 55 percent to 60 percent of all cardiac patients and 75 percent to 80 percent of all joint replacement surgeries, for example.

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 under the age of 65
- Patients who left the hospital against medical advice or who were transferred to another acute care hospital
- Patients discharged alive with a length of stay equal to or less than one day (except for Coronary Interventional Procedures, Acute Myocardial Infraction (Heart Attack), Heart Failure, Carotid Endarterectomy, Back and Neck Surgery (Spinal Fusion), Back and Neck Surgery (except Spinal Fusion), Chronic Obstructive Pulmonary Disease, Community Acquired Pneumonia, Peripheral Vascular Bypass, and Atrial Fibrillation)
- Patients who were still in the hospital when the Medicare claim was filed
- Patients with an invalid gender

## **Methodology for Ratings**

Our methodology takes into account patient characteristics such as age, gender, and underlying medical conditions that could increase the patient's risk of mortality or complication. Specifics about the statistical methods used are provided here and include:

- Multivariate Logistic Regression-Based Ratings
- APR-DRG-Based Ratings

### **Multivariate Logistic Regression-Based Ratings**

The in-hospital data for 28 diagnoses and procedures for more than 5,000 hospitals on the HealthGrades Web site represent three years of patient discharges from 2003 to 2005.

In the initial analysis of the data, a separate data set was created for each group of patients having a specific procedure or diagnosis based on ICD-9-CM coding (e.g., coronary bypass surgery, total hip replacement). Each group of patients was defined by using the information on diagnoses and procedures coded in the patient records. See Appendix A for a list of the diagnosis and procedure codes that define each patient cohort. The quality measure for some cohorts was mortality, whereas for other cohorts, the quality measure was major complications.

For each patient cohort, we developed a list of specific procedures (e.g., quadruple bypass surgery), a list of risk factors, and a list of post-surgical complications. These latter two lists were developed in two steps:

- 1 We identified all diagnoses occurring in more than 0.5 percent of the patients for the current analysis and the previous analysis.
- 2 We used a team of clinical and coding experts to identify the complications in the list created in Step One.

Some diagnosis codes were merged together (e.g., primary and secondary pulmonary hypertension) to minimize the impact of coding variations.

Outcomes were binary, with documented major/minor complications either present or not, and patients recorded as either alive or expired. See Appendix B for a list of complications included in the quality measure "Major Complications." In cohorts where the quality measure is major complications, mortality is considered a complication.

### **Risk-Adjustment Methodology**

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, source of admission, 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, and also for each outcome.

Developing the HealthGrades ratings involved four steps for each cohort (e.g., coronary bypass surgery) and quality measure (e.g., in-hospital mortality).

- 1 First, the predicted value (e.g., predicted mortality) was obtained using logistic regression models discussed in the next section.
- 2 Second, the predicted value was compared with the actual, or observed, value (e.g., actual mortality). Any hospital that did not have at least 30 cases across three years of data was removed, and any hospital that did not have at least five cases in the most current year was removed.
- 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.

### Statistical Models

Unique statistical models were developed for each patient cohort and each outcome using logistic regression.

Comorbid diagnoses (e.g., hypertension, chronic renal failure, anemia, diabetes), demographic characteristics (e.g., age and gender), source of admission (e.g., from Emergency Room), and specific procedures (where clinically relevant) were classified as potential risk factors. We used logistic regression to determine which of these were actually risk factors and to what extent they were correlated with the quality measure (e.g., mortality). A risk factor stayed in the model if it had an odds ratio greater than one (excluding clinically relevant procedures or cohort defining principal diagnosis) and was also statistically significant ( $p < 0.05$ ) in explaining variation. Exceptions to this rule should be noted for the cardiac service line (specifically CABG, PCI and AMI) where cardiogenic shock, anoxic brain injury, and cardiac arrest were excluded from the final model as risk factors. Complications were not counted as risk factors as they were considered a result of care received during the admission.




The statistical models were checked for validity and finalized. All of the models were highly significant, with C-statistics ranging from ~ 0.6 to ~ 0.9. These cohort and outcome-specific models were then used to estimate the probability of the outcome for each patient in the cohort. Patients were then aggregated for each hospital to obtain the predicted outcome for each hospital.

Statistical significance tests were performed to identify, by hospital, whether the actual and predicted rates were significantly different. We used a z-score to establish an approximate 90-percent confidence interval.



## Assignment of Star Ratings

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

-  Actual performance was **better than predicted** and the difference was statistically significant.
-  Actual performance was **not significantly different** from what was predicted.
-  Actual performance was **worse than predicted** and the difference was statistically significant.

In general, 70 percent to 80 percent of hospitals in each procedure/diagnosis are classified as three stars, with actual results statistically the same as predicted results. Approximately 10 percent to 15 percent were one-star hospitals and 10 percent to 15 percent were five-star hospitals.

## APR-DRG-Based Ratings

For Respiratory Failure and Gastrointestinal Procedures and Surgeries, the risk adjustment was based upon APR-DRGs, a methodology developed by 3M™ Corporation. APR-DRGs are an enhanced extension of the basic DRG (diagnosis related group) concept developed by 3M™'s Clinical Research Group, the National Association of Children's Hospitals and Research Institutes (NACHRI), and several physician groups.



While DRGs focus on the Medicare population, APR-DRGs describe a complete cross-section of acute care patients and are specifically designed to adjust data for severity of illness (How sick is the patient?) and risk of mortality (How likely is it that the patient will die?).

The fundamental principle of APR-DRGs is that the severity of illness and risk of mortality are both dependent on the patient's underlying condition. High severity of illness and risk of mortality are characterized by multiple serious diseases and the interactions between the disorders.

The 3M™ APR-DRG methodology is the most widely used severity-of-illness and risk-of-mortality adjustment tool available today. It has become the standard for adjusting large volumes of data to account for differences related to the individual's severity of illness or risk of mortality. As a result, the focus can be on the differences in clinical care, thus providing equitable comparisons of quality and cost of care. APR-DRGs are also recognized as the tool of choice by commissions, state agencies, and others who disseminate comparative performance data to regulators, payers and the general public.

## Data Analysis

The output from the APR-DRG software was twofold:

- It told us how many patients had Respiratory Failure or Gastrointestinal Procedures or Surgeries in each hospital.
- It identified each patient as being in one of four subclasses of mortality risk:
  - Minor
  - Major
  - Moderate
  - Extreme

HealthGrades then took the above APR-DRG output and went through these steps:

- 1 For each patient, a predicted probability of death was calculated based on the average national mortality rate for that mortality risk class in that APR-DRG.
- 2 Based on the observed and predicted deaths, a z-score was calculated for each hospital across the APR-DRGs, which define the cohort.
- 3 Any hospital that did not have at least 30 cases across three years of data was removed, and any hospital that did not have at least five cases in the most current year was removed.

This z-score methodology was compared with the previously used chi-squared test and shown to produce nearly identical results.

## Assignment of Star Ratings

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

- ★★★★★ Actual performance was **better than predicted** and the difference was statistically significant.
- ★★★ Actual performance was **not significantly different** from what was predicted.
- ★ Actual performance was **worse than predicted** and the difference was statistically significant.

## ***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 Health Grades, Inc. 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 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 to CMS 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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## ***Methods Part II: Hospital Quality in America Study***

The purpose of the second part of the study was to evaluate the variation in in-hospital mortality across 18 diagnoses and procedures. These 18 were chosen from the list of 28 in Part I because their outcome measurement was mortality. In Part I, the actual (observed) and predicted (expected) mortality rates were calculated for each of the 18 procedures and diagnoses for each hospital. The in-hospital observed and expected rates of all patients from each of the three hospital star rating groups (5-star, 3-star, and 1-star) were aggregated for each of the 18 procedures and diagnoses to obtain a 5-star, 3-star, and 1-star observed and expected in-hospital mortality rate by procedure and diagnosis.

Unadjusted (observed) mortality rates and numbers were evaluated for trends. Because sicker patients will have higher associated observed mortality, we also calculated and compared observed (O) to expected (E) ratios by procedure or diagnosis and by year for each star rating.

- An **O/E ratio of less than 1** means that the procedure/diagnoses measured had **fewer deaths** than expected given its patient population.
- An **O/E of greater than 1** means that the procedure/diagnoses measured had **more deaths** than expected given its patient populations.

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## **Results Part 1: Hospital Quality Ratings**

HealthGrades' ratings of more than 5,000 hospitals, based on the *Ninth Annual HealthGrades Hospital Quality in America Study*, can be found at [www.healthgrades.com](http://www.healthgrades.com). For all of the specific diagnoses and procedures rated, 10 percent to 15 percent of hospitals stand out as "best" performers (5-star rated), while another 10 percent to 15 percent stand out as "poor" performers (1-star rated). The remaining hospitals are "as expected" (3-star rated).

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## **Results Part 2: Hospital Quality in America Study**

Since 2003, U.S. observed and risk-adjusted mortality rates have improved across a wide array of diagnoses and procedures for many hospitals, but large gaps continue to exist between the "best" and the "worst" hospitals, and more importantly, these gaps are not closing. However, across the 18 diagnoses and procedures studied, U.S. in-hospital unadjusted and adjusted mortality rates improved. (See Appendices C1, C2, C3 and D.) Risk-adjusted mortality rates improved, on average, 7.89 percent from 2003 to 2005, but the degree of improvement varied widely by diagnosis and procedure (range: -19.60% to 24.72%). (See Appendices D and E.)

### **Five-Star Rated Hospitals Have Significantly Lower Mortality and Greater Improvements**

Most notably, 5-star rated hospitals had significantly and consistently lower unadjusted and adjusted mortality rates across all three years studied, compared to other rated hospitals. (See Appendices C, D and E.) Five-star rated hospitals also improved, on average, 9.39 percent from 2003 to 2005, which was 19 percent more than the U.S. hospital average and 57 percent more than 1-star rated hospitals. (See Table 1.) The lower mortality associated with 5-star rated hospitals means that a typical patient would have, on average, a 69 percent and 49 percent lower chance of dying in a 5-star rated hospital as compared to a 1-star rated hospital and the U.S. hospital average, respectively.

### **The Quality Chasm Widens**

Compared to the *Eighth Annual HealthGrades Hospital Quality in America Study*, this difference represents a widening in the performance gap between the best and worst hospitals and best and average hospitals of 5 and 7 percent, respectively. If all hospitals had performed at the level of a 5-star rated hospital across the 18 diagnoses and procedures studied, 302,403 Medicare lives could have potentially been saved during 2003-2005. (See Appendix E.)

**Table 1: Average Risk-Adjusted Mortality Rate Improvements across All Diagnoses and Procedures by Hospital Star Rating Category 2003-2005**

Overall Average Risk-Adjusted Mortality Rate Improvements*	Hospital Quality			
	U.S.	5-star	3-star	1-star
	7.89%	9.39%	7.36%	5.98%

\* Improvement was calculated using the following steps (data not shown): 1) Sum observed and expected counts by year for each star rating category; 2) Calculate a combined O/E which is the ratio of the sum of the observed divided by sum of the expected for each year, for each category; 3) Calculate the Overall Average Improvement by (2003 O/E minus 2005 O/E) divided by 2003 O/E.

### Five-Star Rated Hospitals Save Medicare Lives

Of the total 302,403 Medicare potentially preventable deaths associated with the 18 diagnoses and procedures studied, 50 percent were associated with just four common hospital diagnoses:

- 1) Heart Failure (33,543)
- 2) Community Acquired Pneumonia (37,593)
- 3) Sepsis (38,560)
- 4) Respiratory Failure (40,093)

Five-star rated hospitals consistently performed significantly better than expected across these four high-risk inpatient diagnoses. Although we found an overall average improvement of almost 10 percent among these four diagnoses from 2003 to 2005, the gaps between best and worst performance were most notable, with an average relative difference of 53.81 percent. (See Appendix E.)

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## Discussion

The *Ninth Annual HealthGrades Hospital Quality in America Study* has several important conclusions. First, inpatient outcomes continue to improve for Medicare beneficiaries across a wide array of diagnoses and procedures, even as patients are becoming increasingly complex. Second, this study is consistent with numerous other studies<sup>2-8</sup> demonstrating that significant variation in quality persists and the quality gap between the best and the worst has not appreciably changed since 2003. Third, and most important, this study, similar to others, confirms that better than expected outcomes are achievable and hundreds of thousands of lives could have been saved if all hospitals could improve to a performance level comparable to 5-star rated hospitals. Even moving just the bottom group of hospitals up to the national averages would result in substantial improvement. Targeted quality improvement focus on just four key quality areas (heart failure, respiratory failure, sepsis, and community-acquired pneumonia) can achieve up to a 50-percent reduction in potentially preventable deaths.

Given these stark quality differences among our nation's hospitals, it is imperative that consumers have access to quality information. Fortunately, the quality landscape has been gaining considerable momentum toward embracing and supporting consumer choice in healthcare, through public reporting of provider performance and, more recently, performance-based provider payment. More than 100 reward and incentive payment programs have been launched in the private healthcare sector. Most of these efforts have not yet been fully evaluated. Some of these programs have begun to show that providers respond positively to payment incentives that promote and reward quality improvement practices, but it remains unknown whether the improvements seen will be significant and sustained.<sup>8,9</sup>

For the sizable investments being made in healthcare services, Americans should be getting much greater value from the care they receive.<sup>1</sup> Progress continues to be slow and the quality gap remains wide. The consequence of our inability to effectively translate knowledge into action will result in thousands of potentially preventable deaths among Medicare beneficiaries each year. Improving performance measurement, aligning payment incentives with quality improvement goals, and making comparative information available to all stakeholders will enable the nation to provide better healthcare services and provide high-quality, patient-centered care consistently and efficiently to all Americans.

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## Appendix A: Patient Cohorts and Related ICD-9-CM Codes

Patient Cohort	ICD-9-CM Procedure/Diagnosis Codes and Criteria
Appendectomy	Principal Procedures – Inclusions: 47.01, 47.09 Procedures – Exclusions: 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63 Note: This cohort uses all payer data from states which provide it.
Atrial Fibrillation	Principal Diagnoses – Inclusions: 427.31 Procedures – Exclusions: 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63 Diagnoses – Exclusions: 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, 198.8, 198.81, 198.82, 198.89, 414.06, 414.07, V42.1, V66.7
Back and Neck Surgery (Spinal Fusion)	Principal Procedures – Inclusions: 81.00, 81.01, 81.02, 81.03, 81.04, 81.05, 81.06, 81.07, 81.08, 81.09, 81.61, 81.62, 81.63, 81.64 Procedures – Exclusions: 03.02, 37.5, 37.51, 37.52, 37.53, 37.54, 78.69, 81.3, 81.30, 81.31, 81.32, 81.33, 81.34, 81.35, 81.36, 81.37, 81.38, 81.39, 81.65, 81.66, 84.58, 84.59, 84.60, 84.61, 84.62, 84.63, 84.64, 84.65, 84.66, 84.67, 84.68, 84.69 Diagnoses – Exclusions: 722.80, 722.81, 722.82, 722.83, 996.4, V45.4
Back and Neck Surgery (except Spinal Fusion)	Principal Procedures – Inclusions: 03.09, 03.53, 80.50, 80.51, 80.59, 84.58, 84.59, 84.60, 84.61, 84.62, 84.63, 84.64, 84.65 Procedures – Exclusions: 03.02, 37.5, 37.51, 37.52, 37.53, 37.54, 78.49, 78.69, 81.00, 81.01, 81.02, 81.03, 81.04, 81.05, 81.06, 81.07, 81.08, 81.09, 81.3, 81.30, 81.31, 81.32, 81.33, 81.34, 81.35, 81.36, 81.37, 81.38, 81.39, 81.61, 81.62, 81.63, 81.64, 81.65, 81.66, 84.66, 84.67, 84.68, 84.69 Diagnoses – Exclusions: 722.80, 722.81, 722.82, 722.83, 996.4, V42.4, V45.4, V54.0, V54.01, V54.09
Bowel Obstruction	Principal Diagnoses – Inclusions: 277.01, 532.01, 532.11, 532.21, 532.31, 532.41, 532.51, 532.61, 532.71, 532.91, 534.01, 534.11, 534.21, 534.31, 534.41, 534.51, 534.61, 534.71, 534.91, 537.2, 537.3, 550.10, 550.11, 550.12, 550.13, 552.00, 552.01, 552.02, 552.03, 552.1, 552.20, 552.21, 552.29, 552.8, 552.9, 557.0, 560.0, 560.1, 560.2, 560.30, 560.31, 560.39, 560.81, 560.89, 560.9, 751.1, 751.2, 936, 937 Procedures – Exclusions: 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63 Diagnoses – Exclusions: 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, 198.8, 198.81, 198.82, 198.89, V66.7
Carotid Endarterectomy	Principal Procedures – Inclusions: 00.55, 00.61, 00.63, 38.12, 39.50, 39.72, 39.79 Procedures – Exclusions: 36.1, 36.10, 36.11, 36.12, 36.13, 36.14, 36.15, 36.16, 36.17, 36.19, 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63, 38.08, 38.16, 38.18, 38.36, 39.24, 39.25, 39.29, 39.59, 39.90
Cholecystectomy	Principal Procedures – Inclusions: 51.21, 51.22, 51.23, 51.24 Procedures – Exclusions: 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63 Diagnoses – Exclusions: V66.7



Patient Cohort	ICD-9-CM Procedure/Diagnosis Codes and Criteria
Chronic Obstructive Pulmonary Disease (COPD)	Principal Diagnoses – Inclusions: 491.1, 491.20, 491.21, 491.22, 491.8, 491.9, 492.8, 493.20, 493.21, 493.22, 494, 494.0, 494.1, 496 Procedures – Exclusions: 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63 Diagnoses – Exclusions: 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, 198.8, 198.81, 198.82, 198.89, 480.3, 480.8, V66.7, V66.7
Community Acquired Pneumonia	Principal Diagnoses – Inclusions: 480.0, 480.1, 480.2, 480.8, 480.9, 481, 482.2, 482.30, 482.31, 482.32, 482.39, 482.9, 483.0, 483.1, 483.8, 485, 486, 487.0 Procedures – Exclusions: 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63 Diagnoses – Exclusions: 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, 198.8, 198.81, 198.82, 198.89, 480.3, V66.7
Coronary Bypass Surgery	Principal Procedures – Inclusions: 36.10, 36.11, 36.12, 36.13, 36.14, 36.15, 36.16, 36.19 Procedures – Exclusions: 35.1, 35.10, 35.11, 35.12, 35.13, 35.14, 35.2, 35.20, 35.21, 35.22, 35.23, 35.24, 35.25, 35.26, 35.27, 35.28, 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63, 38.12, 38.34, 38.44, 38.64, 39.71, 44.12 Diagnoses – Exclusions: 414.06, 414.07, 441.00, 441.01, 441.02, 441.03, V42.1
Coronary Interventional Procedures	Principal Procedures – Inclusions: 36.01, 36.02, 36.05, 36.06, 36.07, 36.09 Procedures – Exclusions: 35.1, 35.10, 35.11, 35.12, 35.13, 35.14, 35.2, 35.20, 35.21, 35.22, 35.23, 35.24, 35.25, 35.26, 35.27, 35.28, 36.10, 36.11, 36.12, 36.13, 36.14, 36.15, 36.16, 36.19, 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63 Diagnoses – Exclusions: 414.06, 414.07, V42.1
Diabetic Acidosis and Coma	Principal Diagnosis – Inclusions: 250.10, 250.11, 250.12, 250.13, 250.20, 250.21, 250.22, 250.23, 250.30, 250.31, 250.32, 250.33, 250.80, 250.81, 250.82, 250.83 Procedures – Exclusions: 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63 Diagnoses – Exclusions: 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, 198.8, 198.81, 198.82, 198.89, V66.7
Gastrointestinal Bleed	Principal Diagnoses – Inclusions: 456.0, 456.20, 530.2, 530.21, 530.7, 530.82, 531.00, 531.01, 531.20, 531.21, 531.40, 531.41, 531.60, 531.61, 532.00, 532.01, 532.20, 532.21, 532.40, 532.41, 532.60, 532.61, 533.00, 533.01, 533.20, 533.21, 533.40, 533.41, 533.60, 533.61, 534.0, 534.00, 534.01, 534.20, 534.21, 534.40, 534.41, 534.60, 534.61, 535.01, 535.11, 535.21, 535.31, 535.41, 535.51, 535.61, 537.83, 537.84, 562.02, 562.03, 562.12, 562.13, 569.3, 569.82, 569.85, 569.86, 578, 578.0, 578.1, 578.9, 751.0 Procedures – Exclusions: 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63 Diagnoses – Exclusions: 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, 198.8, 198.81, 198.82, 198.89, V66.7

Patient Cohort	ICD-9-CM Procedure/Diagnosis Codes and Criteria
Gastrointestinal Procedures and Surgeries	APR-DRG: 220-224, 226, 229, 260, 261, 264
Heart Attack	Principal Diagnoses – Inclusions: 410.01, 410.11, 410.21, 410.31, 410.41, 410.51, 410.61, 410.71, 410.81, 410.91 Procedures – Exclusions: 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63 Diagnoses – Exclusions: 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, 198.8, 198.81, 198.82, 198.89, 414.06, 414.07, V42.1, V66.7
Heart Failure	Principal Diagnoses – Inclusions: 398.91, 402.01, 402.11, 402.91, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93, 428.0, 428.1, 428.2, 428.20, 428.21, 428.22, 428.23, 428.3, 428.30, 428.31, 428.32, 428.33, 428.4, 428.40, 428.41, 428.42, 428.43, 428.9 Procedures – Exclusions: 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63, 39.95 Diagnoses – Exclusions: 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, 198.8, 198.81, 198.82, 198.89, 414.06, 414.07, V42.1, V66.7
Hip Fracture Repair	Principal Procedures – Inclusions: 79.05, 79.15, 79.25, 79.35 Procedures – Exclusions: 37.5, 37.51, 37.52, 37.53, 37.54, 78.65, 78.66, 78.67, 80.05, 80.06, 81.54, 81.55 Diagnoses – Exclusions: 800.6, 820.10, 820.11, 820.12, 820.13, 820.19, 820.30, 820.31, 820.32, 820.9, 821.10, 821.11, 821.30, 821.31, 821.32, 821.33, 821.39, 996.4, V66.7
Pancreatitis	Principal Diagnoses – Inclusions: 577.0, 577.1 Procedures – Exclusions: 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63 Diagnoses – Exclusions: 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, 198.8, 198.81, 198.82, 198.89, V66.7
Partial Hip Replacement	Principal Procedures – Inclusions: 81.52 Procedures – Exclusions: 37.5, 37.51, 37.52, 37.53, 37.54, 78.65, 78.66, 78.67, 80.05, 80.06, 81.54, 81.55 Diagnoses – Exclusions: 800.6, 820.10, 820.11, 820.12, 820.13, 820.19, 820.20, 820.22, 820.30, 820.31, 820.32, 820.9, 821.10, 821.11, 821.30, 821.31, 821.32, 821.33, 821.39, 996.4, V66.7

Patient Cohort	ICD-9-CM Procedure/Diagnosis Codes and Criteria
Peripheral Vascular Bypass	Principal Procedures – Inclusions: 39.29 Principal Diagnoses – Inclusions: 250.60, 250.61, 250.62, 250.63, 250.70, 250.71, 250.72, 250.73, 250.80, 250.81, 250.82, 250.83, 440.20, 440.21, 440.22, 440.23, 440.24, 440.29, 440.30, 440.32, 442.2, 442.3, 443.89, 443.9, 444.22, 444.81, 445.02, 445.05, 447.1, 681.10, 682.6, 682.7, 686.8, 707.10, 707.12, 707.13, 707.14, 707.15, 707.19, 707.8, 730.06, 730.07, 730.16, 730.17, 730.18, 730.26, 730.27, 785.4, 902.53, 904.41 Procedures – Exclusions: 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63, 39.25, 39.49 Diagnoses – Exclusions: 440.31, 445.01
Prostatectomy	Principal Procedures – Inclusions: 60.21, 60.29, 60.3, 60.4, 60.5, 60.61, 60.62, 60.69 Procedures – Exclusions: 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63
Pulmonary Embolism	Principal Diagnoses – Inclusions: 415.11, 415.19 Procedures – Exclusions: 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63 Diagnoses – Exclusions: 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, 198.8, 198.81, 198.82, 198.89, V66.7
Resection / Replacement of Abdominal Aorta	Principal Procedures – Inclusions: 38.34, 38.44, 38.64, 39.71 Procedures – Exclusions: 35.10, 35.11, 35.12, 35.13, 35.14, 35.20, 35.21, 35.22, 35.23, 35.24, 35.25, 35.26, 35.27, 35.28, 36.1, 36.10, 36.11, 36.12, 36.13, 36.14, 36.15, 36.16, 36.17, 36.19, 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63, 38.08, 38.16, 38.18, 38.36, 38.45, 39.24, 39.25, 39.29, 39.50, 39.59 Diagnoses – Exclusions: 441.00, 441.01, 441.02, 441.03, 441.1, 441.2, 441.6, 441.7, 441.9
Respiratory Failure	APR-DRG: 130, 133
Sepsis	Principal Diagnoses – Inclusions: 003.1, 022.3, 027.0, 036.2, 036.3, 038.0, 038.10, 038.11, 038.19, 038.2, 038.3, 038.40, 038.41, 038.42, 038.43, 038.44, 038.49, 038.8, 038.9, 054.5, 785.52, 785.59, 995.90, 995.91, 995.92, 999.3 Procedures – Exclusions: 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63 Diagnoses – Exclusions: 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, 198.8, 198.81, 198.82, 198.89, V66.7
Stroke	Principal Diagnoses – Inclusions: 430, 431, 432.0, 432.1, 432.9, 433.01, 433.11, 433.21, 433.31, 433.81, 433.91, 434.01, 434.11, 434.91, 436 Procedures – Exclusions: 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63 Diagnoses – Exclusions: 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, 198.8, 198.81, 198.82, 198.89, V66.7

Patient Cohort	ICD-9-CM Procedure/Diagnosis Codes and Criteria
Total Hip Replacement	<p>Principal Procedures – Inclusions: 81.51</p> <p>Procedures – Exclusions: 00.70, 00.71, 00.72, 00.73, 00.80, 00.81, 00.82, 00.83, 00.84, 37.5, 37.51, 37.52, 37.53, 37.54, 78.65, 78.67, 80.05, 80.06, 81.53, 81.54, 81.55,</p> <p>Diagnoses – Exclusions: 996.4, 996.40, 996.41, 996.42, 996.43, 996.44, 996.45, 996.46, 996.47, 996.49, E800, E800.0, E800.1, E800.2, E800.3, E800.8, E800.9, E801, E801.0, E801.1, E801.2, E801.3, E801.8, E801.9, E802, E802.0, E802.1, E802.2, E802.3, E802.8, E802.9, E803, E803.0, E803.1, E803.2, E803.3, E803.8, E803.9, E804, E804.0, E804.1, E804.2, E804.3, E804.8, E804.9, E805, E805.0, E805.1, E805.2, E805.3, E805.8, E805.9, E806, E806.0, E806.1, E806.2, E806.3, E806.8, E806.9, E807, E807.0, E807.1, E807.2, E807.3, E807.8, E807.9, E810, E810.0, E810.1, E810.2, E810.3, E810.4, E810.5, E810.6, E810.7, E810.8, E810.9, E811, E811.0, E811.1, E811.2, E811.3, E811.4, E811.5, E811.6, E811.7, E811.8, E811.9, E812, E812.0, E812.1, E812.2, E812.3, E812.4, E812.5, E812.6, E812.7, E812.8, E812.9, E813, E813.0, E813.1, E813.2, E813.3, E813.4, E813.5, E813.6, E813.7, E813.8, E813.9, E814, E814.0, E814.1, E814.2, E814.3, E814.4, E814.5, E814.6, E814.7, E814.8, E814.9, E815, E815.0, E815.1, E815.2, E815.3, E815.4, E815.5, E815.6, E815.7, E815.8, E815.9, E816, E816.0, E816.1, E816.2, E816.3, E816.4, E816.5, E816.6, E816.7, E816.8, E816.9, E817, E817.0, E817.1, E817.2, E817.3, E817.4, E817.5, E817.6, E817.7, E817.8, E817.9, E818, E818.0, E818.1, E818.2, E818.3, E818.4, E818.5, E818.6, E818.7, E818.8, E818.9, E819, E819.0, E819.1, E819.2, E819.3, E819.4, E819.5, E819.6, E819.7, E819.8, E819.9, E820, E820.0, E820.1, E820.2, E820.3, E820.4, E820.5, E820.6, E820.7, E820.8, E820.9, E821, E821.0, E821.1, E821.2, E821.3, E821.4, E821.5, E821.6, E821.7, E821.8, E821.9, E822, E822.0, E822.1, E822.2, E822.3, E822.4, E822.5, E822.6, E822.7, E822.8, E822.9, E823, E823.0, E823.1, E823.2, E823.3, E823.4, E823.5, E823.6, E823.7, E823.8, E823.9, E824, E824.0, E824.1, E824.2, E824.3, E824.4, E824.5, E824.6, E824.7, E824.8, E824.9, E825, E825.0, E825.1, E825.2, E825.3, E825.4, E825.5, E825.6, E825.7, E825.8, E825.9, E826, E826.0, E826.1, E826.2, E826.3, E826.4, E826.8, E826.9, E827, E827.0, E827.2, E827.3, E827.4, E827.8, E827.9, E828, E828.0, E828.2, E828.4, E828.8, E828.9, E829, E829.0, E829.4, E829.8, E829.9, E830, E830.0, E830.1, E830.2, E830.3, E830.4, E830.5, E830.6, E830.8, E830.9, E831, E831.0, E831.1, E831.2, E831.3, E831.4, E831.5, E831.6, E831.8, E831.9, E832, E832.0, E832.1, E832.2, E832.3, E832.4, E832.5, E832.6, E832.8, E832.9, E833, E833.0, E833.1, E833.2, E833.3, E833.4, E833.5, E833.6, E833.8, E833.9, E834, E834.0, E834.1, E834.2, E834.3, E834.4, E834.5, E834.6, E834.8, E834.9, E835, E835.0, E835.1, E835.2, E835.3, E835.4, E835.5, E835.6, E835.8, E835.9, E836, E836.0, E836.1, E836.2, E836.3, E836.4, E836.5, E836.6, E836.8, E836.9, E837, E837.0, E837.1, E837.2, E837.3, E837.4, E837.5, E837.6, E837.8, E837.9, E838, E838.0, E838.1, E838.2, E838.3, E838.4, E838.5, E838.6, E838.8, E838.9, E840, E840.0, E840.1, E840.2, E840.3, E840.4, E840.5, E840.6, E840.7, E840.8, E840.9, E841, E841.0, E841.1, E841.2, E841.3, E841.4, E841.5, E841.6, E841.7, E841.8, E841.9, E842, E842.6, E842.7, E842.8, E842.9, E843, E843.0, E843.1, E843.2, E843.3, E843.4, E843.5, E843.6, E843.7, E843.8, E843.9, E844, E844.0, E844.1, E844.2, E844.3, E844.4, E844.5, E844.6, E844.7,</p>

Patient Cohort	ICD-9-CM Procedure/Diagnosis Codes and Criteria
	E844.8, E844.9, E845, E845.0, E845.8, E845.9, E846, E847, E848, E849, E849.0, E849.1, E849.2, E849.3, E849.4, E849.5, E849.6, E849.7, E849.8, E849.9, E880, E880.0, E880.1, E880.9, E881, E881.0, E881.1, E882, E883, E883.0, E883.1, E883.2, E883.9, E884, E884.0, E884.1, E884.2, E884.3, E884.4, E884.5, E884.6, E884.9, E885, E885.0, E885.1, E885.2, E885.3, E885.4, E885.9, E886, E886.0, E886.9, E887, E888, E888.0, E888.1, E888.8, E888.9, E890.0, E890.8, E891.0, E891.8, E916, E917.0, E917.1, E917.2, E917.3, E917.4, E917.5, E917.6, E917.7, E917.8, E917.9, E918, E919.0, E919.1, E919.2, E919.3, E919.4, E919.5, E919.6, E919.7, E919.8, E919.9, E920, E920.0, E920.1, E920.2, E920.3, E920.4, E920.5, E920.8, E920.9, E921, E921.0, E921.1, E921.8, E921.9, E922, E922.0, E922.1, E922.2, E922.3, E922.4, E922.5, E922.8, E922.9, E923, E923.0, E923.1, E923.2, E923.8, E923.9, E928.8, E928.9, E929, E929.0, E929.1, E929.2, E929.3, E929.4, E929.5, E929.8, E929.9, E955.0, E955.1, E955.2, E955.3, E955.4, E955.5, E955.6, E955.7, E955.9, E956, E957.0, E957.1, E957.2, E957.9, E958.0, E958.5, E958.6, E960.0, E965.0, E965.1, E965.2, E965.3, E965.4, E965.5, E965.6, E965.7, E965.8, E965.9, E966, E968.1, E968.2, E968.5, E968.6, E969, E970, E971, E973, E974, E977, E985, E985.0, E985.1, E985.2, E985.3, E985.4, E985.5, E985.6, E985.7, E986, E987, E987.0, E987.1, E987.2, E987.9, E988, E988.0, E988.5, E988.6, E989, E992.5, V15.5, V58.43, V58.49
<b>Total Knee Replacement</b>	Principal Procedures – Inclusions: 81.54 Procedures – Exclusions: 00.74, 00.75, 00.76, 00.80, 00.81, 00.82, 00.83, 00.84, 37.5, 37.51, 37.52, 37.53, 37.54, 78.65, 78.67, 80.05, 80.06, 81.51, 81.52, 81.53, 81.55, Diagnoses – Exclusions: 996.4, 996.40, 996.41, 996.42, 996.43, 996.44, 996.45, 996.46, 996.47, 996.49
<b>Valve Replacement Surgery</b>	Principal Procedures – Inclusions: 35.20, 35.21, 35.22, 35.23, 35.24, 35.25, 35.26, 35.27, 35.28 Procedures – Exclusions: 35.1, 35.33, 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63, 38.12, 38.34, 38.44, 38.64, 39.71, 44.12 Diagnoses – Exclusions: 414.06, 414.07, 441.00, 441.01, 441.02, 441.03, 441.2, V42.1

## Appendix B: Major Complications

### Major Complications – Appendectomy

Major Complications – Appendectomy			
292.81	DRUG-INDUCED DELIRIUM	482.8	PNEUMONIA-BACTERIA, NEC
415.11	IATROG PULM EMBOLISM/INF	482.81	PNEUMONIA DT ANAEROBES
415.19	PULM EMBOLSM/INFARCT, NEC	482.82	PNEUMONIA-E. COLI
427.41	VENTRICULAR FIBRILLATION	482.83	PNEUMONIA-GRM NG BAC, NEC
427.5	CARDIAC ARREST	482.84	LEGIONNAIRES' DISEASE
427.89	CARDIAC DYSRHYTHMIAS, NEC	482.89	PNEUMONIA-BACTERIA, NEC
428.0	CONGESTIVE HEART FAILURE	482.9	BACTERIAL PNEUMONIA, NOS
428.1	LEFT HEART FAILURE	483	PNEUMONIA-OTHER ORGANISM
428.2	SYSTOLIC HEART FAILURE	483.0	PNEUMONIA-M. PNEUMONIAE
428.20	SYSTOLC HEART FAILUR, NOS	483.1	PNEUMONIA DT CHLAMYDIA
428.21	AC SYSTOLC HEART FAILURE	483.8	PNEUMONIA DT ORGANSM, NEC
428.23	AC ON CHR SYSTOL HT FAIL	484	PNEUMONIA-OTH INFECT DIS
428.3	DIASTOLIC HEART FAILURE	484.1	PNEUMONIA-CM INCLUSN DIS
428.30	DIASTOLC HEART FAILR, NOS	484.3	PNEUMONIA-WHOOPING COUGH
428.31	AC DIASTOL HEART FAILURE	484.5	PNEUMONIA IN ANTHRAX
428.33	AC ON CHR DIASTL HT FAIL	484.6	PNEUMONIA-ASPERGILLOSIS
428.4	CMB SYST & DIAST HT FAIL	484.7	PNEUMON-SYST MYCOSES, NEC
428.40	CMB SYS/DIAS HT FAIL, NOS	484.8	PNEUMON IN INFCT DIS, NEC
428.41	AC COMB SYS/DIAS HT FAIL	485	BRONCHOPNEUM-ORGNISM, NOS
428.43	AC ON CH SYS/DIA HT FAIL	486	PNEUMONIA-ORGANISM, NOS
428.9	HEART FAILURE, NOS	511.9	PLEURAL EFFUSION, NOS
480	VIRAL PNEUMONIA	512.1	IATROGENIC PNEUMOTHORAX
480.0	PNEUMONIA DT ADENOVIRUS	518.0	PULMONARY COLLAPSE
480.1	PNEUMONIA DUE TO RSV	518.5	PULM INSUF PST TRAUM/SRG
480.2	PNEUMON-PARAINFLUENZA VR	518.81	RESPIRATORY FAILURE
480.3	PNEUMONIA DT SARS	560.1	PARALYTIC ILEUS
480.8	PNEUMONIA DT VIRUS, NEC	560.9	INTESTINAL OBSTRUCTN, NOS
480.9	VIRAL PNEUMONIA, NOS	593.9	KIDNEY & URETER DIS, NOS
481	PNEUMOCOCCAL PNEUMONIA	996.62	INF/INFLAM VASC DEV/GRFT
482	OTHR BACTERIAL PNEUMONIA	997.02	IATROGN C-VSC INFRCT/HEM
482.0	PNEUMONIA-K. PNEUMONIAE	997.1	CARDIAC COMPLICATION, NEC
482.1	PNEUMONIA DT PSEUDOMONAS	997.3	RESPIR COMPLICATIONS, NEC
482.2	PNEUMONIA-H. INFLUENZAE	997.4	DIGESTIVE SYST COMPL, NEC
482.3	PNEUMONIA-STREPTOCOCCUS	997.5	URINARY COMPLICATION, NEC
482.30	PNEUMONIA-STREPTOCOC, NOS	998.0	POSTOPERATIVE SHOCK NEC
482.31	PNEUMONIA-GROUP A STREP	998.11	HEMORRHAGE COMPLIC PROC
482.32	PNEUMONIA-GROUP B STREP	998.2	ACC PUNCTUR/LAC-PROC, NEC
482.39	PNEUMONIA DT STREP, NEC	998.3	DISRUPT SURGCL WOUND, NEC
482.4	PNEUMONIA-STAPHYLOCOCCUS	998.31	DISRUPT INTERNL OP WOUND
482.40	STAPH PNEUMONIA, NOS	998.32	DISRUPT EXTERNL OP WOUND
482.41	STAPH AUREUS PNEUMONIA	998.59	POSTOPERATIV INFECTN, NEC
482.49	STAPH PNEUMONIA, NEC		

**Dependent Complications – Appendectomy**

<b>Must occur with 997.1 Cardiac Complications</b>	
410.01 AMI-ANTEROLATERL-INITIAL	428.2 SYSTOLIC HEART FAILURE
410.11 AMI-ANT WALL, NEC-INITIAL	428.20 SYSTOLC HEART FAILURE, NOS
410.21 AMI-INFEROLATERL-INITIAL	428.21 AC SYSTOLC HEART FAILURE
410.51 AMI-LAT WALL, NEC-INITIAL	428.23 AC ON CHR SYSTOL HT FAIL
410.61 AMI-TRUE POST WL-INITIAL	428.3 DIASTOLIC HEART FAILURE
410.71 AMI-SUBEND INFRCT-INIT'L	428.31 AC DIASTOL HEART FAILURE
410.81 AMI-SITE, NEC-INITIAL EPI	428.33 AC ON CHR DIASTL HT FAIL
410.91 AMI-SITE, NOS-INITIAL EPI	428.4 CMB SYST & DIAST HT FAIL
427.0 PAROXYSMAL SVT	428.40 CMB SYS/DIAS HT FAIL, NOS
427.1 PAROXYSMAL VENT TACHYCARD	428.41 AC COMB SYS/DIAS HT FAIL
427.31 ATRIAL FIBRILLATION	428.43 AC ON CH SYS/DIA HT FAIL
427.32 ATRIAL FLUTTER	428.9 HEART FAILURE, NOS
428.0 CONGESTIVE HEART FAILURE	427.89 CARDIAC DYSRHYTHMIAS, NEC
428.1 LEFT HEART FAILURE	428.30 DIASTOLC HEART FAILR, NOS
<b>Must occur with 997.3 Respiratory Complications</b>	
480 VIRAL PNEUMONIA	482.8 PNEUMONIA-BACTERIA, NEC
480.0 PNEUMONIA DT ADENOVIRUS	482.81 PNEUMONIA DT ANAEROBES
480.1 PNEUMONIA DUE TO RSV	482.82 PNEUMONIA-E. COLI
480.2 PNEUMON-PARAINFLUENZA VR	482.83 PNEUMONIA-GRM NG BAC, NEC
480.3 PNEUMONIA DT SARS	482.84 LEGIONNAIRES' DISEASE
480.8 PNEUMONIA DT VIRUS, NEC	482.89 PNEUMONIA-BACTERIA, NEC
480.9 VIRAL PNEUMONIA, NOS	482.9 BACTERIAL PNEUMONIA, NOS
481 PNEUMOCOCCAL PNEUMONIA	483 PNEUMONIA-OTHER ORGANISM
482 OTHR BACTERIAL PNEUMONIA	483.0 PNEUMONIA-M. PNEUMONIAE
482.0 PNEUMONIA-K. PNEUMONIAE	483.1 PNEUMONIA DT CHLAMYDIA
482.1 PNEUMONIA DT PSEUDOMONAS	483.8 PNEUMONIA DT ORGANSM, NEC
482.2 PNEUMONIA-H. INFLUENZAE	484 PNEUMONIA-OTH INFECT DIS
482.3 PNEUMONIA-STREPTOCOCCUS	484.1 PNEUMONIA-CM INCLUSN DIS
482.30 PNEUMONIA-STREPTOCOC, NOS	484.3 PNEUMONIA-WHOOPING COUGH
482.31 PNEUMONIA-GROUP A STREP	484.5 PNEUMONIA IN ANTHRAX
482.32 PNEUMONIA-GROUP B STREP	484.6 PNEUMONIA-ASPERGILLOSIS
482.39 PNEUMONIA DT STREP, NEC	484.7 PNEUMON-SYST MYCOSES, NEC
482.4 PNEUMONIA-STAPHYLOCOCCUS	484.8 PNEUMON IN INFCT DIS, NEC
482.40 STAPH PNEUMONIA, NOS	485 BRONCHOPNEUM-ORGNISM, NOS
482.41 STAPH AUREUS PNEUMONIA	486 PNEUMONIA-ORGANISM, NOS
482.49 STAPH PNEUMONIA, NEC	507.0 PNEUMONIT-INH FOOD/VOMIT
<b>Must occur with 997.4 Digestive System Complications</b>	
569.83 PERFORATION OF INTESTINE	

**Dependent Complications – Appendectomy (continued)**

<b>Must occur with 997.5 Urinary Complications</b>			
584.5	AC REN FAIL-LES TUBL, NEC	788.20	RETENTION OF URINE, NOS
584.8	AC REN FAIL-PATH LES, NEC	788.29	RETENTION OF URINE, NEC
584.9	ACUTE RENAL FAILURE, NOS		
<b>Must occur with 998.11 Hemorrhage Complicating a Procedure</b>			
568.81	HEMOPERITONEUM		
<b>Must occur with 998.2 Accidental Puncture or Laceration During a Procedure</b>			
568.81	HEMOPERITONEUM	569.83	PERFORATION OF INTESTINE
<b>Must occur with 998.59 Postoperative Infection</b>			
008.45	C. DIFFICILE INTESTN INF	038.40	SEPTICEMIA GRAM-NEGS, NOS
038	SEPTICEMIA	038.41	SEPTICEMIA-H. INFLUENZAE
038.0	STREPTOCOCCAL SEPTICEMIA	038.42	SEPTICEMIA DT E. COLI
038.1	STAPHYLOCOCC SEPTICEMIA	038.43	SEPTICEMIA - PSEUDOMONAS
038.10	STAPHLOCOCC SEPTICEM, NOS	038.44	SEPTICEMIA DT SERRATIA
038.11	SEPTICEMIA-STAPH AUREUS	038.49	SEPTICEMIA GRAM-NEG, NEC
038.19	STAPHLOCOCC SEPTICEM, NEC	038.8	OTH SPECIFIED SEPTICEMIA
038.2	PNEUMOCOCCAL SEPTICEMIA	038.9	UNSPECIFIED SEPTICEMIA
038.3	SEPTICEMIA DT ANAEROBES	682.2	CELLULITIS/ABSCESS-TRUNK
038.4	SEPTICEMIA GRAM-NEGS, NEC		



**Major Complications – Back and Neck Surgery (Spinal Fusion)**

Major Complications – Back and Neck Surgery (Spinal Fusion)			
038	SEPTICEMIA	482.40	STAPH PNEUMONIA, NOS
038.0	STREPTOCOCCAL SEPTICEMIA	482.41	STAPH AUREUS PNEUMONIA
038.1	STAPHYLOCOCC SEPTICEMIA	482.49	STAPH PNEUMONIA, NEC
038.10	STAPHLOCOCC SEPTICEM, NOS	482.8	PNEUMONIA-BACTERIA, NEC
038.11	SEPTICEMIA-STAPH AUREUS	482.81	PNEUMONIA DT ANAEROBES
038.19	STAPHLOCOCC SEPTICEM, NEC	482.82	PNEUMONIA-E. COLI
038.2	PNEUMOCOCCAL SEPTICEMIA	482.83	PNEUMONIA-GRM NG BAC, NEC
038.3	SEPTICEMIA DT ANAEROBES	482.84	LEGIONNAIRES' DISEASE
038.4	SEPTICEMIA GRAM-NEGS, NEC	482.89	PNEUMONIA-BACTERIA, NEC
038.40	SEPTICEMIA GRAM-NEGS, NOS	482.9	BACTERIAL PNEUMONIA, NOS
038.41	SEPTICEMIA-H. INFLUENZAE	483	PNEUMONIA-OTHER ORGANISM
038.42	SEPTICEMIA DT E. COLI	483.0	PNEUMONIA-M. PNEUMONIAE
038.43	SEPTICEMIA - PSEUDOMONAS	483.1	PNEUMONIA DT CHLAMYDIA
038.44	SEPTICEMIA DT SERRATIA	483.8	PNEUMONIA DT ORGANISM, NEC
038.49	SEPTICEMIA GRAM-NEG, NEC	484	PNEUMONIA-OTH INFECT DIS
038.8	OTH SPECIFIED SEPTICEMIA	484.1	PNEUMONIA-CM INCLUSN DIS
038.9	UNSPECIFIED SEPTICEMIA	484.3	PNEUMONIA-WHOOPING COUGH
292.81	DRUG-INDUCED DELIRIUM	484.5	PNEUMONIA IN ANTHRAX
293.0	DELIRIUM DT CONDITNS, NEC	484.6	PNEUMONIA-ASPERGILLOSIS
410.01	AMI-ANTEROLATERL-INITIAL	484.7	PNEUMON-SYST MYCOSES, NEC
410.11	AMI-ANT WALL, NEC-INITIAL	484.8	PNEUMON IN INFCT DIS, NEC
410.21	AMI-INFEROLATERL-INITIAL	485	BRONCHOPNEUM-ORGNISM, NOS
410.31	AMI-INFEROPOSTER-INITIAL	486	PNEUMONIA-ORGANISM, NOS
410.41	AMI-INF WALL, NEC-INITIAL	507.0	PNEUMONIT-INH FOOD/VOMIT
410.51	AMI-LAT WALL, NEC-INITIAL	511.9	PLEURAL EFFUSION, NOS
410.61	AMI-TRUE POST WL-INITIAL	518.5	PULM INSUF PST TRAUM/SRG
410.71	AMI-SUBEND INFRCT-INIT'L	518.81	RESPIRATORY FAILURE
410.81	AMI-SITE, NEC-INITIAL EPI	584.5	AC REN FAIL-LES TUBL, NEC
410.91	AMI-SITE, NOS-INITIAL EPI	584.8	AC REN FAIL-PATH LES, NEC
415.11	IATROG PULM EMBOLISM/INF	584.9	ACUTE RENAL FAILURE, NOS
415.19	PULM EMBOLSM/INFARCT, NEC	995.91	SIRS DT INFCT-NO ORG DYS
480	VIRAL PNEUMONIA	995.92	SIRS DT INFCT W ORG DYSF
480.0	PNEUMONIA DT ADENOVIRUS	996.4	MECH COMPL-INT ORTHO DEV
480.1	PNEUMONIA DUE TO RSV	996.77	COMP, NEC-INTRN JT PROSTH
480.2	PNEUMON-PARAINFLUENZA VR	996.78	COMP, NEC-ORTHOPD DEV, NEC
480.3	PNEUMONIA DT SARS	997.02	IATROGN C-VSC INFRCT/HEM
480.8	PNEUMONIA DT VIRUS, NEC	997.09	NERVOUS SYST COMPLIC, NEC
480.9	VIRAL PNEUMONIA, NOS	997.1	CARDIAC COMPLICATION, NEC
481	PNEUMOCOCCAL PNEUMONIA	997.3	RESPIR COMPLICATIONS, NEC
482	OTHR BACTERIAL PNEUMONIA	997.4	DIGESTIVE SYST COMPL, NEC
482.0	PNEUMONIA-K. PNEUMONIAE	997.5	URINARY COMPLICATION, NEC
482.1	PNEUMONIA DT PSEUDOMONAS	998.0	POSTOPERATIVE SHOCK, NEC
482.2	PNEUMONIA-H. INFLUENZAE	998.11	HEMORRHAGE COMPLIC PROC
482.3	PNEUMONIA-STREPTOCOCCUS	998.2	ACC PUNCTUR/LAC-PROC, NEC
482.30	PNEUMONIA-STREPTOCOC, NOS	998.3	DISRUPT SURGCL WOUND, NEC

482.31	PNEUMONIA-GROUP A STREP	998.31	DISRUPT INTERNL OP WOUND
482.32	PNEUMONIA-GROUP B STREP	998.32	DISRUPT EXTERNL OP WOUND
482.39	PNEUMONIA DT STREP, NEC	998.59	POSTOPERATIV INFECTN, NEC
482.4	PNEUMONIA-STAPHYLOCOCCUS		

### **Dependent Complications – Back and Neck Surgery (Spinal Fusion)**

<b>Must occur with 997.1 Cardiac Complications</b>			
427.0	PAROXYSMAL SVT	428.23	AC ON CHR SYSTOL HT FAIL
427.1	PAROXYSML VENT TACHYCARD	428.3	DIASTOLIC HEART FAILURE
427.31	ATRIAL FIBRILLATION	428.30	DIASTOLC HEART FAILR, NOS
427.32	ATRIAL FLUTTER	428.31	AC DIASTOL HEART FAILURE
427.89	CARDIAC DYSRHYTHMIAS, NEC	428.33	AC ON CHR DIASTL HT FAIL
428.0	CONGESTIVE HEART FAILURE	428.4	CMB SYST & DIAST HT FAIL
428.1	LEFT HEART FAILURE	428.40	CMB SYS/DIAS HT FAIL, NOS
428.2	SYSTOLIC HEART FAILURE	428.41	AC COMB SYS/DIAS HT FAIL
428.20	SYSTOLC HEART FAILUR, NOS	428.43	AC ON CH SYS/DIA HT FAIL
428.21	AC SYSTOLC HEART FAILURE	428.9	HEART FAILURE, NOS
<b>Must occur with 997.3 Respiratory Complications</b>			
518.0	PULMONARY COLLAPSE		
<b>Must occur with 997.4 Digestive System Complications</b>			
560.1	PARALYTIC ILEUS		
<b>Must occur with 997.5 Urinary Complications</b>			
788.20	RETENTION OF URINE, NOS	788.29	RETENTION OF URINE, NEC

**Major Complications – Back and Neck Surgery (except Spinal Fusion)**

Major Complications – Back and Neck Surgery (except Spinal Fusion)			
292.81	DRUG-INDUCED DELIRIUM	482.89	PNEUMONIA-BACTERIA, NEC
410.01	AMI-ANTEROLATERL-INITIAL	482.9	BACTERIAL PNEUMONIA, NOS
410.11	AMI-ANT WALL, NEC-INITIAL	483	PNEUMONIA-OTHER ORGANISM
410.21	AMI-INFEROLATERL-INITIAL	483.0	PNEUMONIA-M. PNEUMONIAE
410.31	AMI-INFEROPOSTER-INITIAL	483.1	PNEUMONIA DT CHLAMYDIA
410.41	AMI-INF WALL, NEC-INITIAL	483.8	PNEUMONIA DT ORGANISM, NEC
410.51	AMI-LAT WALL, NEC-INITIAL	484	PNEUMONIA-OTH INFECT DIS
410.61	AMI-TRUE POST WL-INITIAL	484.1	PNEUMONIA-CM INCLUSN DIS
410.71	AMI-SUBEND INFRCT-INIT'L	484.3	PNEUMONIA-WHOOPING COUGH
410.81	AMI-SITE, NEC-INITIAL EPI	484.5	PNEUMONIA IN ANTHRAX
410.91	AMI-SITE, NOS-INITIAL EPI	484.6	PNEUMONIA-ASPERGILLOSIS
480	VIRAL PNEUMONIA	484.7	PNEUMON-SYST MYCOSES, NEC
480.0	PNEUMONIA DT ADENOVIRUS	484.8	PNEUMON IN INFCT DIS, NEC
480.1	PNEUMONIA DUE TO RSV	485	BRONCHOPNEUM-ORGNISM, NOS
480.2	PNEUMON-PARAINFLUENZA VR	486	PNEUMONIA-ORGANISM, NOS
480.3	PNEUMONIA DT SARS	507.0	PNEUMONIT-INH FOOD/VOMIT
480.8	PNEUMONIA DT VIRUS, NEC	511.9	PLEURAL EFFUSION, NOS
480.9	VIRAL PNEUMONIA, NOS	518.5	PULM INSUF PST TRAUM/SRG
481	PNEUMOCOCCAL PNEUMONIA	518.81	RESPIRATORY FAILURE
482	OTHR BACTERIAL PNEUMONIA	584.5	AC REN FAIL-LES TUBL, NEC
482.0	PNEUMONIA-K. PNEUMONIAE	584.8	AC REN FAIL-PATH LES, NEC
482.1	PNEUMONIA DT PSEUDOMONAS	584.9	ACUTE RENAL FAILURE, NOS
482.2	PNEUMONIA-H. INFLUENZAE	995.91	SIRS DT INFCT-NO ORG DYS
482.3	PNEUMONIA-STREPTOCOCCUS	995.92	SIRS DT INFCT W ORG DYSF
482.30	PNEUMONIA-STREPTOCOC, NOS	996.4	MECH COMPL-INT ORTHO DEV
482.31	PNEUMONIA-GROUP A STREP	996.77	COMP, NEC-INTRN JT PROSTH
482.32	PNEUMONIA-GROUP B STREP	996.78	COMP, NEC-ORTHOPD DEV, NEC
482.39	PNEUMONIA DT STREP, NEC	997.00	NERVOUS SYST COMPLIC, NOS
482.4	PNEUMONIA-STAPHYLOCOCCUS	997.02	IATROGN C-VSC INFRCT/HEM
482.40	STAPH PNEUMONIA, NOS	997.09	NERVOUS SYST COMPLIC, NEC
482.41	STAPH AUREUS PNEUMONIA	997.1	CARDIAC COMPLICATION, NEC
482.49	STAPH PNEUMONIA, NEC	997.3	RESPIR COMPLICATIONS, NEC
482.8	PNEUMONIA-BACTERIA, NEC	997.4	DIGESTIVE SYST COMPL, NEC
482.81	PNEUMONIA DT ANAEROBES	997.5	URINARY COMPLICATION, NEC
482.82	PNEUMONIA-E. COLI	998.11	HEMORRHAGE COMPLIC PROC
482.83	PNEUMONIA-GRM NG BAC, NEC	998.2	ACC PUNCTUR/LAC-PROC, NEC
482.84	LEGIONNAIRES' DISEASE	998.59	POSTOPERATIV INFECTN, NEC

**Dependent Complications - Back and Neck Surgery (except Spinal Fusion)**

<b>Must occur with 997.1 Cardiac Complications</b>			
427.0	PAROXYSMAL SVT	428.3	DIASTOLIC HEART FAILURE
427.1	PAROXYSML VENT TACHYCARD	428.30	DIASTOLC HEART FAILR, NOS
427.31	ATRIAL FIBRILLATION	428.31	AC DIASTOL HEART FAILURE
427.89	CARDIAC DYSRYTHMIAS, NEC	428.33	AC ON CHR DIASTL HT FAIL
428.0	CONGESTIVE HEART FAILURE	428.4	CMB SYST & DIAST HT FAIL
428.1	LEFT HEART FAILURE	428.40	CMB SYS/DIAS HT FAIL, NOS
428.2	SYSTOLIC HEART FAILURE	428.41	AC COMB SYS/DIAS HT FAIL
428.20	SYSTOLC HEART FAILUR, NOS	428.43	AC ON CH SYS/DIA HT FAIL
428.21	AC SYSTOLC HEART FAILURE	428.9	HEART FAILURE, NOS
428.23	AC ON CHR SYSTOL HT FAIL		
<b>Must occur with 997.4 Digestive System Complications</b>			
560.1	PARALYTIC ILEUS		
<b>Must occur with 997.5 Urinary Complications</b>			
593.9	KIDNEY & URETER DIS, NOS	788.29	RETENTION OF URINE, NEC
788.20	RETENTION OF URINE, NOS		
<b>Must occur with 998.59 Postoperative Infection</b>			
038	SEPTICEMIA	038.40	SEPTICEMIA GRAM-NEGS, NOS
038.0	STREPTOCOCCAL SEPTICEMIA	038.41	SEPTICEMIA-H. INFLUENZAE
038.1	STAPHYLOCOCC SEPTICEMIA	038.42	SEPTICEMIA DT E. COLI
038.10	STAPHLOCOCC SEPTICEM, NOS	038.43	SEPTICEMIA - PSEUDOMONAS
038.11	SEPTICEMIA-STAPH AUREUS	038.44	SEPTICMIA DT SERRATIA
038.19	STAPHLOCOCC SEPTICEM, NEC	038.49	SEPTICEMIA GRAM-NEG, NEC
038.2	PNEUMOCOCCAL SEPTICEMIA	038.8	OTH SPECIFIED SEPTICEMIA
038.3	SEPTICEMIA DT ANAEROBES	038.9	UNSPECIFIED SEPTICEMIA
038.4	SEPTICEMIA GRAM-NEGS, NEC		

**Major Complications – Carotid Endarterectomy**

Major Complications – Carotid Endarterectomy			
410.01	AMI-ANTEROLATERL-INITIAL	482.84	LEGIONNAIRES' DISEASE
410.11	AMI-ANT WALL, NEC-INITIAL	482.89	PNEUMONIA-BACTERIA, NEC
410.21	AMI-INFEROLATERL-INITIAL	482.9	BACTERIAL PNEUMONIA, NOS
410.51	AMI-LAT WALL, NEC-INITIAL	483	PNEUMONIA-OTHER ORGANISM
410.61	AMI-TRUE POST WL-INITIAL	483.0	PNEUMONIA-M. PNEUMONIAE
410.71	AMI-SUBEND INFRCT-INIT'L	483.1	PNEUMONIA DT CHLAMYDIA
410.81	AMI-SITE, NEC-INITIAL EPI	483.8	PNEUMONIA DT ORGANSM, NEC
410.91	AMI-SITE, NOS-INITIAL EPI	484	PNEUMONIA-OTH INFECT DIS
427.5	CARDIAC ARREST	484.1	PNEUMONIA-CM INCLUSN DIS
458.2	IATROGENIC HYPOTENSION	484.3	PNEUMONIA-WHOOPING COUGH
458.29	IATROGENIC HYPOTENSN, NEC	484.5	PNEUMONIA IN ANTHRAX
480	VIRAL PNEUMONIA	484.6	PNEUMONIA-ASPERGILLOSIS
480.0	PNEUMONIA DT ADENOVIRUS	484.7	PNEUMON-SYST MYCOSES, NEC
480.1	PNEUMONIA DUE TO RSV	484.8	PNEUMON IN INFCT DIS, NEC
480.2	PNEUMON-PARAINFLUENZA VR	485	BRONCHOPNEUM-ORGNISM, NOS
480.3	PNEUMONIA DT SARS	486	PNEUMONIA-ORGANISM, NOS
480.8	PNEUMONIA DT VIRUS, NEC	507.0	PNEUMONIT-INH FOOD/VOMIT
480.9	VIRAL PNEUMONIA, NOS	518.5	PULM INSUF PST TRAUM/SRG
481	PNEUMOCOCCAL PNEUMONIA	518.81	RESPIRATORY FAILURE
482	OTHR BACTERIAL PNEUMONIA	780.01	COMA
482.0	PNEUMONIA-K. PNEUMONIAE	951.7	INJURY-HYPOGLOSSAL NERVE
482.1	PNEUMONIA DT PSEUDOMONAS	957.1	NERVE INJURIES, NEC
482.2	PNEUMONIA-H. INFLUENZAE	997.00	NERVOUS SYST COMPLIC, NOS
482.3	PNEUMONIA-STREPTOCOCCUS	997.01	CENTRL NERV SYST COMPLIC
482.30	PNEUMONIA-STREPTOCOC, NOS	997.02	IATROGN C-VSC INFRCT/HEM
482.31	PNEUMONIA-GROUP A STREP	997.09	NERVOUS SYST COMPLIC, NEC
482.32	PNEUMONIA-GROUP B STREP	997.1	CARDIAC COMPLICATION, NEC
482.39	PNEUMONIA DT STREP, NEC	997.3	RESPIR COMPLICATIONS, NEC
482.4	PNEUMONIA-STAPHYLOCOCCUS	997.4	DIGESTIVE SYST COMPL, NEC
482.40	STAPH PNEUMONIA, NOS	997.5	URINARY COMPLICATION, NEC
482.41	STAPH AUREUS PNEUMONIA	997.91	HYPERTENSION AS COMPLIC
482.49	STAPH PNEUMONIA, NEC	998.0	POSTOPERATIVE SHOCK, NEC
482.8	PNEUMONIA-BACTERIA, NEC	998.11	HEMORRHAGE COMPLIC PROC
482.81	PNEUMONIA DT ANAEROBES	998.2	ACC PUNCTUR/LAC-PROC, NEC
482.82	PNEUMONIA-E. COLI	998.59	POSTOPERATIV INFECTN, NEC
482.83	PNEUMONIA-GRM NG BAC, NEC		

**Dependent Complications - Carotid Endarterectomy**

<b>Must occur with 997.09 Nervous System Complications</b>	
434.11 CEREBRAL EMBOLISM-INFRCCT	434.91 CEREBR ART OCCL-INFARCTN
<b>Must occur with 997.1 Cardiac Complications</b>	
427.1 PAROXYSMAL VENT TACHYCARD	428.3 DIASTOLIC HEART FAILURE
427.31 ATRIAL FIBRILLATION	428.30 DIASTOLC HEART FAILR, NOS
427.89 CARDIAC DYSRHYTHMIAS, NEC	428.31 AC DIASTOL HEART FAILURE
428.0 CONGESTIVE HEART FAILURE	428.33 AC ON CHR DIASTL HT FAIL
428.1 LEFT HEART FAILURE	428.4 CMB SYST & DIAST HT FAIL
428.2 SYSTOLIC HEART FAILURE	428.40 CMB SYS/DIAS HT FAIL, NOS
428.20 SYSTOLC HEART FAILUR, NOS	428.41 AC COMB SYS/DIAS HT FAIL
428.21 AC SYSTOLC HEART FAILURE	428.43 AC ON CH SYS/DIA HT FAIL
428.23 AC ON CHR SYSTOL HT FAIL	428.9 HEART FAILURE, NOS
<b>Must occur with 997.4 Digestive System Complications</b>	
560.1 PARALYTIC ILEUS	
<b>Must occur with 997.5 Urinary Complications</b>	
584.5 AC REN FAIL-LES TUBL, NEC	584.9 ACUTE RENAL FAILURE, NOS
584.8 AC REN FAIL-PATH LES, NEC	788.20 RETENTION OF URINE, NOS
<b>Must occur with 998.59 Postoperative Infection</b>	
038 SEPTICEMIA	038.40 SEPTICEMIA GRAM-NEGS, NOS
038.0 STREPTOCOCCAL SEPTICEMIA	038.41 SEPTICEMIA-H. INFLUENZAE
038.1 STAPHYLOCOCC SEPTICEMIA	038.42 SEPTICEMIA DT E. COLI
038.10 STAPHLOCOCC SEPTICEM, NOS	038.43 SEPTICEMIA - PSEUDOMONAS
038.11 SEPTICEMIA-STAPH AUREUS	038.44 SEPTICMIA DT SERRATIA
038.19 STAPHLOCOCC SEPTICEM, NEC	038.49 SEPTICEMIA GRAM-NEG, NEC
038.2 PNEUMOCOCCAL SEPTICEMIA	038.8 OTH SPECIFIED SEPTICEMIA
038.3 SEPTICEMIA DT ANAEROBES	038.9 UNSPECIFIED SEPTICEMIA
038.4 SEPTICEMIA GRAM-NEGS, NEC	

**Major Complications – Cholecystectomy**

Major Complications – Cholecystectomy			
292.81	DRUG-INDUCED DELIRIUM	997.3	RESPIR COMPLICATIONS, NEC
415.11	IATROG PULM EMBOLISM/INF	997.4	DIGESTIVE SYST COMPL, NEC
415.19	PULM EMBOLSM/INFARCT, NEC	997.5	URINARY COMPLICATION, NEC
427.41	VENTRICULAR FIBRILLATION	998.0	POSTOPERATIVE SHOCK, NEC
427.5	CARDIAC ARREST	998.11	HEMORRHAGE COMPLIC PROC
512.1	IATROGENIC PNEUMOTHORAX	998.2	ACC PUNCTUR/LAC-PROC, NEC
518.5	PULM INSUF PST TRAUM/SRG	998.3	DISRUPT SURGCL WOUND, NEC
518.81	RESPIRATORY FAILURE	998.31	DISRUPT INTERNL OP WOUND
996.62	INF/INFLAM VASC DEV/GRFT	998.32	DISRUPT EXTERNL OP WOUND
997.02	IATROGN C-VSC INFRCT/HEM	998.59	POSTOPERATIV INFECTN, NEC
997.1	CARDIAC COMPLICATION, NEC		

**Dependent Complications - Cholecystectomy**

Must occur with 997.1 Cardiac Complications			
427.31	ATRIAL FIBRILLATION	428.9	HEART FAILURE, NOS
428.0	CONGESTIVE HEART FAILURE	427.89	CARDIAC DYSRHYTHMIAS, NEC
428.1	LEFT HEART FAILURE	428.30	DIASTOLC HEART FAILR, NOS
428.2	SYSTOLIC HEART FAILURE	410.01	AMI-ANTEROLATERL-INITIAL
428.20	SYSTOLC HEART FAILUR, NOS	410.11	AMI-ANT WALL, NEC-INITIAL
428.21	AC SYSTOLC HEART FAILURE	410.21	AMI-INFEROLATERL-INITIAL
428.23	AC ON CHR SYSTOL HT FAIL	410.51	AMI-LAT WALL, NEC-INITIAL
428.3	DIASTOLIC HEART FAILURE	410.61	AMI-TRUE POST WL-INITIAL
428.31	AC DIASTOL HEART FAILURE	410.71	AMI-SUBEND INFRCT-INIT'L
428.33	AC ON CHR DIASTL HT FAIL	410.81	AMI-SITE, NEC-INITIAL EPI
428.4	CMB SYST & DIAST HT FAIL	410.91	AMI-SITE, NOS-INITIAL EPI
428.40	CMB SYS/DIAS HT FAIL, NOS	427.0	PAROXYSMAL SVT
428.41	AC COMB SYS/DIAS HT FAIL	427.1	PAROXYSML VENT TACHYCARD
428.43	AC ON CH SYS/DIA HT FAIL	427.32	ATRIAL FLUTTER

**Dependent Complications – Cholecystectomy (continued)**

<b>Must occur with 997.3 Respiratory Complications</b>			
480	VIRAL PNEUMONIA	482.81	PNEUMONIA DT ANAEROBES
480.0	PNEUMONIA DT ADENOVIRUS	482.82	PNEUMONIA-E. COLI
480.1	PNEUMONIA DUE TO RSV	482.83	PNEUMONIA-GRM NG BAC, NEC
480.2	PNEUMON-PARAINFLUENZA VR	482.84	LEGIONNAIRES' DISEASE
480.3	PNEUMONIA DT SARS	482.89	PNEUMONIA-BACTERIA, NEC
480.8	PNEUMONIA DT VIRUS, NEC	482.9	BACTERIAL PNEUMONIA, NOS
480.9	VIRAL PNEUMONIA, NOS	483	PNEUMONIA-OTHER ORGANISM
481	PNEUMOCOCCAL PNEUMONIA	483.0	PNEUMONIA-M. PNEUMONIAE
482	OTHR BACTERIAL PNEUMONIA	483.1	PNEUMONIA DT CHLAMYDIA
482.0	PNEUMONIA-K. PNEUMONIAE	483.8	PNEUMONIA DT ORGANSM, NEC
482.1	PNEUMONIA DT PSEUDOMONAS	484	PNEUMONIA-OTH INFECT DIS
482.2	PNEUMONIA-H. INFLUENZAE	484.1	PNEUMONIA-CM INCLUSN DIS
482.3	PNEUMONIA-STREPTOCOCCUS	484.3	PNEUMONIA-WHOOPING COUGH
482.30	PNEUMONIA-STREPTOCOC, NOS	484.5	PNEUMONIA IN ANTHRAX
482.31	PNEUMONIA-GROUP A STREP	484.6	PNEUMONIA-ASPERGILLOSIS
482.32	PNEUMONIA-GROUP B STREP	484.7	PNEUMON-SYST MYCOSES, NEC
482.39	PNEUMONIA DT STREP, NEC	484.8	PNEUMON IN INFCT DIS, NEC
482.4	PNEUMONIA-STAPHYLOCOCCUS	485	BRONCHOPNEUM-ORGNISM, NOS
482.40	STAPH PNEUMONIA, NOS	486	PNEUMONIA-ORGANISM, NOS
482.41	STAPH AUREUS PNEUMONIA	507.0	PNEUMONIT-INH FOOD/VOMIT
482.49	STAPH PNEUMONIA, NEC	799.0	ASPHYXIA
482.8	PNEUMONIA-BACTERIA, NEC		
<b>Must occur with 997.4 Digestive System Complications</b>			
569.83	PERFORATION OF INTESTINE		
<b>Must occur with 997.5 Urinary Complications</b>			
584.5	AC REN FAIL-LES TUBL, NEC	788.20	RETENTION OF URINE, NOS
584.8	AC REN FAIL-PATH LES, NEC	788.29	RETENTION OF URINE, NEC
584.9	ACUTE RENAL FAILURE, NOS		
<b>Must occur with 998.11 Hemorrhage Complicating a Procedure</b>			
568.81	HEMOPERITONEUM		
<b>Must occur with 998.2 Accidental Puncture or Laceration During a Procedure</b>			
568.81	HEMOPERITONEUM	569.83	PERFORATION OF INTESTINE



**Dependent Complications – Cholecystectomy (continued)**

Must occur with 998.59 Postoperative Infection			
008.45	C. DIFFICILE INTESTN INF	038.40	SEPTICEMIA GRAM-NEGS, NOS
038	SEPTICEMIA	038.41	SEPTICEMIA-H. INFLUENZAE
038.0	STREPTOCOCCAL SEPTICEMIA	038.42	SEPTICEMIA DT E. COLI
038.1	STAPHYLOCOCC SEPTICEMIA	038.43	SEPTICEMIA - PSEUDOMONAS
038.10	STAPHYLOCOCC SEPTICEM, NOS	038.44	SEPTICEMIA DT SERRATIA
038.11	SEPTICEMIA-STAPH AUREUS	038.49	SEPTICEMIA GRAM-NEG, NEC
038.19	STAPHYLOCOCC SEPTICEM, NEC	038.8	OTH SPECIFIED SEPTICEMIA
038.2	PNEUMOCOCCAL SEPTICEMIA	038.9	UNSPECIFIED SEPTICEMIA
038.3	SEPTICEMIA DT ANAEROBES	682.2	CELLULITIS/ABSCESS-TRUNK
038.4	SEPTICEMIA GRAM-NEGS, NEC		

**Major Complications – Hip Fracture Repair**

Major Complications – Hip Fracture Repair			
292.81	DRUG-INDUCED DELIRIUM	997.02	IATROGN C-VSC INFRCT/HEM
415.11	IATROG PULM EMBOLISM/INF	997.1	CARDIAC COMPLICATION, NEC
415.19	PULM EMBOLSM/INFARCT, NEC	997.3	RESPIR COMPLICATIONS, NEC
512.1	IATROGENIC PNEUMOTHORAX	997.4	DIGESTIVE SYST COMPL, NEC
518.5	PULM INSUF PST TRAUM/SRG	997.5	URINARY COMPLICATION, NEC
785.59	SHOCK NEC-NO MENT TRAUMA	998.0	POSTOPERATIVE SHOCK, NEC
996.4	MECH COMPL-INT ORTHO DEV	998.11	HEMORRHAGE COMPLIC PROC
996.77	COMP NEC-INTRN JT PROSTH	998.59	POSTOPERATIV INFECTN, NEC
996.78	COMP NEC-ORTHOPD DEV, NEC		

**Dependent Complications – Hip Fracture Repair**

Must occur with 997.1 Cardiac Complications			
410.01	AMI-ANTEROLATERL-INITIAL	428.2	SYSTOLIC HEART FAILURE
410.11	AMI-ANT WALL, NEC-INITIAL	428.20	SYSTOLC HEART FAILUR, NOS
410.21	AMI-INFEROLATERL-INITIAL	428.21	AC SYSTOLC HEART FAILURE
410.31	AMI-INFEROPOSTER-INITIAL	428.23	AC ON CHR SYSTOL HT FAIL
410.41	AMI-INF WALL, NEC-INITIAL	428.3	DIASTOLIC HEART FAILURE
410.51	AMI-LAT WALL, NEC-INITIAL	428.30	DIASTOLC HEART FAILR, NOS
410.61	AMI-TRUE POST WL-INITIAL	428.31	AC DIASTOL HEART FAILURE
410.71	AMI-SUBEND INFRCT-INIT'L	428.33	AC ON CHR DIASTL HT FAIL
410.81	AMI-SITE, NEC-INITIAL EPI	428.4	CMB SYST & DIAST HT FAIL
410.91	AMI-SITE, NOS-INITIAL EPI	428.40	CMB SYS/DIAS HT FAIL, NOS
427.31	ATRIAL FIBRILLATION	428.41	AC COMB SYS/DIAS HT FAIL
427.89	CARDIAC DYSRYTHMIAS, NEC	428.43	AC ON CH SYS/DIA HT FAIL
428.0	CONGESTIVE HEART FAILURE	428.9	HEART FAILURE, NOS
428.1	LEFT HEART FAILURE		

**Dependent Complications – Hip Fracture Repair (continued)**

<b>Must occur with 997.3 Respiratory Complications</b>			
480	VIRAL PNEUMONIA	482.82	PNEUMONIA-E. COLI
480.0	PNEUMONIA DT ADENOVIRUS	482.83	PNEUMONIA-GRM NG BAC, NEC
480.1	PNEUMONIA DUE TO RSV	482.84	LEGIONNAIRES' DISEASE
480.2	PNEUMON-PARAINFLUENZA VR	482.89	PNEUMONIA-BACTERIA, NEC
480.3	PNEUMONIA DT SARS	482.9	BACTERIAL PNEUMONIA, NOS
480.8	PNEUMONIA DT VIRUS, NEC	483	PNEUMONIA-OTHER ORGANISM
480.9	VIRAL PNEUMONIA, NOS	483.0	PNEUMONIA-M. PNEUMONIAE
481	PNEUMOCOCCAL PNEUMONIA	483.1	PNEUMONIA DT CHLAMYDIA
482	OTHR BACTERIAL PNEUMONIA	483.8	PNEUMONIA DT ORGANSM, NEC
482.0	PNEUMONIA-K. PNEUMONIAE	484	PNEUMONIA-OTH INFECT DIS
482.1	PNEUMONIA DT PSEUDOMONAS	484.1	PNEUMONIA-CM INCLUSN DIS
482.2	PNEUMONIA-H. INFLUENZAE	484.3	PNEUMONIA-WHOOPING COUGH
482.3	PNEUMONIA-STREPTOCOCCUS	484.5	PNEUMONIA IN ANTHRAX
482.30	PNEUMONIA-STREPTOCOC, NOS	484.6	PNEUMONIA-ASPERGILLOSIS
482.31	PNEUMONIA-GROUP A STREP	484.7	PNEUMON-SYST MYCOSES, NEC
482.32	PNEUMONIA-GROUP B STREP	484.8	PNEUMON IN INFCT DIS, NEC
482.39	PNEUMONIA DT STREP, NEC	485	BRONCHOPNEUM-ORGNISM, NOS
482.4	PNEUMONIA-STAPHYLOCOCCUS	486	PNEUMONIA-ORGANISM, NOS
482.40	STAPH PNEUMONIA, NOS	507.0	PNEUMONIT-INH FOOD/VOMIT
482.41	STAPH AUREUS PNEUMONIA	518.81	RESPIRATORY FAILURE
482.49	STAPH PNEUMONIA, NEC	518.82	OTH PULMONARY INSUFF, NEC
482.8	PNEUMONIA-BACTERIA, NEC	518.84	AC & CHRON RESP FAILURE
482.81	PNEUMONIA DT ANAEROBES		
<b>Must occur with 997.4 Digestive System Complications</b>			
560.1	PARALYTIC ILEUS		
<b>Must occur with 997.5 Urinary Complications</b>			
584.5	AC REN FAIL-LES TUBL, NEC	584.9	ACUTE RENAL FAILURE, NOS
584.8	AC REN FAIL-PATH LES, NEC	788.20	RETENTION OF URINE, NOS
593.9	KIDNEY & URETER DIS, NOS		
<b>Must occur with 998.59 Postoperative Infection</b>			
008.45	C. DIFFICILE INTESTN INF	038.41	SEPTICEMIA-H. INFLUENZAE
038	SEPTICEMIA	038.42	SEPTICEMIA DT E. COLI
038.0	STREPTOCOCCAL SEPTICEMIA	038.43	SEPTICEMIA - PSEUDOMONAS
038.1	STAPHYLOCOCC SEPTICEMIA	038.44	SEPTICEMIA DT SERRATIA
038.10	STAPHLOCOCC SEPTICEM, NOS	038.49	SEPTICEMIA GRAM-NEG, NEC
038.11	SEPTICEMIA-STAPH AUREUS	038.8	OTH SPECIFIED SEPTICEMIA
038.19	STAPHLOCOCC SEPTICEM, NEC	038.9	UNSPECIFIED SEPTICEMIA
038.2	PNEUMOCOCCAL SEPTICEMIA	041.4	E. COLI INF IN OTHER DIS
038.3	SEPTICEMIA DT ANAEROBES	785.52	SEPTIC SHOCK
038.4	SEPTICEMIA GRAM-NEGS, NEC	995.91	SIRS DT INFCT-NO ORG DYS
038.40	SEPTICEMIA GRAM-NEGS, NOS		

**Major Complications – Partial Hip Replacement**

Major Complications – Partial Hip Replacement			
292.81	DRUG-INDUCED DELIRIUM	996.78	COMP, NEC-ORTHOPD DEV, NEC
293.0	DELIRIUM DT CONDITNS, NEC	997.02	IATROGN C-VSC INFRCT/HEM
415.11	IATROG PULM EMBOLISM/INF	997.1	CARDIAC COMPLICATION, NEC
415.19	PULM EMBOLSM/INFARCT, NEC	997.3	RESPIR COMPLICATIONS, NEC
512.1	IATROGENIC PNEUMOTHORAX	997.4	DIGESTIVE SYST COMPL, NEC
518.5	PULM INSUF PST TRAUM/SRG	997.5	URINARY COMPLICATION, NEC
785.59	SHOCK, NEC-NO MENT TRAUMA	998.0	POSTOPERATIVE SHOCK, NEC
996.4	MECH COMPL-INT ORTHO DEV	998.11	HEMORRHAGE COMPLIC PROC
996.77	COMP, NEC-INTRN JT PROSTH	998.59	POSTOPERATIV INFECTN, NEC

**Dependent Complications – Partial Hip Replacement**

Must occur with 997.1 Cardiac Complications			
410.01	AMI-ANTEROLATERL-INITIAL	428.1	LEFT HEART FAILURE
410.11	AMI-ANT WALL, NEC-INITIAL	428.2	SYSTOLIC HEART FAILURE
410.21	AMI-INFEROLATERL-INITIAL	428.20	SYSTOLC HEART FAILUR, NOS
410.31	AMI-INFEROPOSTER-INITIAL	428.21	AC SYSTOLC HEART FAILURE
410.41	AMI-INF WALL, NEC-INITIAL	428.23	AC ON CHR SYSTOL HT FAIL
410.51	AMI-LAT WALL, NEC-INITIAL	428.3	DIASTOLIC HEART FAILURE
410.61	AMI-TRUE POST WL-INITIAL	428.30	DIASTOLC HEART FAILR, NOS
410.71	AMI-SUBEND INFRCT-INIT'L	428.31	AC DIASTOL HEART FAILURE
410.81	AMI-SITE, NEC-INITIAL EPI	428.33	AC ON CHR DIASTL HT FAIL
410.91	AMI-SITE, NOS-INITIAL EPI	428.4	CMB SYST & DIAST HT FAIL
427.0	PAROXYSMAL SVT	428.40	CMB SYS/DIAS HT FAIL, NOS
427.1	PAROXYSMAL VENT TACHYCARD	428.41	AC COMB SYS/DIAS HT FAIL
427.31	ATRIAL FIBRILLATION	428.43	AC ON CH SYS/DIA HT FAIL
427.89	CARDIAC DYSRYTHMIAS, NEC	428.9	HEART FAILURE, NOS
428.0	CONGESTIVE HEART FAILURE	593.9	KIDNEY & URETER DIS, NOS

**Dependent Complications – Partial Hip Replacement (continued)**

<b>Must occur with 997.3 Respiratory Complications</b>			
480	VIRAL PNEUMONIA	482.82	PNEUMONIA-E. COLI
480.0	PNEUMONIA DT ADENOVIRUS	482.83	PNEUMONIA-GRM NG BAC, NEC
480.1	PNEUMONIA DUE TO RSV	482.84	LEGIONNAIRES' DISEASE
480.2	PNEUMON-PARAINFLUENZA VR	482.89	PNEUMONIA-BACTERIA, NEC
480.3	PNEUMONIA DT SARS	482.9	BACTERIAL PNEUMONIA, NOS
480.8	PNEUMONIA DT VIRUS, NEC	483	PNEUMONIA-OTHER ORGANISM
480.9	VIRAL PNEUMONIA, NOS	483.0	PNEUMONIA-M. PNEUMONIAE
481	PNEUMOCOCCAL PNEUMONIA	483.1	PNEUMONIA DT CHLAMYDIA
482	OTHR BACTERIAL PNEUMONIA	483.8	PNEUMONIA DT ORGANSM, NEC
482.0	PNEUMONIA-K. PNEUMONIAE	484	PNEUMONIA-OTH INFECT DIS
482.1	PNEUMONIA DT PSEUDOMONAS	484.1	PNEUMONIA-CM INCLUSN DIS
482.2	PNEUMONIA-H. INFLUENZAE	484.3	PNEUMONIA-WHOOPING COUGH
482.3	PNEUMONIA-STREPTOCOCCUS	484.5	PNEUMONIA IN ANTHRAX
482.30	PNEUMONIA-STREPTOCOC, NOS	484.6	PNEUMONIA-ASPERGILLOSIS
482.31	PNEUMONIA-GROUP A STREP	484.7	PNEUMON-SYST MYCOSES, NEC
482.32	PNEUMONIA-GROUP B STREP	484.8	PNEUMON IN INFCT DIS, NEC
482.39	PNEUMONIA DT STREP, NEC	485	BRONCHOPNEUM-ORGNISM, NOS
482.4	PNEUMONIA-STAPHYLOCOCCUS	486	PNEUMONIA-ORGANISM, NOS
482.40	STAPH PNEUMONIA, NOS	507.0	PNEUMONIT-INH FOOD/VOMIT
482.41	STAPH AUREUS PNEUMONIA	518.81	RESPIRATORY FAILURE
482.49	STAPH PNEUMONIA, NEC	518.82	OTH PULMONARY INSUFF, NEC
482.8	PNEUMONIA-BACTERIA, NEC	518.84	AC & CHRON RESP FAILURE
482.81	PNEUMONIA DT ANAEROBES		
<b>Must occur with 997.4 Digestive System Complications</b>			
560.1	PARALYTIC ILEUS		
<b>Must occur with 997.5 Urinary Complications</b>			
584.5	AC REN FAIL-LES TUBL, NEC	584.9	ACUTE RENAL FAILURE, NOS
584.8	AC REN FAIL-PATH LES, NEC	788.20	RETENTION OF URINE, NOS
<b>Must occur with 998.59 Postoperative Infection</b>			
038	SEPTICEMIA	038.41	SEPTICEMIA-H. INFLUENZAE
038.0	STREPTOCOCCAL SEPTICEMIA	038.42	SEPTICEMIA DT E. COLI
038.1	STAPHYLOCOCC SEPTICEMIA	038.43	SEPTICEMIA - PSEUDOMONAS
038.10	STAPHLOCOCC SEPTICEM, NOS	038.44	SEPTICEMIA DT SERRATIA
038.11	SEPTICEMIA-STAPH AUREUS	038.49	SEPTICEMIA GRAM-NEG, NEC
038.19	STAPHLOCOCC SEPTICEM, NEC	038.8	OTH SPECIFIED SEPTICEMIA
038.2	PNEUMOCOCCAL SEPTICEMIA	038.9	UNSPECIFIED SEPTICEMIA
038.3	SEPTICEMIA DT ANAEROBES	041.4	E. COLI INF IN OTHER DIS
038.4	SEPTICEMIA GRAM-NEGS, NEC	785.52	SEPTIC SHOCK
038.40	SEPTICEMIA GRAM-NEGS, NOS	995.91	SIRS DT INFCT-NO ORG DYS

**Major Complications – Peripheral Vascular Bypass**

Major Complications – Peripheral Vascular Bypass			
518.5	PULM INSUF PST TRAUM/SRG	997.5	URINARY COMPLICATION, NEC
518.81	RESPIRATORY FAILURE	998.0	POSTOPERATIVE SHOCK, NEC
996.74	COMP, NEC-VASC DEV/GRAFT	998.11	HEMORRHAGE COMPLIC PROC
997.1	CARDIAC COMPLICATION, NEC	998.2	ACC PUNCTUR/LAC-PROC, NEC
997.3	RESPIR COMPLICATIONS, NEC	998.59	POSTOPERATIV INFECTN, NEC
997.4	DIGESTIVE SYST COMPL, NEC		
Must occur with 997.1 Cardiac Complications			
427.1	PAROXYSMAL VENT TACHYCARD	428.40	CMB SYS/DIAS HT FAIL, NOS
427.31	ATRIAL FIBRILLATION	428.41	AC COMB SYS/DIAS HT FAIL
427.89	CARDIAC DYSRHYTHMIAS, NEC	428.43	AC ON CH SYS/DIA HT FAIL
428.0	CONGESTIVE HEART FAILURE	428.9	HEART FAILURE, NOS
428.1	LEFT HEART FAILURE	428.31	AC DIASTOL HEART FAILURE
428.2	SYSTOLIC HEART FAILURE	410.01	AMI-ANTEROLATERL-INITIAL
428.20	SYSTOLC HEART FAILUR, NOS	410.11	AMI-ANT WALL, NEC-INITIAL
428.21	AC SYSTOLC HEART FAILURE	410.21	AMI-INFEROLATERL-INITIAL
428.23	AC ON CHR SYSTOL HT FAIL	410.51	AMI-LAT WALL, NEC-INITIAL
428.3	DIASTOLIC HEART FAILURE	410.61	AMI-TRUE POST WL-INITIAL
428.30	DIASTOLC HEART FAILR, NOS	410.71	AMI-SUBEND INFRCT-INIT'L
428.33	AC ON CHR DIASTL HT FAIL	410.81	AMI-SITE, NEC-INITIAL EPI
428.4	CMB SYST & DIAST HT FAIL	410.91	AMI-SITE, NOS-INITIAL EPI

**Dependent Complications – Peripheral Vascular Bypass**

Must occur with 997.3 Respiratory Complications			
480	VIRAL PNEUMONIA	482.8	PNEUMONIA-BACTERIA, NEC
480.0	PNEUMONIA DT ADENOVIRUS	482.81	PNEUMONIA DT ANAEROBES
480.1	PNEUMONIA DUE TO RSV	482.82	PNEUMONIA-E. COLI
480.2	PNEUMON-PARAINFLUENZA VR	482.83	PNEUMONIA-GRM NG BAC, NEC
480.3	PNEUMONIA DT SARS	482.84	LEGIONNAIRES' DISEASE
480.8	PNEUMONIA DT VIRUS, NEC	482.89	PNEUMONIA-BACTERIA, NEC
480.9	VIRAL PNEUMONIA, NOS	482.9	BACTERIAL PNEUMONIA, NOS
481	PNEUMOCOCCAL PNEUMONIA	483	PNEUMONIA-OTHER ORGANISM
482	OTHR BACTERIAL PNEUMONIA	483.0	PNEUMONIA-M. PNEUMONIAE
482.0	PNEUMONIA-K. PNEUMONIAE	483.1	PNEUMONIA DT CHLAMYDIA
482.1	PNEUMONIA DT PSEUDOMONAS	483.8	PNEUMONIA DT ORGANISM, NEC
482.2	PNEUMONIA-H. INFLUENZAE	484	PNEUMONIA-OTH INFECT DIS
482.3	PNEUMONIA-STREPTOCOCCUS	484.1	PNEUMONIA-CM INCLUSN DIS
482.30	PNEUMONIA-STREPTOCOC, NOS	484.3	PNEUMONIA-WHOOPING COUGH
482.31	PNEUMONIA-GROUP A STREP	484.5	PNEUMONIA IN ANTHRAX
482.32	PNEUMONIA-GROUP B STREP	484.6	PNEUMONIA-ASPERGILLOSIS
482.39	PNEUMONIA DT STREP, NEC	484.7	PNEUMON-SYST MYCOSES, NEC
482.4	PNEUMONIA-STAPHYLOCOCCUS	484.8	PNEUMON IN INFCT DIS, NEC
482.40	STAPH PNEUMONIA, NOS	485	BRONCHOPNEUM-ORGNISM, NOS
482.41	STAPH AUREUS PNEUMONIA	486	PNEUMONIA-ORGANISM, NOS
482.49	STAPH PNEUMONIA, NEC	507.0	PNEUMONIT-INH FOOD/VOMIT

**Dependent Complications – Peripheral Vascular Bypass (continued)**

Must occur with 997.4 Digestive System Complications			
560.1	PARALYTIC ILEUS		
Must occur with 997.5 Urinary Complications			
584.5	AC REN FAIL-LES TUBL, NEC	593.9	KIDNEY & URETER DIS, NOS
584.8	AC REN FAIL-PATH LES, NEC	788.20	RETENTION OF URINE, NOS
584.9	ACUTE RENAL FAILURE, NOS		
Must occur with 998.51 Infected Postoperative Seroma			
041.04	BACTR INF DT GRP D STREP	041.7	PSEUDOMONAS IN OTHER DIS
041.11	BACTERL INF DT S. AUREUS		
Must occur with 998.59 Postoperative Infection			
008.45	C. DIFFICILE INTESTN INF	038.41	SEPTICEMIA-H. INFLUENZAE
038	SEPTICEMIA	038.42	SEPTICEMIA DT E. COLI
038.0	STREPTOCOCCAL SEPTICEMIA	038.43	SEPTICEMIA - PSEUDOMONAS
038.1	STAPHYLOCOCC SEPTICEMIA	038.44	SEPTICEMIA DT SERRATIA
038.10	STAPHLOCOCC SEPTICEM, NOS	038.49	SEPTICEMIA GRAM-NEG, NEC
038.11	SEPTICEMIA-STAPH AUREUS	038.8	OTH SPECIFIED SEPTICEMIA
038.19	STAPHLOCOCC SEPTICEM, NEC	038.9	UNSPECIFIED SEPTICEMIA
038.2	PNEUMOCOCCAL SEPTICEMIA	041.04	BACTR INF DT GRP D STREP
038.3	SEPTICEMIA DT ANAEROBES	041.11	BACTERL INF DT S. AUREUS
038.4	SEPTICEMIA GRAM-NEGS, NEC	041.7	PSEUDOMONAS IN OTHER DIS
038.40	SEPTICEMIA GRAM-NEGS, NOS	995.92	SIRS DT INFCT W ORG DYSF

**Major Complications – Prostatectomy**

Major Complications – Prostatectomy			
008.45	C. DIFFICILE INTESTN INF	507.0	PNEUMONIT-INH FOOD/VOMIT
410.01	AMI-ANTEROLATERL-INITIAL	518.5	PULM INSUF PST TRAUM/SRG
410.11	AMI-ANT WALL NEC-INITIAL	518.81	RESPIRATORY FAILURE
410.21	AMI-INFEROLATERL-INITIAL	996.76	COMP NEC-GU DEV/IMP/GRFT
410.51	AMI-LAT WALL NEC-INITIAL	997.1	CARDIAC COMPLICATION NEC
410.61	AMI-TRUE POST WL-INITIAL	997.3	RESPIR COMPLICATIONS NEC
410.71	AMI-SUBEND INFRCT-INIT'L	997.4	DIGESTIVE SYST COMPL NEC
410.81	AMI-SITE NEC-INITIAL EPI	997.5	URINARY COMPLICATION NEC
410.91	AMI-SITE NOS-INITIAL EPI	998.11	HEMORRHAGE COMPLIC PROC
427.1	PAROXYSM VENT TACHYCARD	998.2	ACC PUNCTUR/LAC-PROC NEC
427.5	CARDIAC ARREST		

**Dependent Complications – Prostatectomy**

<b>Must occur with 997.1 Cardiac Complications</b>			
427.31	ATRIAL FIBRILLATION	428.30	DIASTOLC HEART FAILR NOS
427.89	CARDIAC DYSRYTHMIAS NEC	428.31	AC DIASTOL HEART FAILURE
428.0	CONGESTIVE HEART FAILURE	428.33	AC ON CHR DIASTL HT FAIL
428.1	LEFT HEART FAILURE	428.4	CMB SYST & DIAST HT FAIL
428.2	SYSTOLIC HEART FAILURE	428.40	CMB SYS/DIAS HT FAIL NOS
428.20	SYSTOLC HEART FAILUR NOS	428.41	AC COMB SYS/DIAS HT FAIL
428.21	AC SYSTOLC HEART FAILURE	428.43	AC ON CH SYS/DIA HT FAIL
428.23	AC ON CHR SYSTOL HT FAIL	428.9	HEART FAILURE, NOS
428.3	DIASTOLIC HEART FAILURE		
<b>Must occur with 997.3 Respiratory Complications</b>			
480	VIRAL PNEUMONIA	482.8	PNEUMONIA-BACTERIA, NEC
480.0	PNEUMONIA DT ADENOVIRUS	482.81	PNEUMONIA DT ANAEROBES
480.1	PNEUMONIA DUE TO RSV	482.82	PNEUMONIA-E. COLI
480.2	PNEUMON-PARAINFLUENZA VR	482.83	PNEUMONIA-GRM NG BAC, NEC
480.3	PNEUMONIA DT SARS	482.84	LEGIONNAIRES' DISEASE
480.8	PNEUMONIA DT VIRUS, NEC	482.89	PNEUMONIA-BACTERIA, NEC
480.9	VIRAL PNEUMONIA, NOS	482.9	BACTERIAL PNEUMONIA, NOS
481	PNEUMOCOCCAL PNEUMONIA	483	PNEUMONIA-OTHER ORGANISM
482	OTHR BACTERIAL PNEUMONIA	483.0	PNEUMONIA-M. PNEUMONIAE
482.0	PNEUMONIA-K. PNEUMONIAE	483.1	PNEUMONIA DT CHLAMYDIA
482.1	PNEUMONIA DT PSEUDOMONAS	483.8	PNEUMONIA DT ORGANSM, NEC
482.2	PNEUMONIA-H. INFLUENZAE	484	PNEUMONIA-OTH INFECT DIS
482.3	PNEUMONIA-STREPTOCOCCUS	484.1	PNEUMONIA-CM INCLUSN DIS
482.30	PNEUMONIA-STREPTOCOC, NOS	484.3	PNEUMONIA-WHOOPING COUGH
482.31	PNEUMONIA-GROUP A STREP	484.5	PNEUMONIA IN ANTHRAX
482.32	PNEUMONIA-GROUP B STREP	484.6	PNEUMONIA-ASPERGILLOSIS
482.39	PNEUMONIA DT STREP, NEC	484.7	PNEUMON-SYST MYCOSES, NEC
482.4	PNEUMONIA-STAPHYLOCOCCUS	484.8	PNEUMON IN INFCT DIS, NEC
482.40	STAPH PNEUMONIA, NOS	485	BRONCHOPNEUM-ORGNISM, NOS
482.41	STAPH AUREUS PNEUMONIA	486	PNEUMONIA-ORGANISM, NOS
482.49	STAPH PNEUMONIA, NEC		
<b>Must occur with 997.4 Digestive Complications</b>			
560.1	PARALYTIC ILEUS		
<b>Must occur with 997.5 Urinary Complications</b>			
584.5	AC REN FAIL-LES TUBL, NEC	584.9	ACUTE RENAL FAILURE, NOS
584.8	AC REN FAIL-PATH LES, NEC		

**Dependent Complications – Prostatectomy (continued)**

Must occur with 998.59 Postoperative Infection			
038	SEPTICEMIA	038.40	SEPTICEMIA GRAM-NEGS, NOS
038.0	STREPTOCOCCAL SEPTICEMIA	038.41	SEPTICEMIA-H. INFLUENZAE
038.1	STAPHYLOCOCCAL SEPTICEMIA	038.42	SEPTICEMIA DT E. COLI
038.10	STAPHYLOCOCC SEPTICEM, NOS	038.43	SEPTICEMIA - PSEUDOMONAS
038.11	SEPTICEMIA-STAPH AUREUS	038.44	SEPTICEMIA DT SERRATIA
038.19	STAPHYLOCOCC SEPTICEM, NEC	038.49	SEPTICEMIA GRAM-NEG, NEC
038.2	PNEUMOCOCCAL SEPTICEMIA	038.8	OTH SPECIFIED SEPTICEMIA
038.3	SEPTICEMIA DT ANAEROBES	038.9	UNSPECIFIED SEPTICEMIA
038.4	SEPTICEMIA GRAM-NEGS, NEC		



**Major Complications – Total Hip Replacement**

Major Complications – Total Hip Replacement			
292.81	DRUG-INDUCED DELIRIUM	483.0	PNEUMONIA-M. PNEUMONIAE
410.01	AMI-ANTEROLATERL-INITIAL	483.1	PNEUMONIA DT CHLAMYDIA
410.11	AMI-ANT WALL NEC-INITIAL	483.8	PNEUMONIA DT ORGANISM NEC
410.21	AMI-INFEROLATERL-INITIAL	484	PNEUMONIA-OTH INFECT DIS
410.31	AMI-INFEROPOSTER-INITIAL	484.1	PNEUMONIA-CM INCLUSN DIS
410.41	AMI-INF WALL NEC-INITIAL	484.3	PNEUMONIA-WHOOPING COUGH
410.51	AMI-LAT WALL NEC-INITIAL	484.5	PNEUMONIA IN ANTHRAX
410.61	AMI-TRUE POST WL-INITIAL	484.6	PNEUMONIA-ASPERGILLOSIS
410.71	AMI-SUBEND INFRCT-INIT'L	484.7	PNEUMON-SYST MYCOSES NEC
410.81	AMI-SITE NEC-INITIAL EPI	484.8	PNEUMON IN INFCT DIS NEC
410.91	AMI-SITE NOS-INITIAL EPI	485	BRONCHOPNEUM-ORGNISM NOS
415.11	IATROG PULM EMBOLISM/INF	486	PNEUMONIA-ORGANISM NOS
480	VIRAL PNEUMONIA	507.0	PNEUMONIT-INH FOOD/VOMIT
480.0	PNEUMONIA DT ADENOVIRUS	518.5	PULM INSUF PST TRAUM/SRG
480.1	PNEUMONIA DUE TO RSV	518.81	RESPIRATORY FAILURE
480.2	PNEUMON-PARAINFLUENZA VR	584.5	AC REN FAIL-LES TUBL NEC
480.3	PNEUMONIA DT SARS	584.8	AC REN FAIL-PATH LES NEC
480.8	PNEUMONIA DT VIRUS NEC	584.9	ACUTE RENAL FAILURE, NOS
480.9	VIRAL PNEUMONIA, NOS	707.0	DECUBITUS ULCER
481	PNEUMOCOCCAL PNEUMONIA	707.00	DECUBITUS ULCER NOS
482	OTHR BACTERIAL PNEUMONIA	707.01	DECUBITUS ULCER-ELBOW
482.0	PNEUMONIA-K. PNEUMONIAE	707.02	DECUBITUS ULCER-UP BACK
482.1	PNEUMONIA DT PSEUDOMONAS	707.03	DECUBITUS ULCER-LO BACK
482.2	PNEUMONIA-H. INFLUENZAE	707.04	DECUBITUS ULCER-HIP
482.3	PNEUMONIA-STREPTOCOCCUS	707.05	DECUBITUS ULCER-BUTTOCK
482.30	PNEUMONIA-STREPTOCOC NOS	707.06	DECUBITUS ULCER-ANKLE
482.31	PNEUMONIA-GROUP A STREP	707.07	DECUBITUS ULCER-HEEL
482.32	PNEUMONIA-GROUP B STREP	707.09	DECUBITUS ULCER NEC
482.39	PNEUMONIA DT STREP NEC	799.1	RESPIRATORY ARREST
482.4	PNEUMONIA-STAPHYLOCOCCUS	995.92	SIRS DT INFCT W ORG DYSF
482.40	STAPH PNEUMONIA NOS	996.4	MECH COMPL-INT ORTHO DEV
482.41	STAPH AUREUS PNEUMONIA	996.77	COMP NEC-INTRN JT PROSTH
482.49	STAPH PNEUMONIA NEC	996.78	COMP NEC-ORTHO PD DEV NEC
482.8	PNEUMONIA-BACTERIA NEC	997.02	IATROGN C-VSC INFRCT/HEM
482.81	PNEUMONIA DT ANAEROBES	997.1	CARDIAC COMPLICATION NEC
482.82	PNEUMONIA-E. COLI	997.3	RESPIR COMPLICATIONS NEC
482.83	PNEUMONIA-GRM NG BAC NEC	997.4	DIGESTIVE SYST COMPL NEC
482.84	LEGIONNAIRES' DISEASE	997.5	URINARY COMPLICATION NEC
482.89	PNEUMONIA-BACTERIA NEC	998.0	POSTOPERATIVE SHOCK NEC
482.9	BACTERIAL PNEUMONIA, NOS	998.11	HEMORRHAGE COMPLIC PROC
483	PNEUMONIA-OTHER ORGANISM	998.59	POSTOPERATIV INFECTN NEC

**Dependent Complications – Total Hip Replacement**

<b>Must occur with 997.1 Cardiac Complications</b>			
427.31	ATRIAL FIBRILLATION	428.31	AC DIASTOL HEART FAILURE
427.89	CARDIAC DYSRYTHMIAS, NEC	428.33	AC ON CHR DIASTL HT FAIL
428.0	CONGESTIVE HEART FAILURE	428.4	CMB SYST & DIAST HT FAIL
428.1	LEFT HEART FAILURE	428.40	CMB SYS/DIAS HT FAIL, NOS
428.2	SYSTOLIC HEART FAILURE	428.41	AC COMB SYS/DIAS HT FAIL
428.20	SYSTOLC HEART FAILUR, NOS	428.43	AC ON CH SYS/DIA HT FAIL
428.21	AC SYSTOLC HEART FAILURE	427.0	PAROXYSMAL SVT
428.23	AC ON CHR SYSTOL HT FAIL	427.1	PAROXYSML VENT TACHYCARD
428.3	DIASTOLIC HEART FAILURE	428.9	HEART FAILURE, NOS
428.30	DIASTOLC HEART FAILR, NOS		
<b>Must occur with 997.4 Digestive Complications</b>			
560.1	PARALYTIC ILEUS		
<b>Must occur with 997.5 Urinary Complications</b>			
593.9	KIDNEY & URETER DIS, NOS	788.20	RETENTION OF URINE, NOS
599.0	URINARY TRACT INFECT, NOS	788.29	RETENTION OF URINE, NEC
<b>Must occur with 998.59 Postoperative Infection</b>			
038	SEPTICEMIA	038.40	SEPTICEMIA GRAM-NEGS, NOS
038.0	STREPTOCOCCAL SEPTICEMIA	038.41	SEPTICEMIA-H. INFLUENZAE
038.1	STAPHYLOCOCC SEPTICEMIA	038.42	SEPTICEMIA DT E. COLI
038.10	STAPHLOCOCC SEPTICEM, NOS	038.43	SEPTICEMIA - PSEUDOMONAS
038.11	SEPTICEMIA-STAPH AUREUS	038.44	SEPTICMIA DT SERRATIA
038.19	STAPHLOCOCC SEPTICEM, NEC	038.49	SEPTICEMIA GRAM-NEG, NEC
038.2	PNEUMOCOCCAL SEPTICEMIA	038.8	OTH SPECIFIED SEPTICEMIA
038.3	SEPTICEMIA DT ANAEROBES	038.9	UNSPECIFIED SEPTICEMIA
038.4	SEPTICEMIA GRAM-NEGS, NEC		

**Major Complications – Total Knee Replacement**

Major Complications – Total Knee Replacement	
292.81	DRUG-INDUCED DELIRIUM
410.01	AMI-ANTEROLATERL-INITIAL
410.11	AMI-ANT WALL, NEC-INITIAL
410.21	AMI-INFEROLATERL-INITIAL
410.31	AMI-INFEROPOSTER-INITIAL
410.41	AMI-INF WALL, NEC-INITIAL
410.51	AMI-LAT WALL, NEC-INITIAL
410.61	AMI-TRUE POST WL-INITIAL
410.71	AMI-SUBEND INFRCT-INIT'L
410.81	AMI-SITE, NEC-INITIAL EPI
410.91	AMI-SITE, NOS-INITIAL EPI
415.11	IATROG PULM EMBOLISM/INF
415.19	PULM EMBOLSM/INFARCT, NEC
480	VIRAL PNEUMONIA
480.0	PNEUMONIA DT ADENOVIRUS
480.1	PNEUMONIA DUE TO RSV
480.2	PNEUMON-PARAINFLUENZA VR
480.3	PNEUMONIA DT SARS
480.8	PNEUMONIA DT VIRUS, NEC
480.9	VIRAL PNEUMONIA, NOS
481	PNEUMOCOCCAL PNEUMONIA
482	OTHR BACTERIAL PNEUMONIA
482.0	PNEUMONIA-K. PNEUMONIAE
482.1	PNEUMONIA DT PSEUDOMONAS
482.2	PNEUMONIA-H. INFLUENZAE
482.3	PNEUMONIA-STREPTOCOCCUS
482.30	PNEUMONIA-STREPTOCOC, NOS
482.31	PNEUMONIA-GROUP A STREP
482.32	PNEUMONIA-GROUP B STREP
482.39	PNEUMONIA DT STREP, NEC
482.4	PNEUMONIA-STAPHYLOCOCCUS
482.40	STAPH PNEUMONIA, NOS
482.41	STAPH AUREUS PNEUMONIA
482.49	STAPH PNEUMONIA, NEC
482.8	PNEUMONIA-BACTERIA, NEC
482.81	PNEUMONIA DT ANAEROBES
482.82	PNEUMONIA-E. COLI
482.83	PNEUMONIA-GRM NG BAC, NEC
482.84	LEGIONNAIRES' DISEASE
482.89	PNEUMONIA-BACTERIA, NEC
482.9	BACTERIAL PNEUMONIA, NOS
483	PNEUMONIA-OTHER ORGANISM
483.0	PNEUMONIA-M. PNEUMONIAE
483.1	PNEUMONIA DT CHLAMYDIA
483.8	PNEUMONIA DT ORGANISM, NEC
484	PNEUMONIA-OTH INFECT DIS
484.1	PNEUMONIA-CM INCLUSN DIS
484.3	PNEUMONIA-WHOOPING COUGH
484.5	PNEUMONIA IN ANTHRAX
484.6	PNEUMONIA-ASPERGILLOSIS
484.7	PNEUMON-SYST MYCOSES, NEC
484.8	PNEUMON IN INFCT DIS, NEC
485	BRONCHOPNEUM-ORGNISM, NOS
486	PNEUMONIA-ORGANISM, NOS
507.0	PNEUMONIT-INH FOOD/VOMIT
518.5	PULM INSUF PST TRAUM/SRG
518.81	RESPIRATORY FAILURE
584.5	AC REN FAIL-LES TUBL, NEC
584.8	AC REN FAIL-PATH LES, NEC
584.9	ACUTE RENAL FAILURE, NOS
707.0	DECUBITUS ULCER
707.00	DECUBITUS ULCER, NOS
707.01	DECUBITUS ULCER-ELBOW
707.02	DECUBITUS ULCER-UP BACK
707.03	DECUBITUS ULCER-LO BACK
707.04	DECUBITUS ULCER-HIP
707.05	DECUBITUS ULCER-BUTTOCK
707.06	DECUBITUS ULCER-ANKLE
707.07	DECUBITUS ULCER-HEEL
707.09	DECUBITUS ULCER, NEC
799.1	RESPIRATORY ARREST
995.92	SIRS DT INFCT W ORG DYSF
996.4	MECH COMPL-INT ORTHO DEV
996.77	COMP, NEC-INTRN JT PROSTH
996.78	COMP, NEC-ORTHOPD DEV, NEC
997.02	IATROGN C-VSC INFRCT/HEM
997.1	CARDIAC COMPLICATION, NEC
997.3	RESPIR COMPLICATIONS, NEC
997.4	DIGESTIVE SYST COMPL, NEC
997.5	URINARY COMPLICATION, NEC
998.0	POSTOPERATIVE SHOCK, NEC
998.11	HEMORRHAGE COMPLIC PROC
998.59	POSTOPERATIV INFECTN, NEC
999.8	TRANSFUSION REACTION, NEC

**Dependent Complications – Total Knee Replacement**

<b>Must occur with 997.1 Cardiac Complications</b>			
427.0	PAROXYSMAL SVT	428.3	DIASTOLIC HEART FAILURE
427.1	PAROXYSML VENT TACHYCARD	428.30	DIASTOLC HEART FAILR, NOS
427.31	ATRIAL FIBRILLATION	428.31	AC DIASTOL HEART FAILURE
427.89	CARDIAC DYSRYTHMIAS, NEC	428.33	AC ON CHR DIASTL HT FAIL
428.0	CONGESTIVE HEART FAILURE	428.4	CMB SYST & DIAST HT FAIL
428.1	LEFT HEART FAILURE	428.40	CMB SYS/DIAS HT FAIL, NOS
428.2	SYSTOLIC HEART FAILURE	428.41	AC COMB SYS/DIAS HT FAIL
428.20	SYSTOLC HEART FAILUR, NOS	428.43	AC ON CH SYS/DIA HT FAIL
428.21	AC SYSTOLC HEART FAILURE	428.9	HEART FAILURE, NOS
428.23	AC ON CHR SYSTOL HT FAIL		
<b>Must occur with 997.4 Digestive System Complications</b>			
560.1	PARALYTIC ILEUS		
<b>Must occur with 997.5 Urinary Complications</b>			
593.9	KIDNEY & URETER DIS, NOS	788.20	RETENTION OF URINE, NOS
599.0	URINARY TRACT INFECT, NOS	788.29	RETENTION OF URINE, NEC
<b>Must occur with 998.59 Postoperative Infection</b>			
038	SEPTICEMIA	038.40	SEPTICEMIA GRAM-NEGS, NOS
038.0	STREPTOCOCCAL SEPTICEMIA	038.41	SEPTICEMIA-H. INFLUENZAE
038.1	STAPHYLOCOCC SEPTICEMIA	038.42	SEPTICEMIA DT E. COLI
038.10	STAPHLOCOCC SEPTICEM, NOS	038.43	SEPTICEMIA - PSEUDOMONAS
038.11	SEPTICEMIA-STAPH AUREUS	038.44	SEPTICMIA DT SERRATIA
038.19	STAPHLOCOCC SEPTICEM, NEC	038.49	SEPTICEMIA GRAM-NEG, NEC
038.2	PNEUMOCOCCAL SEPTICEMIA	038.8	OTH SPECIFIED SEPTICEMIA
038.3	SEPTICEMIA DT ANAEROBES	038.9	UNSPECIFIED SEPTICEMIA
038.4	SEPTICEMIA GRAM-NEGS, NEC		

**Appendix C.1**  
**Unadjusted Observed Mortality Rates and Change by Year**  
**Associated with Common Medicare Hospitalization in 5-Star Rated**  
**Hospitals 2003-2005**

Hospitalization Diagnosis or Procedure	Observed Mortality Rate 2003-2005	Observed Mortality Rate 2003	Observed Mortality Rate 2004	Observed Mortality Rate 2005	Change 2003-2004	Change 2004-2005	Change 2003-2005
Abdominal Aortic Aneurysm Repair	2.68%	2.94%	2.16%	2.92%	-26.48%	35.28%	-0.55%
Acute Myocardial Infarction	8.60%	9.15%	8.57%	8.03%	-6.34%	-6.30%	-12.23%
Atrial Fibrillation	0.43%	0.45%	0.45%	0.38%	-0.40%	-15.66%	-16.00%
Bowel Obstruction	3.58%	3.83%	3.42%	3.48%	-10.55%	1.82%	-8.92%
Chronic Obstructive Pulmonary Disease	1.48%	1.63%	1.55%	1.29%	-4.97%	-16.56%	-20.71%
Community Acquired Pneumonia	4.16%	4.84%	4.23%	3.49%	-12.57%	-17.45%	-27.83%
Coronary Bypass Surgery	1.60%	1.47%	1.62%	1.73%	+10.14%	6.58%	17.39%
Coronary Interventional Procedures	0.93%	0.99%	0.89%	0.91%	-9.99%	2.11%	-8.09%
Diabetic Acidosis and Coma	0.36%	0.29%	0.40%	0.38%	36.68%	-3.27%	32.27%
GI Bleed	1.95%	2.09%	1.93%	1.83%	-7.57%	-5.49%	-12.65%
GI Surgery and Procedures	4.33%	4.66%	4.25%	4.09%	-8.82%	-3.83%	-12.31%
Heart Failure	3.17%	3.36%	3.23%	2.91%	-4.15%	-9.77%	-13.52%
Pancreatitis	0.94%	1.08%	0.71%	1.03%	-34.76%	46.46%	-4.45%
Pulmonary Embolism	1.93%	2.48%	1.79%	1.59%	-28.05%	-10.93%	-35.91%
Respiratory Failure	17.31%	19.36%	17.30%	15.88%	-10.66%	-8.22%	-18.00%
Sepsis	16.42%	16.40%	16.49%	16.39%	0.54%	-0.59%	-0.06%
Stroke	8.61%	8.81%	8.66%	8.37%	-1.68%	-3.32%	-4.95%
Valve Replacement Surgery	3.89%	4.19%	4.00%	3.47%	-4.58%	-13.23%	17.20%

**Appendix C.2**  
**Unadjusted Observed Mortality Rates and Change by Year**  
**Associated with Common Medicare Hospitalization in 3-Star Rated**  
**Hospitals 2003-2005**

Hospitalization Diagnosis or Procedure	Observed Mortality Rate 2003-2005	Observed Mortality Rate 2003	Observed Mortality Rate 2004	Observed Mortality Rate 2005	Change 2003-2004	Change 2004-2005	Change 2003-2005
Abdominal Aortic Aneurysm Repair	4.76%	5.61%	4.30%	4.48%	-23.30%	-4.09%	-20.16%
Acute Myocardial Infarction	11.85%	12.45%	11.86%	11.17%	-4.76%	-5.82%	-10.30%
Atrial Fibrillation	1.31%	1.35%	1.29%	1.29%	-4.65%	-0.16%	-4.49%
Bowel Obstruction	5.77%	6.11%	5.82%	5.38%	-4.63%	-7.65%	-11.93%
Chronic Obstructive Pulmonary Disease	2.31%	2.56%	2.30%	2.09%	-10.02%	-9.27%	-18.37%
Community Acquired Pneumonia	5.80%	6.50%	5.94%	5.03%	-8.69%	-15.27%	-22.64%
Coronary Bypass Surgery	2.94%	3.01%	2.91%	2.90%	-3.32%	-0.10%	-3.42%
Coronary Interventional Procedures	1.78%	1.87%	1.76%	1.73%	-6.13%	-1.37%	-7.42%
Diabetic Acidosis and Coma	1.40%	1.55%	1.39%	1.27%	-10.33%	-8.85%	-18.27%
GI Bleed	3.06%	3.23%	3.07%	2.89%	-4.82%	-5.79%	-10.33%
GI Surgery and Procedures	6.48%	6.83%	6.52%	6.10%	-4.60%	-6.35%	-10.65%
Heart Failure	4.38%	4.58%	4.40%	4.15%	-3.97%	-5.56%	-9.32%
Pancreatitis	3.05%	3.34%	3.03%	2.78%	-9.29%	-8.50%	-17.00%
Pulmonary Embolism	5.49%	6.04%	5.63%	4.90%	-6.72%	-12.91%	-18.76%
Respiratory Failure	24.91%	26.85%	25.06%	23.34%	-6.68%	-6.87%	-13.08%
Sepsis	21.72%	21.52%	21.87%	21.73%	1.65%	-0.64%	1.00%
Stroke	10.96%	11.27%	10.96%	10.65%	-2.76%	-2.81%	-5.49%
Valve Replacement Surgery	7.28%	7.81%	7.18%	6.87%	-8.11%	-4.28%	-12.04%

**Appendix C.3**  
**Unadjusted Observed Mortality Rates and Change by Year**  
**Associated with Common Medicare Hospitalization in 1-Star Rated**  
**Hospitals 2003-2005**

Hospitalization Diagnosis or Procedure	Observed Mortality Rate 2003-2005	Observed Mortality Rate 2003	Observed Mortality Rate 2004	Observed Mortality Rate 2005	Change 2003-2004	Change 2004-2005	Change 2003-2005
Abdominal Aortic Aneurysm Repair	11.12%	13.45%	10.58%	9.61%	-21.29%	-9.22%	-28.55%
Acute Myocardial Infarction	14.42%	14.90%	14.50%	13.83%	-2.67%	-4.66%	-7.20%
Atrial Fibrillation	3.49%	3.79%	3.25%	3.43%	-14.14%	5.63%	-9.31%
Bowel Obstruction	9.91%	10.44%	9.82%	9.47%	-5.92%	-3.49%	-9.21%
Chronic Obstructive Pulmonary Disease	4.46%	4.67%	4.54%	4.19%	-2.63%	-7.90%	-10.32%
Community Acquired Pneumonia	9.10%	9.97%	9.26%	8.10%	-7.07%	-12.52%	-18.70%
Coronary Bypass Surgery	5.26%	5.51%	5.22%	4.99%	-5.37%	-4.24%	-9.39%
Coronary Interventional Procedures	2.78%	2.84%	2.76%	2.73%	-2.76%	-0.99%	-3.73%
Diabetic Acidosis and Coma	4.58%	5.41%	4.62%	3.76%	-14.61%	-18.65%	-30.54%
GI Bleed	5.50%	5.92%	5.49%	5.08%	-7.25%	-7.44%	-14.15%
GI Surgery and Procedures	9.66%	10.02%	9.84%	9.11%	-1.82%	-7.38%	-9.07%
Heart Failure	6.57%	6.73%	6.65%	6.32%	-1.23%	-5.01%	-6.18%
Pancreatitis	7.92%	8.85%	7.53%	7.38%	-14.89%	-1.96%	-16.56%
Pulmonary Embolism	12.16%	13.69%	12.50%	10.51%	-8.71%	-15.89%	-23.22%
Respiratory Failure	35.21%	37.10%	35.76%	33.28%	-3.61%	-6.93%	-10.29%
Sepsis	29.60%	29.14%	29.85%	29.74%	2.45%	-0.37%	2.07%
Stroke	15.32%	15.45%	15.59%	14.90%	0.87%	-4.39%	-3.56%
Valve Replacement Surgery	12.62%	13.00%	12.33%	12.52%	-5.17%	1.57%	-3.68%

## Appendix D

### Risk-Adjusted Performance by Year across 18 Diagnoses and Procedures from 2003 through 2005

Hospitalization Diagnosis or Procedure	Year	U.S. Observed to Expected Ratio	1-Star Observed to Expected Ratio (95% CI)	3-Star Observed to Expected Ratio	5-Star Observed to Expected Ratio (95% CI)
Abdominal Aortic Aneurysm Repair	2003	0.994	2.181 (1.936-2.426)	0.988	0.457 (0.291-0.623)
	2004	0.851	1.976 (1.727-2.225)	0.848	0.340 (0.174-0.505)
	2005	0.902	1.636 (1.405-1.867)	0.919	0.439 (0.293-0.586)
	3-year aggregate	0.916	1.923 (1.783-2.062)	0.919	0.413 (0.321-0.505)
Acute Myocardial Infarction	2003	1.016	1.371 (1.348-1.393)	1.013	0.735 (0.716-0.755)
	2004	1.004	1.397 (1.375-1.420)	0.997	0.708 (0.688-0.728)
	2005	0.971	1.341 (1.318-1.365)	0.971	0.671 (0.650-0.692)
	3-year aggregate	0.998	1.370 (1.357-1.383)	0.995	0.706 (0.694-0.717)
Atrial Fibrillation	2003	1.093	2.715 (2.589-2.841)	0.997	0.304 (0.167-0.440)
	2004	0.955	2.133 (2.013-2.252)	0.898	0.269 (0.146-0.393)
	2005	0.945	2.347 (2.223-2.471)	0.878	0.220 (0.098-0.341)
	3-year aggregate	0.995	2.391 (2.320-2.462)	0.922	0.262 (0.189-0.335)
Bowel Obstruction	2003	1.069	1.784 (1.731-1.836)	1.043	0.602 (0.554-0.650)
	2004	0.994	1.710 (1.657-1.764)	0.976	0.519 (0.473-0.566)
	2005	0.936	1.643 (1.590-1.696)	0.908	0.522 (0.475-0.568)
	3-year aggregate	0.999	1.713 (1.682-1.743)	0.975	0.547 (0.520-0.574)
Chronic Obstructive Pulmonary Disease	2003	1.052	1.939 (1.888-1.991)	1.015	0.507 (0.463-0.551)
	2004	0.984	1.880 (1.829-1.930)	0.939	0.481 (0.438-0.523)
	2005	0.956	1.839 (1.789-1.890)	0.912	0.437 (0.393-0.481)
	3-year aggregate	0.997	1.886 (1.856-1.915)	0.955	0.475 (0.450-0.500)
Community Acquired Pneumonia	2003	1.092	1.663 (1.641-1.685)	1.076	0.704 (0.685-0.722)
	2004	1.004	1.579 (1.558-1.601)	0.989	0.629 (0.611-0.646)
	2005	0.904	1.453 (1.430-1.475)	0.894	0.549 (0.530-0.567)
	3-year aggregate	1.000	1.566 (1.553-1.579)	0.986	0.626 (0.615-0.636)



Hospitalization Diagnosis or Procedure	Year	U.S. Observed to Expected Ratio	1-Star Observed to Expected Ratio (95% CI)	3-Star Observed to Expected Ratio	5-Star Observed to Expected Ratio (95% CI)
Coronary Bypass Surgery	2003	1.065	1.965 (1.883-2.048)	1.020	0.449 (0.371-0.528)
	2004	1.007	1.788 (1.704-1.873)	0.963	0.497 (0.417-0.577)
	2005	0.921	1.580 (1.496-1.664)	0.878	0.504 (0.422-0.585)
	3-year aggregate	0.999	1.781 (1.733-1.830)	0.954	0.483 (0.437-0.529)
Coronary Interventional Procedures	2003	0.905	1.455 (1.394-1.517)	0.893	0.507 (0.453-0.562)
	2004	1.027	1.635 (1.570-1.700)	1.022	0.546 (0.487-0.604)
	2005	1.082	1.782 (1.713-1.851)	1.065	0.604 (0.543-0.665)
	3-year aggregate	0.999	1.612 (1.574-1.649)	0.988	0.549 (0.516-0.583)
Diabetic Acidosis and Coma	2003	1.088	3.096 (2.942-3.251)	0.926	0.135 (-0.055-0.324)
	2004	0.972	2.709 (2.557-2.862)	0.841	0.167 (-0.004-0.339)
	2005	0.902	2.392 (2.234-2.550)	0.797	0.179 (-0.006-0.363)
	3-year aggregate	0.986	2.737 (2.648-2.827)	0.854	0.161 (0.056-0.266)
GI Bleed	2003	1.072	1.934 (1.880-1.989)	1.044	0.574 (0.528-0.620)
	2004	0.999	1.829 (1.774-1.885)	0.977	0.525 (0.480-0.570)
	2005	0.926	1.709 (1.652-1.767)	0.909	0.489 (0.444-0.534)
	3-year aggregate	0.999	1.827 (1.795-1.859)	0.976	0.529 (0.503-0.555)
GI Surgery and Procedures	2003	0.998	1.501 (1.464-1.538)	0.986	0.665 (0.633-0.697)
	2004	1.000	1.556 (1.517-1.594)	0.988	0.642 (0.609-0.675)
	2005	0.999	1.538 (1.498-1.578)	0.990	0.649 (0.615-0.682)
	3-year aggregate	0.999	1.531 (1.509-1.553)	0.988	0.652 (0.633-0.671)
Heart Failure	2003	1.065	1.648 (1.623-1.673)	1.057	0.685 (0.664-0.705)
	2004	0.995	1.585 (1.561-1.610)	0.987	0.631 (0.611-0.650)
	2005	0.939	1.508 (1.483-1.533)	0.940	0.573 (0.553-0.592)
	3-year aggregate	0.999	1.581 (1.567-1.595)	0.994	0.628 (0.617-0.640)
Pancreatitis	2003	1.131	2.880 (2.719-3.042)	1.026	0.274 (0.099-0.448)
	2004	0.971	2.344 (2.194-2.494)	0.899	0.164 (0.004-0.324)
	2005	0.852	2.139 (1.992-2.285)	0.775	0.219 (0.065-0.373)
	3-year aggregate	0.981	2.440 (2.352-2.528)	0.897	0.217 (0.123-0.310)

Hospitalization Diagnosis or Procedure	Year	U.S. Observed to Expected Ratio	1-Star Observed to Expected Ratio (95% CI)	3-Star Observed to Expected Ratio	5-Star Observed to Expected Ratio (95% CI)
Pulmonary Embolism	2003	1.051	2.255 (2.112-2.397)	1.028	0.363 (0.244-0.482)
	2004	0.955	2.152 (2.012-2.292)	0.935	0.257 (0.142-0.373)
	2005	0.840	1.780 (1.643-1.917)	0.829	0.240 (0.126-0.355)
	3-year aggregate	0.943	2.053 (1.973-2.134)	0.925	0.285 (0.217-0.352)
Respiratory Failure	2003	0.996	1.319 (1.299-1.340)	0.998	0.732 (0.714-0.751)
	2004	0.995	1.359 (1.339-1.379)	1.002	0.705 (0.688-0.723)
	2005	0.993	1.350 (1.331-1.369)	1.005	0.701 (0.684-0.717)
	3-year aggregate	0.994	1.343 (1.332-1.355)	1.001	0.712 (0.702-0.722)
Sepsis	2003	1.040	1.422 (1.405-1.439)	1.046	0.755 (0.741-0.770)
	2004	1.016	1.412 (1.396-1.428)	1.027	0.740 (0.727-0.753)
	2005	0.950	1.337 (1.323-1.351)	0.965	0.686 (0.675-0.697)
	3-year aggregate	0.995	1.384 (1.375-1.393)	1.007	0.721 (0.714-0.728)
Stroke	2003	1.039	1.462 (1.441-1.483)	1.042	0.726 (0.708-0.743)
	2004	0.999	1.422 (1.401-1.443)	0.995	0.698 (0.681-0.715)
	2005	0.954	1.359 (1.338-1.381)	0.955	0.665 (0.648-0.682)
	3-year aggregate	0.997	1.415 (1.403-1.427)	0.998	0.696 (0.686-0.706)
Valve Replacement Surgery	2003	1.076	1.759 (1.668-1.849)	1.078	0.566 (0.488-0.643)
	2004	0.973	1.731 (1.637-1.826)	0.964	0.519 (0.444-0.593)
	2005	0.920	1.692 (1.599-1.785)	0.916	0.440 (0.367-0.514)
	3-year aggregate	0.989	1.728 (1.674-1.781)	0.985	0.506 (0.463-0.550)

**Appendix E**  
**Risk-Adjusted Performance Improvement and Relative Risk**  
**Reductions by Year across 18 Diagnoses and Procedures**  
**from 2003 through 2005**

Hospitalization Diagnosis or Procedure	Year	Percent of Improvement U.S. Average (2003-2005)	Relative Risk Reduction Associated with 5-Star Hospitals Compared to 1-Star	Relative Risk Reduction Associated with 5-Star Hospitals Compared to National	Reduction in Deaths If All Hospitals Operated at 5-Star Level (2003-2005)
Abdominal Aortic Aneurysm Repair	2003	9.20%	79.06%	54.04%	1,443
	2004		82.81%	60.10%	
	2005		73.14%	51.29%	
	3-year aggregate		78.51%	54.88%	
Acute Myocardial Infarction	2003	4.47%	46.35%	27.62%	29,471
	2004		49.36%	29.51%	
	2005		49.97%	30.86%	
	3-year aggregate		48.49%	29.26%	
Atrial Fibrillation	2003	13.56%	88.82%	72.23%	5,697
	2004		87.37%	71.79%	
	2005		90.64%	76.75%	
	3-year aggregate		89.05%	73.68%	
Bowel Obstruction	2003	12.51%	66.24%	43.69%	13,345
	2004		69.64%	47.75%	
	2005		68.25%	44.22%	
	3-year aggregate		68.08%	45.27%	
Chronic Obstructive Pulmonary Disease	2003	9.14%	73.87%	51.86%	14,144
	2004		74.42%	51.13%	
	2005		76.24%	54.30%	
	3-year aggregate		74.83%	52.40%	
Community Acquired Pneumonia	2003	17.23%	57.69%	35.55%	37,593
	2004		60.20%	37.42%	
	2005		62.24%	39.90%	
	3-year aggregate		60.05%	37.41%	

Appendix E: Risk-Adjusted Performance Improvements and Relative Risk Reductions

Hospitalization Diagnosis or Procedure	Year	Percent of Improvement U.S. Average (2003-2005)	Relative Risk Reduction Associated with 5-Star Hospitals Compared to 1-Star	Relative Risk Reduction Associated with 5-Star Hospitals Compared to National	Reduction in Deaths If All Hospitals Operated at 5-Star Level (2003-2005)
Coronary Bypass Surgery	2003	13.59%	77.14%	57.82%	5,308
	2004		72.19%	50.61%	
	2005		68.11%	45.27%	
	3-year aggregate		72.90%	51.66%	
Coronary Interventional Procedures	2003	-19.60%	65.13%	43.90%	8,065
	2004		66.63%	46.88%	
	2005		66.08%	44.14%	
	3-year aggregate		65.92%	45.01%	
Diabetic Acidosis and Coma	2003	17.05%	95.65%	87.61%	3,668
	2004		93.83%	82.79%	
	2005		92.52%	80.17%	
	3-year aggregate		94.11%	83.66%	
GI Bleed	2003	13.61%	70.33%	46.48%	12,894
	2004		71.29%	47.44%	
	2005		71.37%	47.17%	
	3-year aggregate		71.05%	47.05%	
GI Surgery and Procedures	2003	-0.11%	55.71%	33.40%	18,878
	2004		58.74%	35.79%	
	2005		57.82%	35.07%	
	3-year aggregate		57.41%	34.74%	
Heart Failure	2003	11.87%	58.47%	35.73%	33,543
	2004		60.22%	36.60%	
	2005		62.02%	38.99%	
	3-year aggregate		60.25%	37.09%	

Appendix E: Risk-Adjusted Performance Improvements and Relative Risk Reductions

Hospitalization Diagnosis or Procedure	Year	Percent of Improvement U.S. Average (2003-2005)	Relative Risk Reduction Associated with 5-Star Hospitals Compared to 1-Star	Relative Risk Reduction Associated with 5-Star Hospitals Compared to National	Reduction in Deaths If All Hospitals Operated at 5-Star Level (2003-2005)
Pancreatitis	2003	24.72%	90.50%	75.82%	3,558
	2004		93.01%	83.12%	
	2005		89.75%	74.26%	
	3-year aggregate		91.12%	77.91%	
Pulmonary Embolism	2003	20.07%	83.90%	65.46%	4,694
	2004		88.05%	73.08%	
	2005		86.49%	71.37%	
	3-year aggregate		86.14%	69.82%	
Respiratory Failure	2003	0.28%	44.49%	26.46%	40,093
	2004		48.08%	29.07%	
	2005		48.08%	29.42%	
	3-year aggregate		47.02%	28.42%	
Sepsis	2003	8.65%	46.88%	27.37%	38,560
	2004		47.58%	27.18%	
	2005		48.69%	27.81%	
	3-year aggregate		47.92%	27.57%	
Stroke	2003	8.16%	50.36%	30.14%	27,458
	2004		50.91%	30.08%	
	2005		50.10%	30.31%	
	3-year aggregate		50.80%	30.20%	
Valve Replacement Surgery	2003	14.54%	67.84%	47.45%	3,991
	2004		70.04%	46.73%	
	2005		73.97%	52.13%	
	3-year aggregate		70.69%	48.79%	
					<b>302,403</b>