



The Seventh Annual HealthGrades Women's Health in American Hospitals Study

April 2010

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HEALTHGRADES®

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HealthGrades Women's Health in American Hospitals Study

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This study evaluates the quality of care for women at U.S. hospitals. For this study, HealthGrades identified patient outcomes (mortality and complication rates) for in-hospital treatment of 16 procedures/diagnoses related to women's health based on three years of Medicare data (2006 through 2008). This research focuses on three major aspects of care for women: cardiovascular, medicine, and bone and joint health. The analysis identifies top-performing hospitals in women's health to establish a best-practice benchmark against which other hospitals can be evaluated. Hospital performance by state is also examined to identify the top-ten and bottom-ten states in women's health. See www.HealthGrades.com for a list of best-performing hospitals and for individual hospital quality results.

Executive Summary

The *Seventh Annual HealthGrades Women's Health in American Hospitals Study* analyzes the quality of care for women at U.S. hospitals. The primary aims of the study are to:

- Examine mortality and complication trends,
- Identify the best-performing U.S. hospitals in women's health, and
- Identify states which have hospitals that provided the best women's health care from 2006 through 2008.

Heart disease is the leading cause of death in women (25.8% of all deaths) followed by cancer (22.0%), stroke (6.7%), and chronic lower respiratory diseases (5.3%).¹ Although major risk factors for heart disease can often be prevented or controlled through lifestyle changes, physicians are less likely to counsel women than men about diet, exercise, and weight reduction.² Additionally, the Agency for Healthcare Research and Quality (AHRQ) has looked at various discrepancies in hospital quality and safety that appear to exist between women and men, specifically in heart attack and complications after surgery.³

Over the past six years, the American Heart Association's *Go Red for Women* campaign has helped change the perception that heart disease is a "man's disease." Its goal continues to be to raise awareness about the signs and symptoms of heart disease in women and to educate women on how to talk to their doctors about heart disease. Despite this effort, overall, women were more likely than men to die after coronary bypass surgery, valve replacement surgery, coronary interventional procedures, and stroke. The need to better understand the difference in quality outcomes for in-hospital treatment for women is essential, given the impact these conditions have on the U.S. health care system.

Females in the U.S. number 155.8 million, comprising over half the U.S. population. The female population is projected to continue to outnumber the male population, going from a numerical difference of 4.8 million in 2010 (157.5 million females and 152.7 million males) to 7.4 million (223.2 million females and 215.8 million males) by 2050.⁴ Additionally, the country's population as a whole is expected to become older. Of the female population, the percentage of women 65 years and older is projected to increase from 14.57% in 2010 to 21.79% in 2050.⁵

As the population ages, chronic conditions requiring hospitalization are increasing. An example of a chronic disease is congestive heart failure. Not only did the number of women being hospitalized with heart failure increase (from 13.95 hospitalizations per 1,000 in 1980, to 19.58 hospitalizations per 1,000 in 2006), but women had a significantly higher annual percentage increase rate than men (1.55% versus 1.20%, adjusted for age).⁶ Because variations in outcomes exist for women, it is important for us to evaluate the consistency of care, not only when compared to men, but amongst states and hospitals.

Information regarding the variation in [outcomes-based performance among hospitals is essential to improving the quality of care in America](#). Many Americans are using a number of different sources for health care quality information. Interestingly, women make 80% of all health care decisions in the U.S.⁷ and 63% of the almost 8 million visitors to HealthGrades.com each month are female.⁸ Where possible, women should arm themselves with as much information about their specific health care issues and the quality of care available for those conditions.

Assessing Mortality and Complication Outcomes in Women

HealthGrades studied outcomes of disease states and procedures pertaining specifically to women for nearly 7 million discharges (6,975,441) using Medicare data from 2006 through 2008. This study identifies the top 20% of eligible hospitals specific to the care and treatment of women for 16 procedures/diagnoses (cohorts). These top-performing hospitals are designated as HealthGrades Women's Health Excellence Award recipients. In this research, we highlight differences and trends in mortality and complication outcomes between these best-performing and the worst-performing hospitals for women's health.

Women's health outcomes were separated into three categories:

Women's Bone and Joint Health	Women's Cardiovascular	Women's Medicine
<ul style="list-style-type: none"> • Back and Neck Surgery (<i>with</i> Spinal Fusion) • Back and Neck Surgery (<i>without</i> Spinal Fusion) • Hip Fracture Repair • Total Hip Replacement • Total Knee Replacement 	<ul style="list-style-type: none"> • Carotid Surgery • Coronary Bypass Surgery • Coronary Interventional Procedures (PTCA/Angioplasty, Stent) • Peripheral Vascular Bypass • Resection / Replacement of Abdominal Aorta • Valve Replacement Surgery 	<ul style="list-style-type: none"> • Chronic Obstructive Pulmonary Disease • Heart Attack • Heart Failure • Pneumonia • Stroke

Hospital Eligibility Requirements

To be included in the analysis, a hospital must have had all of the following:

- For each diagnosis or procedure above (cohort), a minimum of 30 female discharges over the three years, and at least five female discharges in the most recent year in the cohort.
- For stroke, a hospital must have transferred out less than 10% of stroke patients to another acute care hospital over three years (2006 through 2008). This implies that the hospital is more likely to have onsite neurosurgical services.

To be eligible to receive a Women's Health Excellence Award, a hospital must:

- Meet the volume requirements above in stroke and either coronary bypass or valve replacement surgery.

- Meet the volume requirements in at least six additional cohorts (of the 16 cohorts listed above).

More information on the women's health methodology can be found in the following *Women's Health Methodology Brief* section, or in the *HealthGrades Women's Health Excellence Award™ Methodology 2010/2011* white paper at www.HealthGrades.com.

Summary of Findings

From 2006 through 2008:

- Compared to men, women had a **higher risk of mortality in four cardiovascular cohorts**: valve replacement surgery (52.75%), coronary bypass surgery (36.59%), coronary interventional procedures (19.52%), and stroke (5.76%) (see *Table 1*).
- Compared to poor-performing hospitals, best-performing hospitals had overall **40.51% lower risk-adjusted in-hospital mortality** across nine cohorts and overall **19.05% lower risk-adjusted in-hospital complications** across seven cohorts (see *Table 2*).
- If all eligible hospitals performed at the level of Women's Health Excellence Award hospitals across the 16 procedures and diagnoses studied, an additional **16,863 women could have potentially survived their hospitalizations**, and **4,735 women could have potentially avoided a major in-hospital complication** in the Medicare population from 2006 through 2008 (see *Table 2* and *Appendices B, C, D*).
- Of the 16,863 potentially preventable deaths, 80.74% or 13,615 were associated with just four diagnoses (see *Table 2* and *Appendix D*):
 - 1) Pneumonia (3,768)
 - 2) Heart Failure (3,415)
 - 3) Stroke (3,332)
 - 4) Heart Attack (3,100)
- Nationwide, 830 hospitals (16.9% of all hospitals) were eligible to be considered for the women's health award. Of eligible hospitals, 166 hospitals ranked in the top 20% and are recipients of the HealthGrades 2010/2011 Women's Health Excellence Award™. (A list of recipients can be found in *Appendix A* and at www.HealthGrades.com.)
- Over the three years studied, in-hospital risk-adjusted mortality improved at both Women's Health Excellence Award hospitals and all other hospitals. However, Women's Health Excellence Award hospitals improved at a greater rate overall (14.66% versus 12.34%) (see *Appendix E*).
- **Thirty states have one or more hospitals** that have been recognized with a HealthGrades Women's Health Excellence Award (see *Table 3*).
- **Eighty-five (51.20%) of the 166 Women's Health Excellence Award hospitals are in six states**: Florida (20), Ohio (15), Texas (14), Illinois (13), Pennsylvania (12), and California (11) (see *Table 3*).
- Five states—Illinois, Michigan, Ohio, Oregon, and South Dakota—ranked among the top 10 (lowest mortality and morbidity) in at least two out of three categories of women's health. No state made the top 10 in all three categories (see *Table 4* and *Appendix G*).
- When evaluating performance across all 16 procedures/diagnoses, the top 10 states that had, on average, the lowest mortality and morbidity were: Colorado, Florida, Indiana, Michigan, South Dakota, Illinois, Delaware, Texas, Ohio, and Connecticut (see *Table 5*).

Overall, women were more likely than men to die after valve replacement surgery, coronary bypass surgery, coronary interventional procedures, and stroke.

If all eligible hospitals performed at the level of Women's Health Excellence Award hospitals across the 16 procedures and diagnoses studied, an additional 16,863 women could have potentially survived their hospitalizations, and 4,735 women could have potentially avoided an in-hospital major complication from 2006 through 2008.

Eighty-five (51.2%) of the 166 Women's Health Excellence Award hospitals are in six states: Florida, Ohio, Texas, Illinois, Pennsylvania, and California.

Women's Health Methodology Brief

To help consumers evaluate and compare hospital performance in women's health, HealthGrades analyzed female patient outcomes data for virtually every hospital in the country and recognized best-performing hospitals in women's health with the HealthGrades Women's Health Excellence Award. HealthGrades used Medicare inpatient data from the MedPAR database (purchased from the Centers for Medicare and Medicaid Services) for fiscal years 2006 through 2008.

The women's health ratings used to determine award recipients were based upon HealthGrades' risk-adjustment methodology for 16 procedures/diagnoses listed below. The purpose of risk adjustment is to obtain fair statistical comparisons among disparate populations or groups. Significant differences in demographic and clinical risk factors are found among patients treated in different hospitals. Risk adjustment of the data is needed to make accurate and valid comparisons of clinical outcomes at different hospitals. HealthGrades analyzed the following 16 procedures and diagnoses (cohorts) for each hospital's female patients:

Mortality-Based Cohorts

- Chronic Obstructive Pulmonary Disease
- Coronary Bypass Surgery
- Coronary Interventional Procedures (PTCA/Angioplasty, Stent)
- Heart Attack
- Heart Failure
- Pneumonia
- Resection / Replacement of Abdominal Aorta
- Stroke
- Valve Replacement Surgery

Complication-Based Cohorts

- Back and Neck Surgery (with Spinal Fusion)
- Back and Neck Surgery (without Spinal Fusion)
- Carotid Surgery
- Hip Fracture Repair
- Peripheral Vascular Bypass
- Total Hip Replacement
- Total Knee Replacement

HealthGrades used the following steps to determine Women's Health Excellence Award recipients:

1. For each patient cohort, unique statistical, female-only models were developed using logistic regression. For most mortality cohorts, separate models were created for in-hospital mortality, in-hospital +1 month mortality, and in-hospital +6 months mortality. (Chronic obstructive pulmonary disease and heart failure do not have in-hospital +1 month mortality models.) See *Women's Health Excellence Award™ Methodology 2010/2011* white paper at www.HealthGrades.com for details on the modeling process.
2. The statistical models were checked for validity and finalized. All of the models were highly significant, with p values not greater than 0.0001. These cohort specific models were then used to estimate the probability of death or complication for each patient in the cohort.
3. For each hospital, cohort, and outcome, the observed and predicted numbers were summed and a z-score was calculated. Thus, the complication-based cohorts had a single z-score but most mortality-based cohorts had three z-scores (in-hospital, in-hospital +1 month, in-hospital +6 months).
4. The straight average of all z-scores for a hospital was calculated for all cohorts in which the hospital had at least 30 female cases over the three-year period and at least five female cases in the most recent year. The eligible hospitals were then rank ordered by their average z-score and the top 20% of eligible hospitals were recognized with a HealthGrades Women's Health Excellence Award.

Detailed Findings

Nationwide, 830 hospitals (16.9% of all hospitals) were eligible to be considered for the women's health award. Of these eligible hospitals, 166 have outcomes that are best in the nation—making these hospitals the recipients of the HealthGrades 2010/2011 Women's Health Excellence Award™.

Women's Mortality Risk and Improvement Rates Mixed from 2006 to 2008

Being a woman increases the likelihood of death in several of the cardiovascular cohorts studied. Specifically, women had a higher risk of mortality in four cohorts: valve replacement surgery (52.75%), coronary bypass surgery (36.59%), coronary interventional procedures (19.52%), and stroke (5.76%) (see *Table 1*).

However, women had a better chance of surviving hospitalization (lower relative mortality risk) for chronic obstructive pulmonary disease (-16.41%), heart failure (-12.83%), pneumonia (-10.60%), and heart attack (-2.43%) compared to men (see *Table 1*).

When evaluating improvement rates for women, even with the public emphasis in cardiac health for women, outcomes in cardiac surgery and heart attack improved at a slower rate compared to the national average of all patients. However, stroke outcomes in women improved at a slightly faster rate (11.85% compared to 11.48%), and heart failure outcomes improved at about the same rate for women and all patients (7.69%) (see *Table 1*).

Table 1. Women-Only Mortality Improvements and Relative Risk 2006 to 2008

Procedure/Diagnosis	Overall Medicare Improvement in Risk-adjusted Mortality 2006-2008	Women-Only Improvement in Risk-adjusted Mortality 2006-2008	Ratio of Women's Improvement to Overall Improvement	Relative Mortality Risk of Women Versus Men	Difference in Mortality Risk of Women Versus Men
Valve Replacement Surgery	17.04%	16.32%	.96	152.75%	52.75%
Coronary Bypass Surgery	14.72%	13.96%	.95	136.59%	36.59%
Coronary Interventional Procedures	9.20%	9.19%	1.00	119.52%	19.52%
Stroke	11.48%	11.85%	1.03	105.76%	5.76%
Heart Attack	11.88%	11.17%	.94	97.57%	-2.43%
Pneumonia	11.72%	13.02%	1.11	89.40%	-10.60%
Heart Failure	7.69%	7.69%	1.00	87.17%	-12.83%
Chronic Obstructive Pulmonary Disease	20.15%	20.91%	1.04	83.59%	-16.41%

Best-performing Hospitals have Lower Risk-adjusted Mortality and Inhospital Complications

Compared to poor-performing hospitals, best-performing hospitals had overall 40.51% lower risk-adjusted inhospital mortality across nine mortality-based procedures and overall 19.05% lower risk-adjusted inhospital complications across seven complication-based procedures.

If all eligible hospitals performed at the level of Women's Health Excellence Award hospitals across the 16 procedures and diagnoses studied, an additional 16,863 women could have potentially survived their hospitalizations, and 4,735 women could have potentially avoided an inhospital major complication from 2006 through 2008 (see *Table 2*).

Table 2. Performance Comparison Summary Best-performing and Poor-performing Hospitals

Procedure/Diagnosis	Complication Outcomes		Mortality Outcomes	
	Relative Risk Reduction Best- to Poor- Performing Hospitals	Potential Complications Avoided	Relative Risk Reduction Best- to Poor- Performing Hospitals	Potential Lives Saved
Women's Bone and Joint Performance				
Back and Neck Surgery (with Spinal Fusion)	15.73%	396		
Back and Neck Surgery (without Spinal Fusion)	23.13%	664		
Hip Fracture Repair	19.86%	2,054		
Total Hip Replacement	28.92%	706		
Total Knee Replacement	21.39%	892		
Women's Cardiovascular Performance				
Carotid Surgery	4.97%	-8		
Peripheral Vascular Bypass	19.36%	31		
Coronary Bypass Surgery			47.72%	661
Coronary Interventional Procedures			41.31%	946
Resection / Replacement of Abdominal Aorta			30.41%	1
Valve Replacement Surgery			36.38%	535
Women's Medicine Performance				
Chronic Obstructive Pulmonary Disease			48.58%	1,105
Heart Attack			30.81%	3,100
Heart Failure			42.49%	3,415
Pneumonia			48.32%	3,768
Stroke			38.55%	3,332
Average Risk Reduction	19.05%		40.51%	
Total Complications Avoided / Lives Saved		4,735		16,863

See *Appendices B, C, and D* for more detail.

If all eligible hospitals performed at the level of Women's Health Excellence Award hospitals across the 16 procedures and diagnoses studies, an additional 16,863 women could have potentially survived their hospitalizations, and 4,735 women could have potentially avoided an inhospital major complication from 2006 through 2008.

Women's Health Excellence Award Hospitals Showed Greater Improvement for Risk-adjusted Mortality

Over the three years of study, in-hospital risk-adjusted mortality improved at both Women's Health Excellence Award hospitals and all other hospitals. However, Women's Health Excellence Award hospitals improved at a greater rate overall (see *Appendix E*). Comparing 2008 data with 2006 data, Women's Health Excellence Award hospitals had an average reduction in risk-adjusted in-hospital mortality of 14.66% versus 12.34% for all other hospitals. In fact, they had a greater improvement in seven of the nine mortality-based cohorts.

The evaluation of in-hospital complications in the seven complication-based cohorts studied showed an increase in the average rate of complications from 2006 through 2008 for both Women's Health Excellence Award hospitals and all other hospitals. Overall, risk-adjusted in-hospital complication improvement rates were -4.97% for Women's Health Excellence Award hospitals and -3.90% for all other hospitals (see *Appendix F*). This finding is consistent with the findings in *The Twelfth Annual HealthGrades Hospital Quality in America Study*⁸ where we saw this trend among all Medicare patients. As the population ages, it is likely that more elective procedures will be performed to improve the quality of life of individuals. However, with an increasingly aged population, the risk of complications is greater. This will be an important trend to continue to study.

Women's Health Excellence Award Hospitals Save Women's Lives

If all eligible hospitals performed at the level of Women's Health Excellence Award hospitals across the 16 procedures and diagnoses studied, an additional **16,863 women could have potentially survived their hospitalizations**, and **4,735 women could have potentially avoided an in-hospital major complication** from 2006 through 2008 (see *Table 2* and *Appendices B, C, D*).

Of the 16,863 Medicare potentially preventable deaths associated with nine procedures/diagnoses, 80.74% or 13,615 were associated with just four diagnoses:

- 1) Pneumonia (3,768)
- 2) Heart Failure (3,415)
- 3) Stroke (3,332)
- 4) Heart Attack (3,100)

Women's Health Excellence Award hospitals performed better than expected across all 16 procedures and diagnoses.

Thirty States have One or More Women's Health Excellence Award Hospitals

Nationwide, 830 hospitals (16.9% of all hospitals) were eligible to be considered for the women's health award. Of these eligible hospitals, 166 ranked in the top 20% and are recipients of the HealthGrades 2010/2011 Women's Health Excellence Award™. (See *Appendix A* for a list of award recipients.)

- Thirty states have one or more hospitals that have been recognized with a HealthGrades Women's Health Excellence Award (see *Table 3*).
- Eighty-five (51.20%) of the 166 Women's Health Excellence Award hospitals are in six states: Florida (20), Ohio (15), Texas (14), Illinois (13), Pennsylvania (12), and California (11) (see *Table 3*).
- Two states, Connecticut and Maryland, had at least half of their eligible hospitals recognized as a Women's Health Excellence Award hospital (57.14% and 50.00% respectively) (see *Table 3*).

Women's Health Excellence Award Hospitals by Eligible Hospitals by State

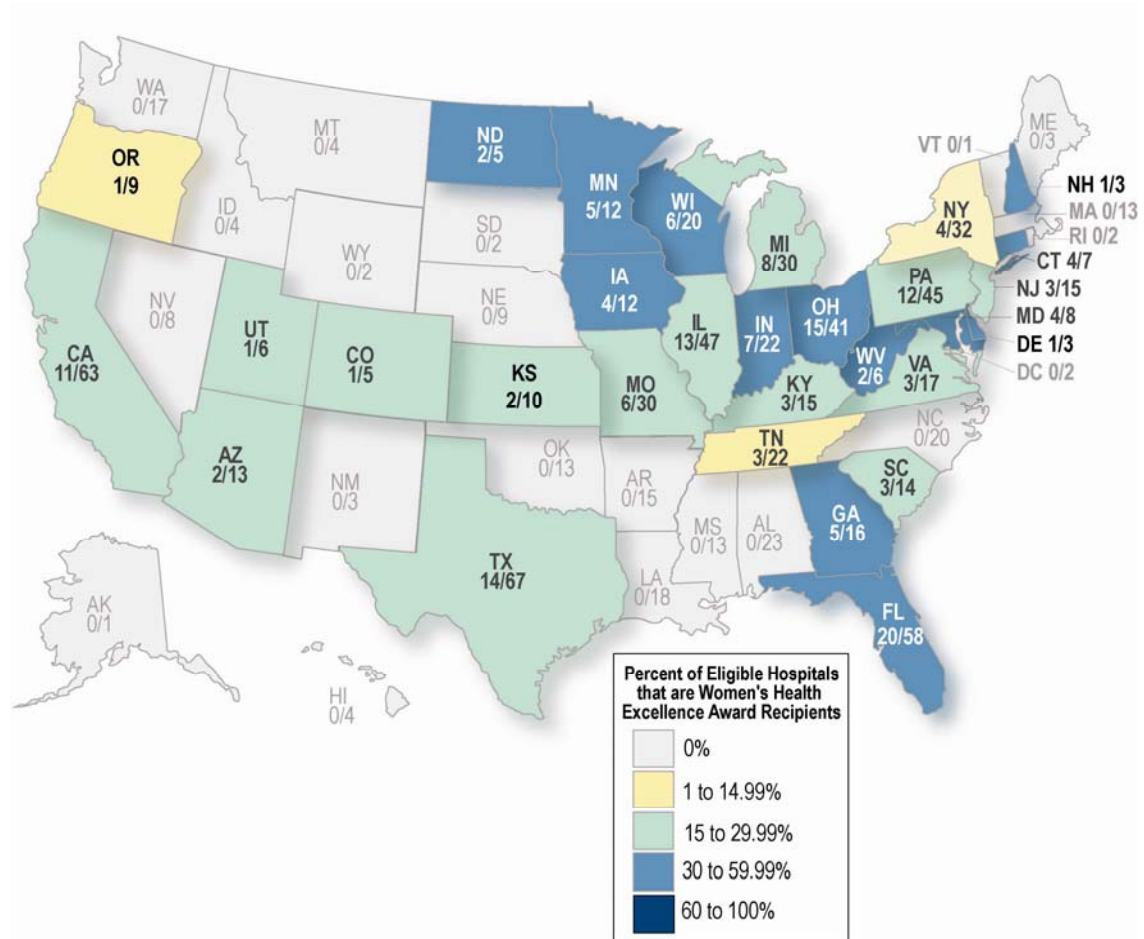


Table 3. Women's Health Excellence Award Hospitals Distribution by State

Eighty-five or more than half (51.20%) of the 166 Women's Health Excellence Award hospitals are in the six states shaded below.

State / Abbreviation	Eligible Hospitals	Women's Health Excell. Award Hospitals	% of Eligible Hospitals that are Women's Health Excell. Award Hospitals	% of All Women's Health Excell. Award Hospitals
Alabama	AL	23	0	.00%
Alaska	AK	1	0	.00%
Arizona	AZ	13	2	15.38%
Arkansas	AR	15	0	.00%
California	CA	63	11	17.46%
Colorado	CO	5	1	20.00%
Connecticut	CT	7	4	57.14%
Delaware	DE	3	1	33.33%
Dist. Of Columbia	DC	2	0	.00%
Florida	FL	58	20	34.48%
Georgia	GA	16	5	31.25%
Hawaii	HI	4	0	.00%
Idaho	ID	4	0	.00%
Illinois	IL	47	13	27.66%
Indiana	IN	22	7	31.82%
Iowa	IA	12	4	33.33%
Kansas	KS	10	2	20.00%
Kentucky	KY	15	3	20.00%
Louisiana	LA	18	0	.00%
Maine	ME	3	0	.00%
Maryland	MD	8	4	50.00%
Massachusetts	MA	13	0	.00%
Michigan	MI	30	8	26.67%
Minnesota	MN	12	5	41.67%
Mississippi	MS	13	0	.00%
Missouri	MO	30	6	20.00%
Montana	MT	4	0	.00%
Nebraska	NE	9	0	.00%
Nevada	NV	8	0	.00%
New Hampshire	NH	3	1	33.33%
New Jersey	NJ	15	3	20.00%
New Mexico	NM	3	0	.00%
New York	NY	32	4	12.50%
North Carolina	NC	20	0	.00%
North Dakota	ND	5	2	40.00%
Ohio	OH	41	15	36.59%
Oklahoma	OK	13	0	.00%
Oregon	OR	9	1	11.11%
Pennsylvania	PA	45	12	26.67%
Rhode Island	RI	2	0	.00%
South Carolina	SC	14	3	21.43%
South Dakota	SD	2	0	.00%
Tennessee	TN	22	3	13.64%
Texas	TX	67	14	20.90%
Utah	UT	6	1	16.67%
Vermont	VT	1	0	.00%
Virginia	VA	17	3	17.65%
Washington	WA	17	0	.00%
West Virginia	WV	6	2	33.33%
Wisconsin	WI	20	6	30.00%
Wyoming	WY	2	0	.00%

No States are Top 10 in All Three Women's Health Categories

No states are in the top 10 (lowest mortality and morbidity) for all three categories of women's health. However, five states—Illinois, Michigan, Ohio, Oregon, and South Dakota—ranked among the top 10 in at least two out of three women's health categories. More state results can be found in *Appendix G*.

Table 4. Women's Health Top 10 States by Category

Women's Bone and Joint Health		Women's Cardiovascular Procedures		Women's Medicine	
State	O/E Ratio*	State	O/E Ratio*	State	O/E Ratio*
Hawaii	.682	Idaho	.585	Arizona	.655
New Mexico	.748	Colorado	.718	Ohio	.785
South Dakota	.780	Alaska	.778	Maryland	.786
Arkansas	.812	South Dakota	.786	Minnesota	.791
Dist. of Columbia	.835	Illinois	.876	Florida	.815
Tennessee	.841	Wisconsin	.884	Indiana	.835
Oklahoma	.842	Ohio	.902	Utah	.836
Montana	.871	Oregon	.903	Michigan	.840
Oregon	.880	Pennsylvania	.906	Illinois	.845
North Dakota	.886	Michigan	.928	Connecticut	.846

*O/E Ratio = Observed-to-Expected Ratio

Colorado Ranked Highest in Women's Health Overall Average

When evaluating performance across all 16 procedures and diagnoses, the top 10 states that had, on average, the lowest mortality and morbidity were, in order of rank: Colorado, Florida, Indiana, Michigan, South Dakota, Illinois, Delaware, Texas, Ohio and Connecticut.

Table 5. Women's Health Top 10 States by Overall Average

Women's Health Overall Average	
State	O/E Ratio*
Colorado	.876
Florida	.892
Indiana	.897
Michigan	.904
South Dakota	.905
Illinois	.909
Delaware	.914
Texas	.919
Ohio	.921
Connecticut	.923

*O/E Ratio = Observed-to-Expected Ratio

Interpretation of Results

In this study, we evaluated the 166 top-performing hospitals for women's health in the U.S. compared to all other U.S. hospitals. These hospitals consistently outperformed all other hospitals for women's cardiovascular, internal medicine, and bone and joint health. These hospitals had:

- Lower risk-adjusted mortality,
- Fewer in-hospital complications, and
- Greater improvement in mortality from 2006 through 2008.

All hospitals showed an increase in in-hospital complications from 2006 through 2008 among women in the seven complication-based procedures studied. This finding is consistent with the findings in *The Twelfth Annual HealthGrades Hospital Quality in America Study*⁹ where we saw this trend among all Medicare patients. As the population ages, it is likely that more elective procedures will be performed to improve the quality of life of individuals. However, with an increasingly aged population, the risk of complications is greater. This will be an important trend to continue to study.

While the overall quality of health care for women in the U.S. is improving slowly³, women are still more likely than men to die of heart disease. Although heart disease has been thought of as a "man's disease," it is the leading cause of death for *both* women and men in the United States, with half of the deaths in 2006 being women.¹⁰ Heart disease killed 315,930 or 26% of the women who died in 2006—more than one in four women.¹⁰ In fact, being a woman increases the likelihood of death after valve replacement surgery, coronary bypass surgery, coronary interventional procedures, and stroke. Women have a higher risk of mortality than men for these cardiovascular procedures and stroke and their outcomes are improving at a slower rate than the general public.

For this reason, it is important to understand the variation in care for women's health outcomes. As the decision-makers for their own health care as well as those of their family members, women need access to information about where to find the best quality care. This study illustrates that quality patient outcomes for women among U.S. hospitals are not equal. Significant gaps continue to exist amongst hospitals and states. Information regarding the variation in outcomes-based performance among hospitals is essential to improving the quality of care in America. All patients, especially women, need to take a more active role in their health care by seeking out quality outcomes information, including this information, when selecting a hospital.

Women's Health Excellence Award hospitals save women's lives in the Medicare population. If all eligible hospitals performed at the level of Women's Health Excellence Award hospitals across the 16 procedures and diagnoses studied, **16,863 mothers, wives, sisters, and daughters could have potentially survived their hospitalizations**, and **4,735 could have potentially avoided an in-hospital major complication** from 2006 through 2008.

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Acknowledgements

Health Grades, Inc., 500 Golden Ridge Road, Suite 100, Golden, Colorado 80401. Health Grades Inc. is the leading independent health care ratings organization, providing quality ratings, profiles and cost information on the nation's hospitals, physicians, nursing homes and prescription drugs.

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Appendix A: HealthGrades 2010/2011 Women's Health Excellence Award™ Recipients

The following hospitals are recipients of the HealthGrades 2010/2011 Women's Health Excellence Award*. Some of the Women's Health Excellence Award recipients have multiple locations. In these cases, results for all locations were used in the analysis and each of the facilities is designated as a recipient of the award.

HealthGrades 2010/2011 Women's Health Excellence Award™ Recipients*	City
Alabama	
<i>There are no recipients of this award in this state.</i>	
Alaska	
<i>There are no recipients of this award in this state.</i>	
Arizona	
Banner Boswell Medical Center	Sun City
Northwest Medical Center	Tucson
Arkansas	
<i>There are no recipients of this award in this state.</i>	
California	
California Pacific Medical Center - Pacific	San Francisco
<i>including:</i> California Pacific Medical Center - California	San Francisco
Cedars - Sinai Medical Center	Los Angeles
El Camino Hospital	Mountain View
Garfield Medical Center	Monterey Park
Glendale Memorial Hospital & Health Center	Glendale
Huntington Memorial Hospital	Pasadena
Pomona Valley Hospital Medical Center	Pomona
Saint Johns Hospital Health Center	Santa Monica
Saint Vincent Medical Center	Los Angeles
Scripps Memorial Hospital La Jolla	La Jolla
Sharp Chula Vista Medical Center	Chula Vista
Colorado	
Penrose St. Francis Health Services - Centura Health	Colorado Springs
Connecticut	
Danbury Hospital	Danbury
Hartford Hospital	Hartford
Hospital of Saint Raphael	New Haven
Yale-New Haven Hospital	New Haven
Delaware	
Christiana Care Health System - Christiana Hospital	Newark
<i>including:</i> Wilmington Hospital	Wilmington

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HealthGrades 2010/2011 Women's Health Excellence Award™ Recipients*	City
District of Columbia	
<i>There are no recipients of this award in this state.</i>	
Florida	
Baptist Hospital of Miami	Miami
Baptist Medical Center	Jacksonville
Boca Raton Community Hospital	Boca Raton
Central Florida Regional Hospital	Sanford
Charlotte Regional Medical Center	Punta Gorda
Delray Medical Center	Delray Beach
Flagler Hospital	Saint Augustine
Gulf Coast Medical Center	Fort Myers
Halifax Medical Center	Daytona Beach
<i>including:</i> Atlantic Medical Center	Daytona Beach
Holy Cross Hospital	Fort Lauderdale
JFK Medical Center	Atlantis
Largo Medical Center	Largo
<i>including:</i> Largo Medical Center - Indian Rocks Campus	Largo
Lawnwood Regional Medical Center and Heart Institute	Fort Pierce
Lee Memorial Hospital	Fort Myers
Martin Memorial Medical Center	Stuart
Mercy Hospital	Miami
Munroe Regional Medical Center	Ocala
NCH Healthcare System	Naples
Palm Beach Gardens Medical Center	Palm Beach Gardens
Sarasota Memorial Hospital	Sarasota
Georgia	
Memorial University Medical Center	Savannah
Northeast Georgia Medical Center	Gainesville
<i>including:</i> Northeast Georgia Medical Center - Lanier Park	Gainesville
Piedmont Hospital	Atlanta
Saint Joseph's Hospital of Atlanta	Atlanta
Wellstar Kennestone Hospital	Marietta
Hawaii	
<i>There are no recipients of this award in this state.</i>	
Idaho	
<i>There are no recipients of this award in this state.</i>	

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HealthGrades 2010/2011 Women's Health Excellence Award™ Recipients*	City
Illinois	
Advocate Christ Hospital and Medical Center	Oak Lawn
Advocate Good Samaritan Hospital	Downers Grove
Alexian Brothers Medical Center	Elk Grove Village
Central DuPage Hospital	Winfield
Evanston Hospital	Evanston
<i>including:</i> Highland Park Hospital	Highland Park
Mercy Hospital and Medical Center	Chicago
Northwest Community Hospital	Arlington Heights
Palos Community Hospital	Palos Heights
Provena Saint Joseph Medical Center	Joliet
Saint James Hospital and Health Center - Olympia Fields	Olympia Fields
<i>including:</i> Saint James Hospital and Health Centers	Chicago Heights
Sherman Hospital	Elgin
Swedish Covenant Hospital	Chicago
SwedishAmerican Hospital	Rockford
Indiana	
Clarian Health Partners Incorporated	Indianapolis
<i>including:</i> Indiana University Medical Center	Indianapolis
Floyd Memorial Hospital and Health Services	New Albany
Parkview Hospital	Fort Wayne
Saint Margaret Mercy Healthcare Centers	Hammond
Saint Vincent Indianapolis Hospital	Indianapolis
The Community Hospital	Munster
The Methodist Hospital	Gary
<i>including:</i> Methodist Hospital - Southlake	Merrillville
Iowa	
Iowa Methodist Medical Center	Des Moines
Mercy Hospital - Iowa City	Iowa City
Mercy Medical Center - Des Moines	Des Moines
Saint Luke's Hospital	Cedar Rapids
Kansas	
Providence Medical Center	Kansas City
Saint Francis Health Center	Topeka
Kentucky	
Owensboro Medical Health System	Owensboro
Saint Elizabeth Medical Center	Edgewood
Saint Joseph - London	London

* Distinction cannot be used without a Licensing Agreement from Health Grades, Inc. Continued...

HealthGrades 2010/2011 Women's Health Excellence Award™ Recipients*	City
Louisiana	
<i>There are no recipients of this award in this state.</i>	
Maine	
<i>There are no recipients of this award in this state.</i>	
Maryland	
Peninsula Regional Medical Center	Salisbury
Saint Joseph Medical Center	Towson
Sinai Hospital of Baltimore	Baltimore
Union Memorial Hospital	Baltimore
Massachusetts	
<i>There are no recipients of this award in this state.</i>	
Michigan	
Beaumont Hospital - Royal Oak	Royal Oak
Beaumont Hospital - Troy	Troy
Genesys Regional Medical Center	Grand Blanc
Henry Ford Macomb Hospital	Clinton Township
Munson Medical Center	Traverse City
Providence Hospital	Southfield
Sinai - Grace Hospital	Detroit
Spectrum Health Butterworth Hospital	Grand Rapids
<i>including:</i> Spectrum Health Blodgett Hospital	Grand Rapids
Minnesota	
Fairview Southdale Hospital	Edina
North Memorial	Robbinsdale
Park Nicollet Methodist Hospital	Minneapolis
Saint Luke's Hospital	Duluth
United Hospitals	Saint Paul
Mississippi	
<i>There are no recipients of this award in this state.</i>	
Missouri	
Boone Hospital Center	Columbia
Christian Hospital	Saint Louis
Missouri Baptist Medical Center	Saint Louis
Skaggs Regional Medical Center	Branson
SSM Saint Joseph Hospital of Kirkwood	Kirkwood
St. Luke's Hospital	Chesterfield

* Distinction cannot be used without a Licensing Agreement from Health Grades, Inc. Continued...

HealthGrades 2010/2011 Women's Health Excellence Award™ Recipients*	City
Montana	
<i>There are no recipients of this award in this state.</i>	
Nebraska	
<i>There are no recipients of this award in this state.</i>	
Nevada	
<i>There are no recipients of this award in this state.</i>	
New Hampshire	
Dartmouth - Hitchcock Medical Center	Lebanon
New Jersey	
Hackensack University Medical Center	Hackensack
Jersey Shore University Medical Center	Neptune
Valley Hospital	Ridgewood
New Mexico	
<i>There are no recipients of this award in this state.</i>	
New York	
Albany Medical Center Hospital	Albany
Maimonides Medical Center	Brooklyn
Rochester General Hospital	Rochester
Winthrop - University Hospital	Mineola
North Carolina	
<i>There are no recipients of this award in this state.</i>	
North Dakota	
Altru Hospital	Grand Forks
Saint Alexius Medical Center	Bismarck
Ohio	
Akron General Medical Center	Akron
Aultman Hospital	Canton
Christ Hospital	Cincinnati
EMH Regional Medical Center	Elyria
Fairview Hospital	Cleveland
Forum Health Trumbull Memorial Hospital	Warren
Good Samaritan Hospital	Cincinnati
Hillcrest Hospital	Mayfield Heights
Kettering Medical Center	Kettering
Lake Health	Painesville
Miami Valley Hospital	Dayton
Mount Carmel Health	Columbus

* Distinction cannot be used without a Licensing Agreement from Health Grades, Inc. Continued....

HealthGrades 2010/2011 Women's Health Excellence Award™ Recipients*	City
Ohio (continued)	
Parma Community General Hospital	Parma
Saint Elizabeth Health Center	Youngstown
The Toledo Hospital	Toledo
Oklahoma	
<i>There are no recipients of this award in this state.</i>	
Oregon	
Saint Charles Medical Center - Bend	Bend
Pennsylvania	
Community Medical Center	Scranton
Easton Hospital	Easton
Hamot Medical Center	Erie
Lancaster General Hospital	Lancaster
Lehigh Valley Hospital	Allentown
Mercy Hospital Scranton	Scranton
Penn Presbyterian Medical Center	Philadelphia
Pocono Medical Center	East Stroudsburg
Saint Luke's Hospital	Bethlehem
<i>including:</i> Saint Luke's Hospital - Allentown Campus	Allentown
The Reading Hospital and Medical Center	Reading
Thomas Jefferson University Hospitals	Philadelphia
<i>including:</i> Methodist Hospital	Philadelphia
Western Pennsylvania Hospital	Pittsburgh
Rhode Island	
<i>There are no recipients of this award in this state.</i>	
South Carolina	
AnMed Health	Anderson
Medical University of South Carolina	Charleston
Spartanburg Regional Medical Center	Spartanburg
South Dakota	
<i>There are no recipients of this award in this state.</i>	
Tennessee	
Baptist Memorial Hospital	Memphis
Memorial Healthcare System	Chattanooga
Saint Thomas Hospital	Nashville

* Distinction cannot be used without a Licensing Agreement from Health Grades, Inc. Continued...

HealthGrades 2010/2011 Women's Health Excellence Award™ Recipients*	City
Texas	
Baptist Health System	San Antonio
<i>including:</i> Saint Luke's Lutheran Hospital	San Antonio
CHRISTUS Santa Rosa Healthcare - San Antonio	San Antonio
Harlingen Medical Center	Harlingen
Laredo Medical Center	Laredo
Medical Center of Arlington	Arlington
Memorial Hermann Memorial City Hospital	Houston
Methodist Hospital	San Antonio
<i>including:</i> Methodist Specialty and Transplant Hospital	San Antonio
Metropolitan Methodist Hospital	San Antonio
Northeast Methodist Hospital	San Antonio
Saint David's Medical Center	Austin
Saint Luke's Episcopal Hospital	Houston
Seton Medical Center	Austin
South Texas Health - Edinburg Regional Medical Center	Edinburg
<i>including:</i> South Texas Health - McAllen Medical Center/ Heart Hospital	McAllen
The Methodist Hospital	Houston
<i>including:</i> Diagnostic Center Hospital	Houston
Tomball Regional Medical Center	Tomball
Valley Baptist Medical Center	Harlingen
Utah	
Intermountain Medical Center	Murray
Vermont	
<i>There are no recipients of this award in this state.</i>	
Virginia	
Bon Secours Memorial Regional Medical Center	Mechanicsville
Henrico Doctors' Hospital - Forest	Richmond
<i>including:</i> Henrico Doctors' Hospital - Parham	Richmond
Inova Alexandria Hospital	Alexandria
Washington	
<i>There are no recipients of this award in this state</i>	
West Virginia	
Charleston Area Medical Center	Charleston
Saint Mary's Medical Center	Huntington

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 Appendix A: HealthGrades 2010/2011 Women's Health Excellence Award Recipients

HealthGrades 2010/2011 Women's Health Excellence Award™ Recipients*	City
Wisconsin	
Aspirus Wausau Hospital	Wausau
Aurora BayCare Medical Center	Green Bay
Aurora Saint Luke's Medical Center <i>including:</i> Saint Luke's Medical Center	Milwaukee Cudahy
Bellin Memorial Hospital	Green Bay
Gundersen Lutheran Medical Center	La Crosse
Saint Joseph's Hospital	Marshfield
Wyoming	
<i>There are no recipients of this award in this state.</i>	

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Appendix B: Women's Bone and Joint Health Performance

Women's Health Outcomes Performance	Observed Inhospital Complication Rate	Expected Inhospital Complication Rate	Observed-to-Expected Ratio	95 Percent CI for Ratio	Relative Risk Reduction Best to Poor	Relative Risk Reduction Best to Average	Potential Complications Avoided
Back and Neck Surgery (with Spinal Fusion)							
Best	15.66%	16.21%	.97	(.93-1.01)			0
Average	15.43%	15.85%	.97	(.95-1.00)		.77%	47
Poor	17.73%	15.47%	1.15	(1.10-1.19)	15.73%		349
Total							396
Back and Neck Surgery (without Spinal Fusion)							
Best	9.80%	10.94%	.90	(.84-.95)			0
Average	10.67%	10.67%	1.00	(.97-1.03)		10.48%	395
Poor	12.50%	10.73%	1.17	(1.10-1.23)	23.13%		269
Total							664
Hip Fracture Repair							
Best	10.44%	11.58%	.90	(.88-.93)			0
Average	11.31%	11.34%	1.00	(.98-1.01)		9.56%	1,212
Poor	12.32%	10.95%	1.13	(1.09-1.16)	19.86%		842
Total							2,054
Total Hip Replacement							
Best	6.19%	7.01%	.88	(.84-.93)			0
Average	6.82%	6.97%	.98	(.95-1.01)		9.88%	370
Poor	8.54%	6.88%	1.24	(1.18-1.31)	28.92%		336
Total							706
Total Knee Replacement							
Best	5.97%	6.54%	.91	(.88-.94)			0
Average	6.05%	6.39%	.95	(.93-.97)		3.58%	310
Poor	7.29%	6.29%	1.16	(1.12-1.20)	21.39%		582
Total							892

Appendix C: Women's Cardiovascular Performance

Women's Health Outcomes Performance	Observed Inhospital Mortality Rate	Expected Inhospital Mortality Rate	Observed-to-Expected Ratio	95 Percent CI for Ratio	Relative Risk Reduction Best to Poor	Relative Risk Reduction Best to Average	Potential Lives Saved
Coronary Bypass Surgery							
Best	2.69%	3.74%	.72	(.64-.80)			0
Average	3.33%	3.30%	1.01	(.95-1.06)		28.61%	400
Poor	4.48%	3.26%	1.38	(1.28-1.47)	47.72%		261
						Total	661
Coronary Interventional Procedures							
Best	1.37%	1.76%	.78	(.72-.83)			0
Average	1.54%	1.60%	.96	(.92-1.00)		19.02%	523
Poor	2.00%	1.51%	1.33	(1.26-1.40)	41.31%		423
						Total	946
Resection / Replacement of Abdominal Aorta							
Best	4.18%	5.14%	.81	(.50-1.13)			0
Average	3.67%	5.09%	.72	(.49-.96)		-12.9%	-6
Poor	9.67%	8.26%	1.17	(.75-1.59)	30.41%		7
						Total	1
Valve Replacement Surgery							
Best	6.55%	8.09%	.81	(.74-.88)			0
Average	7.71%	7.84%	.98	(.94-1.03)		17.72%	345
Poor	9.76%	7.68%	1.27	(1.17-1.37)	36.38%		190
						Total	535
Complication-based Procedures							
Women's Health Outcomes Performance	Observed Inhospital Complication Rate	Expected Inhospital Complication Rate	Observed-to-Expected Ratio	95 Percent CI for Ratio	Relative Risk Reduction Best to Poor	Relative Risk Reduction Best to Average	Potential Complications Avoided
Carotid Surgery							
Best	6.94%	7.20%	.96	(.90-1.02)			0
Average	6.75%	7.14%	.95	(.91-.98)		-1.93%	-49
Poor	7.48%	7.37%	1.01	(.95-1.08)	4.97%		41
						Total	-8
Peripheral Vascular Bypass							
Best	9.42%	9.45%	1.00	(.86-1.13)			0
Average	9.08%	8.91%	1.02	(.93-1.11)		2.17%	10
Poor	11.04%	8.93%	1.24	(1.03-1.44)	19.36%		21
						Total	31

Appendix D: Women's Medicine Performance

Women's Health Outcomes Performance	Observed Inhospital Mortality Rate	Expected Inhospital Mortality Rate	Observed-to-Expected Ratio	95 Percent CI for Ratio	Relative Risk Reduction Best to Poor	Relative Risk Reduction Best to Average	Potential Lives Saved
Chronic Obstructive Pulmonary Disease							
Best	1.38%	2.01%	.69	(.63-.75)			0
Average	1.80%	1.90%	.95	(.91-.99)		27.21%	660
Poor	2.31%	1.72%	1.34	(1.26-1.41)	48.58%		445
Total							1,105
Heart Attack							
Best	7.75%	9.33%	.83	(.80-.86)			0
Average	8.75%	8.82%	.99	(.97-1.01)		16.30%	1,899
Poor	10.34%	8.61%	1.20	(1.17-1.23)	30.81%		1,201
Total							3,100
Heart Failure							
Best	2.84%	3.97%	.71	(.68-.74)			0
Average	3.46%	3.71%	.93	(.91-.95)		23.28%	2,062
Poor	4.35%	3.50%	1.24	(1.20-1.28)	42.49%		1,353
Total							3,415
Pneumonia							
Best	3.41%	5.31%	.64	(.61-.67)			0
Average	4.51%	5.08%	.89	(.87-.91)		27.72%	2,199
Poor	5.95%	4.79%	1.24	(1.20-1.28)	48.32%		1,569
Total							3,768
Stroke							
Best	5.75%	7.79%	.74	(.71-.77)			0
Average	7.51%	7.64%	.98	(.96-1.00)		24.78%	2,113
Poor	9.30%	7.73%	1.20	(1.16-1.24)	38.55%		1,219
Total							3,332

Appendix E: Risk-adjusted Mortality Performance Improvement Women's Health Excellence Award Hospitals Compared to All Others

Cohort	Year	Observed Mortality	Expected Mortality	Cases All Hospitals	Observed to Expected Ratio All Hospitals	Improvement 2006-2008 All Hospitals	Observed to Expected Ratio Women's Health Excell. Award Hospitals	Improvement 2006-2008 Women's Health Excell. Award Hospitals
Chronic Obstructive Pulmonary Disease	2006	1,435	1,327.58	74,031	1.08		.80	
	2007	1,241	1,357.11	71,350	.91		.67	
	2008	1,444	1,689.09	85,107	.85		.61	
	2006-2008	4,120	4,373.78	230,488	.94	20.91%	.69	23.97%
Coronary Bypass Surgery	2006	941	873.44	26,003	1.08		.83	
	2007	783	814.25	23,618	.96		.71	
	2008	675	728.17	21,469	.93		.59	
	2006-2008	2,399	2,415.86	71,090	.99	13.96%	.72	28.42%
Coronary Interventional Procedures	2006	1,461	1,421.19	113,330	1.03		.79	
	2007	1,367	1,403.03	98,066	.97		.83	
	2008	1,909	2,044.95	88,378	.93		.73	
	2006-2008	4,737	4,869.16	299,774	.97	9.19%	.78	6.77%
Heart Attack	2006	7,110	6,807.96	78,069	1.04		.89	
	2007	6,502	6,620.25	74,020	.98		.84	
	2008	6,122	6,599.35	72,700	.93		.76	
	2006-2008	19,734	20,027.57	224,789	.99	11.17%	.83	14.82%
Heart Failure	2006	5,605	5,742.61	156,375	.98		.77	
	2007	5,110	5,767.77	146,677	.89		.69	
	2008	4,448	4,937.01	136,429	.90		.68	
	2006-2008	15,163	16,447.38	439,481	.92	7.69%	.71	11.78%
Pneumonia	2006	4,936	5,128.24	106,099	.96		.72	
	2007	4,385	5,062.98	100,869	.87		.63	
	2008	4,275	5,106.62	94,188	.84		.58	
	2006-2008	13,596	15,297.85	301,156	.89	13.02%	.64	19.75%
Resection / Replacement of Abdominal Aorta	2006	40	43.37	820	.92		.79	
	2007	32	45.54	836	.70		.74	
	2008	36	41.93	739	.86		.92	
	2006-2008	108	130.84	2,395	.83	6.91%	.81	-16.24%
Stroke	2006	5,107	5,024.50	66,210	1.02		.83	
	2007	4,833	4,962.66	63,945	.97		.71	
	2008	4,387	4,896.17	63,283	.90		.68	
	2006-2008	14,327	14,883.34	193,438	.96	11.85%	.74	18.34%
Valve Replacement Surgery	2006	1,149	1,087.67	13,991	1.06		.95	
	2007	1,026	1,037.44	13,473	.99		.75	
	2008	944	1,067.90	13,047	.88		.72	
	2006-2008	3,119	3,193.02	40,511	.98	16.32%	.81	24.34%
Totals		77,303	81,638.79	1,803,122		12.34%		14.66%

Appendix F: Risk-adjusted Complication Performance Improvement Women's Health Excellence Award Hospitals Compared to All Others

Cohort	Year	Observed Complications	Expected Complications	Cases All Hospitals	Observed to Expected Ratio All Hospitals	Improvement 2006-2008 All Hospitals	Observed to Expected Ratio Women's Health Excell. Award Hospitals	Improvement 2006-2008 Women's Health Excell. Award Hospitals
Back and Neck Surgery (with Spinal Fusion)	2006	3,546	3,496.67	22,030	1.01		.95	
	2007	3,506	3,616.09	22,537	.97		.96	
	2008	3,829	3,736.54	23,838	1.02		.99	
	2006-2008	10,881	10,849.30	68,405	1.00	-1.05%	.97	-4.31%
Back and Neck Surgery (without Spinal Fusion)	2006	2,128	2,198.62	20,416	.97		.89	
	2007	2,111	2,079.63	19,067	1.02		.93	
	2008	2,036	1,984.70	18,832	1.03		.87	
	2006-2008	6,275	6,262.95	58,315	1.00	-5.99%	.90	2.78%
Carotid Surgery	2006	1,465	1,521.14	21,945	.96		1.04	
	2007	1,427	1,542.23	21,288	.93		.93	
	2008	1,498	1,499.62	20,167	1.00		.93	
	2006-2008	4,390	4,562.99	63,400	.96	-3.72%	.96	10.34%
Hip Fracture Repair	2006	7,042	7,147.64	64,812	.99		.89	
	2007	7,016	7,267.98	63,801	.97		.88	
	2008	7,608	7,323.81	63,365	1.04		.94	
	2006-2008	21,666	21,739.44	191,978	1.00	-5.44%	.90	-5.56%
Peripheral Vascular Bypass	2006	300	285.43	3,216	1.05		.87	
	2007	254	249.08	2,753	1.02		1.04	
	2008	238	228.12	2,450	1.04		1.10	
	2006-2008	792	762.63	8,419	1.04	.74%	1.00	-25.99%
Total Hip Replacement	2006	2,115	2,208.50	31,468	.96		.88	
	2007	2,108	2,188.98	31,200	.96		.81	
	2008	2,318	2,211.07	32,178	1.05		.96	
	2006-2008	6,541	6,608.56	94,846	.99	-9.47%	.88	-9.09%
Total Knee Replacement	2006	5,135	5,305.59	82,827	.97		.92	
	2007	4,966	5,248.86	81,340	.95		.86	
	2008	5,217	5,265.18	82,359	.99		.95	
	2006-2008	15,318	15,819.63	246,526	.97	-2.38%	.91	-2.92%
Totals		65,863	66,605.50	731,889		-3.90%		-4.97%

Appendix G: Women's Health Outcomes by State

Top-ten and bottom-ten states based on women's health overall average performance are shaded below.

State / Abbreviation		Average		Women's Bone and Joint Health		Women's Cardiovascular Procedures		Women's Medicine	
		O/E*	Rank	O/E*	Rank	O/E*	Rank	O/E*	Rank
Alabama	AL	1.06		.98		1.05		1.13	
Alaska	AK	1.06		1.27	Bottom 10	.78	Top 10	1.13	
Arizona	AZ	.92		1.13	Bottom 10	.99		.66	Top 10
Arkansas	AR	1.00		.81	Top 10	1.01		1.17	Bottom 10
California	CA	.97		.95		.99		.98	
Colorado	CO	.88	Top 10	1.02		.72	Top 10	.89	
Connecticut	CT	.92	Top 10	.95		.97		.85	Top 10
Delaware	DE	.91	Top 10	.91		.98		.85	
Dist. Of Columbia	DC	1.03		.83	Top 10	1.22	Bottom 10	1.03	
Florida	FL	.89	Top 10	.91		.95		.82	Top 10
Georgia	GA	1.00		.91		.99		1.11	
Hawaii	HI	1.09	Bottom 10	.68	Top 10	1.34	Bottom 10	1.26	Bottom 10
Idaho	ID	.96		.96		.58	Top 10	1.33	Bottom 10
Illinois	IL	.91	Top 10	1.01		.88	Top 10	.85	Top 10
Indiana	IN	.90	Top 10	.90		.96		.83	Top 10
Iowa	IA	.95		.95		1.04		.87	
Kansas	KS	1.01		.93		1.15	Bottom 10	.94	
Kentucky	KY	.98		1.03		.98		.94	
Louisiana	LA	1.00		.99		1.03		.99	
Maine	ME	1.07	Bottom 10	1.21	Bottom 10	.98		1.03	
Maryland	MD	.96		1.10		1.01		.79	Top 10
Massachusetts	MA	1.07	Bottom 10	1.17	Bottom 10	.98		1.06	
Michigan	MI	.90	Top 10	.94		.93	Top 10	.84	Top 10
Minnesota	MN	.99		1.15	Bottom 10	1.04		.79	Top 10
Mississippi	MS	1.02		.92		.97		1.18	Bottom 10
Missouri	MO	1.04		1.04		1.10	Bottom 10	.98	
Montana	MT	1.01		.87	Top 10	.95		1.21	Bottom 10
Nebraska	NE	1.06	Bottom 10	1.03		1.06		1.10	
Nevada	NV	1.16	Bottom 10	1.19	Bottom 10	1.26	Bottom 10	1.02	
New Hampshire	NH	.99		1.06		1.04		.86	
New Jersey	NJ	.98		.97		.98		1.00	
New Mexico	NM	.95		.75	Top 10	.95		1.16	Bottom 10
New York	NY	1.06	Bottom 10	1.12	Bottom 10	.96		1.10	
North Carolina	NC	1.10	Bottom 10	1.07		1.07	Bottom 10	1.16	Bottom 10
North Dakota	ND	.94		.89	Top 10	1.04		.88	
Ohio	OH	.92	Top 10	1.07		.90	Top 10	.78	Top 10

*O/E = Observed-to-Expected Ratio

Continued...

Appendix G: Women's Health Outcomes by State (continued)

State / Abbreviation		Average		Women's Bone and Joint Health		Women's Cardiovascular Procedures		Women's Medicine	
		O/E*	Rank	O/E*	Rank	O/E*	Rank	O/E*	Rank
Oklahoma	OK	.94		.84	Top 10	.97		1.00	
Oregon	OR	.94		.88	Top 10	.90	Top 10	1.02	
Pennsylvania	PA	.96		1.06		.91	Top 10	.90	
Rhode Island	RI	1.14	Bottom 10	1.20	Bottom 10	1.22	Bottom 10	1.01	
South Carolina	SC	1.01		.97		.96		1.10	
South Dakota	SD	.91	Top 10	.78	Top 10	.79	Top 10	1.15	Bottom 10
Tennessee	TN	.96		.84	Top 10	1.01		1.01	
Texas	TX	.92	Top 10	.94		.93		.89	
Utah	UT	.95		1.03		1.00		.84	Top 10
Vermont	VT	1.24	Bottom 10	1.31	Bottom 10	1.17	Bottom 10	1.23	Bottom 10
Virginia	VA	1.03		1.10	Bottom 10	1.05		.93	
Washington	WA	1.02		.98		1.15	Bottom 10	.92	
West Virginia	WV	1.01		1.10		.95		1.00	
Wisconsin	WI	.94		1.08		.88	Top 10	.87	
Wyoming	WY	1.18	Bottom 10	.99		1.19	Bottom 10	1.36	Bottom 10

*O/E = Observed-to-Expected Ratio

Appendix H: Patient Cohorts and Related ICD-9-CM Codes

Patient Definitions	ICD-9 Procedure/Diagnosis Codes and Criteria
Back and Neck Surgery (with Spinal Fusion)	Inclusions
	Principal Procedure: 81.00, 81.01, 81.02, 81.03, 81.04, 81.05, 81.06, 81.07, 81.08, 81.61, 81.62, 81.63, 81.64
	Exclusions Procedures (Primary or Secondary): 03.02, 37.51, 37.52, 37.53, 37.54, 37.5, 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 Principal Diagnoses: 996.4, 996.40, 996.41, 996.42, 996.43, 996.44, 996.47, 996.49, 996.78 Diagnoses (Primary or Secondary): 198.5, 722.80, 722.81, 722.82, 722.83, 996.45, 996.46, V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9, V45.4
Back and Neck Surgery (without Spinal Fusion)	Inclusions
	Principal Procedure: 03.09, 03.53, 80.50, 80.51, 80.59, 84.59, 84.60, 84.61, 84.62, 84.63, 84.64, 84.65
	Exclusions Procedures (Primary or Secondary): 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 Principal Diagnoses: 996.4, 996.40, 996.41, 996.42, 996.43, 996.44, 996.47, 996.49, 996.78 Diagnoses (Primary or Secondary): 198.5, 722.80, 722.81, 722.82, 722.83, 996.45, 996.46, V42.0, V42.1, V42.4, V45.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9, V54.0, V54.01, V54.09
Carotid Surgery	Inclusions
	Principal Procedure: 00.61, 00.63, 38.12, 39.72, 39.74
	Exclusions Procedures (Primary or Secondary): 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 Diagnoses (Primary or Secondary): 430, V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9
Chronic Obstructive Pulmonary Disease (COPD)	Inclusions
	Principal Diagnosis: 491.1, 491.20, 491.21, 491.8, 491.9, 492.8, 493.20, 493.21, 493.22, 494, 494.0, 494.1, 496 Diagnosis (Primary or Secondary): 491.22
	Exclusions Procedures (Primary or Secondary): 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63 Diagnoses (Primary or Secondary): 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, V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9, V66.7

Patient Definitions	ICD-9 Procedure/Diagnosis Codes and Criteria
Coronary Bypass Surgery	Inclusions
	Principal Procedure: 36.10, 36.11, 36.12, 36.13, 36.14, 36.15, 36.16, 36.19
	Exclusions Procedures (Primary or Secondary): 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, 35.55, 36.33, 36.34, 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 (Primary or Secondary): 414.06, 414.07, 441.00, 441.01, 441.02, 441.03, V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9
Coronary Interventional Procedures	Inclusions
	Principal Procedure: 00.66, 36.01, 36.02, 36.05, 36.06, 36.07, 36.09
	Exclusions Procedures (Primary or Secondary): 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 (Primary or Secondary): 414.06, 414.07, V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9
Heart Attack	Inclusions
	Principal Diagnosis: 410.01, 410.11, 410.21, 410.31, 410.41, 410.51, 410.61, 410.71, 410.81, 410.91
	Exclusions Procedures (Primary or Secondary): 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63 Diagnoses (Primary or Secondary): 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, V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9, V66.7
Heart Failure	Inclusions
	Principal Diagnosis: 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
	Exclusions Procedures (Primary or Secondary): 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63, 39.95 Diagnoses (Primary or Secondary): 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, V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9, V66.7

Patient Definitions	ICD-9 Procedure/Diagnosis Codes and Criteria
Hip Fracture Repair	Inclusions
	Principal Procedure: 79.05, 79.15, 79.25, 79.35, 81.52
	Exclusions
Peripheral Vascular Bypass	Inclusions
	Principal Procedure: 39.29 Principal Diagnosis: 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, 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
	Exclusions
Pneumonia	Inclusions
	Principal Diagnosis: 481, 482.0, 482.1, 482.2, 482.30, 482.31, 482.32, 482.39, 482.40, 482.41, 482.49, 482.81, 482.82, 482.83, 482.84, 482.89, 482.9, 483.0, 483.1, 483.8, 485, 486, 487.0
	Exclusions
Resection / Replacement of Abdominal Aorta	Inclusions
	Principal Procedure: 38.34, 38.44, 38.64, 39.71
	Exclusions

Patient Definitions	ICD-9 Procedure/Diagnosis Codes and Criteria
Stroke	Inclusions
	Principal Diagnosis: 430, 431, 432.9, 433.01, 433.11, 433.21, 433.31, 433.81, 433.91, 434.01, 434.11, 434.91, 436
	Exclusions
	Procedures (Primary or Secondary): 37.5, 37.51, 37.52, 37.53, 37.54, 37.62, 37.63 Diagnoses (Primary or Secondary): 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, 432.1, V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9, V66.7
Total Hip Replacement	Inclusions
	Principal Procedure: 00.85, 00.86, 00.87, 81.51
	Exclusions
	Procedures (Primary or Secondary): 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 Diagnoses (Primary only): 996.4, 996.40, 996.41, 996.42, 996.43, 996.44, 996.47, 996.49, 996.78 Diagnoses (Primary or Secondary): 820.09, 820.8, 996.45, 996.46, 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, 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, V15.5, V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9, V58.43, V58.49
Total Knee Replacement	Inclusions
	Principal Procedure: 81.54
	Exclusions
	Procedures (Primary or Secondary): 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
	Principal Diagnoses: 996.4, 996.40, 996.41, 996.42, 996.43, 996.44, 996.47, 996.49, 996.78
	Diagnoses (Primary or Secondary): 996.45, 996.46, V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9
Valve Replacement Surgery	Inclusions
	Procedures (Primary or Secondary): 35.20, 35.21, 35.22, 35.23, 35.24, 35.25, 35.26, 35.27, 35.28
	Exclusions
	Procedures (Primary or Secondary): 35.55, 36.33, 36.34, 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 (Primary or Secondary): 414.06, 414.07, 441.00, 441.01, 441.02, 441.03, 441.2, V42.0, V42.1, V42.4, V42.6, V42.7, V42.81, V42.82, V42.83, V42.84, V42.89, V42.9

Appendix I: Major Complications

Major Complications – Back and Neck Surgery (Spinal Fusion)

Major Complications – Back and Neck Surgery (Spinal Fusion)			
038	SEPTICEMIA	482.32	GROUP B STREP PNEUMONIA
038.0	STREPTOCOCCAL SEPTICEMIA	482.39	STREP PNEUMONIA NEC
038.1	STAPH SEPTICEMIA	482.4	STAPHYLOCOCCAL PNEUMONIA
038.10	STAPH SEPTICEMIA NOS	482.40	STAPH PNEUMONIA NOS
038.11	STAPH AUREUS SEPTICEMIA	482.41	STAPH AUREUS PNEUMONIA
038.19	STAPH SEPTICEMIA NEC	482.49	STAPH PNEUMONIA NEC
038.2	PNEUMOCOCCAL SEPTICEMIA	482.81	PNEUMONIA D/T ANAEROBES
038.3	ANAEROBIC SEPTICEMIA	482.82	E. COLI PNEUMONIA
038.4	GRAM-NEG SEPTICEMIA NEC	482.83	GRAM-NEG PNEUMONIA NEC
038.40	GRAM-NEG SEPTICEMIA NOS	482.84	LEGIONNAIRES' DISEASE
038.41	H. INFLUENZAE SEPTICEMIA	482.89	BACTERIAL PNEUMONIA NEC
038.42	E. COLI SEPTICEMIA	482.9	BACTERIAL PNEUMONIA NOS
038.43	PSEUDOMONAS SEPTICEMIA	483	PNEUMONIA ORGANISM NEC
038.44	SERRATIA SEPTICEMIA	483.0	M. PNEUMONIAE PNEUMONIA
038.49	GRAM-NEG SEPTICEMIA NEC	483.1	CHLAMYDIAL PNEUMONIA
038.8	SEPTICEMIA NEC	483.8	PNEUMONIA D/T ORG NEC
038.9	SEPTICEMIA NOS	484	PNEUM IN OTH INF DIS
292.81	DRUG-INDUCED DELIRIUM	484.1	PNEUMONIA IN CMV DISEASE
293.0	DELIRIUM D/T CCE	484.3	PNEUMONIA IN WHOOP COUGH
410.01	ANTEROLAT AMI-INITIAL	484.5	PNEUMONIA IN ANTHRAX
410.11	ANT AMI NEC-INITIAL	484.6	PNEUM IN ASPERGILLOSIS
410.21	INFEROLAT AMI-INITIAL	484.7	PNEUM IN SYST MYCOSESNEC
410.31	INFEROPOST AMI-INITIAL	484.8	PNEUM IN INFECT DIS NEC
410.41	INF AMI NEC-INITIAL	485	BRONCHOPNEUMONIA ORG NOS
410.51	LAT AMI NEC-INITIAL	486	PNEUMONIA ORGANISM NOS
410.61	POSTERIOR AMI-INITIAL	507.0	FOOD/VOMIT PNEUMONITIS
410.71	SUBEND INFARCT-INITIAL	511.9	PLEURAL EFFUSION NOS
410.81	AMI NEC-INITIAL EPISODE	518.5	POSTTR PULMON INSUFF
410.91	AMI NOS-INITIAL EPISODE	518.7	TRALI
415.11	IATRO PULM EMBOL/INFARCT	518.81	AC RESPIRATORY FAILURE
415.19	PULMON EMBOL/INFARCT NEC	584.5	AC RF W TUBULAR NEPHR
480	VIRAL PNEUMONIA	584.8	ACUTE RENAL FAILURE NEC
480.0	ADENOVIRAL PNEUMONIA	584.9	ACUTE RENAL FAILURE NOS
480.1	RSV PNEUMONIA	995.91	SEPSIS
480.2	PARINFLUENZA VIRAL PNEUM	995.92	SEVERE SEPSIS
480.3	SARS PNEUMONIA	996.4	MECH COMP INT ORTH DEV
480.8	VIRAL PNEUMONIA NEC	996.40	MECH COMP INT ORTH NOS
480.9	VIRAL PNEUMONIA NOS	996.42	DISLOCATION JOINT PROSTH
481	PNEUMOCOCCAL PNEUMONIA	996.41	MECH LOOSENING JT PROSTH
482	OTHER BACT PNEUMONIA	996.43	PROSTH JOINT FAILURE
482.0	K. PNEUMONIAE PNEUMONIA	996.44	PERI-PROSTHETIC FRACTURE
482.1	PSEUDOMONAL PNEUMONIA	996.47	MECH COMP JT PROSTH NEC
482.2	H. INFLUENZAE PNEUMONIA	996.49	MECH COMP INT ORTH NEC
482.3	STREPTOCOCCAL PNEUMONIA	996.77	COMP NEC D/T JT PROSTH
482.4	PNEUMONIA-STAPHYLOCOCCUS	996.78	COMP NEC ORTH DEV NEC
482.30	STREP PNEUMONIA NOS	997.02	IATROGEN CV INFARCT/HEM
482.31	GROUP A STREP PNEUMONIA	997.09	NERV SYST SURG COMP NEC

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

Major Complications – Back and Neck Surgery (Spinal Fusion) continued			
997.1	SURG COMP-HEART	998.2	ACCIDENTAL OP LACERATION
997.3	SURG COMP-RESP NEC	998.3	POSTOP WOUND DISRUPTION
997.4	SURG COMP-DIGESTIVE	998.31	DISRUPT INTERNAL OP WND
997.5	SURG COMP-URINARY NEC	998.32	DISRUPT EXTERNAL OP WND
998.0	POSTOPERATIVE SHOCK	998.59	POSTOP INFECTION NEC
998.11	HEMORRHAGE COMP PX		

Dependent Complications – Back and Neck Surgery (Spinal Fusion)

Must occur with 997.1 Cardiac Complications			
427.0	PSVT	428.23	AC & CHR SYSTOLIC HF
427.1	PVT	428.3	DIASTOLIC HEART FAILURE
427.31	ATRIAL FIBRILLATION	428.30	DIASTOLIC HF NOS
427.32	ATRIAL FLUTTER	428.31	ACUTE DIASTOLIC HF
427.89	OTH CARDIAC DYSRHYTHMIAS	428.33	AC & CHR DIASTOLIC HF
427.9	CARDIAC DYSRHYTHMIA NOS	428.4	SYSTOLIC & DIASTOLIC HF
428.0	CHF NOS	428.40	SYS & DIASTOLIC HF NOS
428.1	LEFT HEART FAILURE	428.41	AC SYS & DIASTOLIC HF
428.2	SYSTOLIC HEART FAILURE	428.43	ACCHR SYS & DIASTOLIC HF
428.20	SYSTOLIC HF NOS	428.9	HEART FAILURE NOS
428.21	ACUTE SYSTOLIC HF		
Must occur with 997.4 Digestive System Complications			
560.1	PARALYTIC ILEUS		
Must occur with 997.5 Urinary Complications			
593.9	RENAL/URETER DISORD NOS	788.20	RETENTION OF URINE NOS
599.0	URINARY TRACT INF 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)			
038	SEPTICEMIA	482.8	BACTERIAL PNEUMONIA NEC
038.0	STREPTOCOCCAL SEPTICEMIA	482.81	PNEUMONIA D/T ANAEROBES
038.1	STAPH SEPTICEMIA	482.82	E. COLI PNEUMONIA
038.10	STAPH SEPTICEMIA NOS	482.83	GRAM-NEG PNEUMONIA NEC
038.11	STAPH AUREUS SEPTICEMIA	482.84	LEGIONNAIRES' DISEASE
038.19	STAPH SEPTICEMIA NEC	482.89	BACTERIAL PNEUMONIA NEC
038.2	PNEUMOCOCCAL SEPTICEMIA	482.9	BACTERIAL PNEUMONIA NOS
038.3	ANAEROBIC SEPTICEMIA	483	PNEUMONIA ORGANISM NEC
038.4	GRAM-NEG SEPTICEMIA NEC	483.0	M. PNEUMONIAE PNEUMONIA
038.40	GRAM-NEG SEPTICEMIA NOS	483.1	CHLAMYDIAL PNEUMONIA
038.41	H. INFLUENZAE SEPTICEMIA	483.8	PNEUMONIA D/T ORG NEC
038.42	E. COLI SEPTICEMIA	484	PNEUM IN OTH INF DIS
038.43	PSEUDOMONAS SEPTICEMIA	484.1	PNEUMONIA IN CMV DISEASE
038.44	SERRATIA SEPTICEMIA	484.3	PNEUMONIA IN WHOOP COUGH
038.49	GRAM-NEG SEPTICEMIA NEC	484.5	PNEUMONIA IN ANTHRAX
038.8	SEPTICEMIA NEC	484.6	PNEUM IN ASPERGILLOSIS
038.9	SEPTICEMIA NOS	484.7	PNEUM IN SYST MYCOSESNEC
292.81	DRUG-INDUCED DELIRIUM	484.8	PNEUM IN INFECT DIS NEC
293.0	DELIRIUM D/T CCE	485	BRONCHOPNEUMONIA ORG NOS
410.01	ANTEROLAT AMI-INITIAL	486	PNEUMONIA ORGANISM NOS
410.11	ANT AMI NEC-INITIAL	507.0	FOOD/VOMIT PNEUMONITIS
410.21	INFEROLAT AMI-INITIAL	511.9	PLEURAL EFFUSION NOS
410.31	INFEROPOST AMI-INITIAL	518.5	POSTTR PULMON INSUFF
410.41	INF AMI NEC-INITIAL	518.7	TRALI
410.51	LAT AMI NEC-INITIAL	518.81	AC RESPIRATORY FAILURE
410.61	POSTERIOR AMI-INITIAL	584.5	AC RF W TUBULAR NEPHR
410.71	SUBEND INFARCT-INITIAL	584.8	ACUTE RENAL FAILURE NEC
410.81	AMI NEC-INITIAL EPISODE	584.9	ACUTE RENAL FAILURE NOS
410.91	AMI NOS-INITIAL EPISODE	995.91	SEPSIS
480	VIRAL PNEUMONIA	995.92	SEVERE SEPSIS
480.0	ADENOVIRAL PNEUMONIA	996.4	MECH COMP INT ORTH DEV
480.1	RSV PNEUMONIA	996.40	MECH COMP INT ORTH NOS
480.2	PARINFLUENZA VIRAL PNEUM	996.41	MECH LOOSENING JT PROSTH
480.3	SARS PNEUMONIA	996.42	DISLOCATION JOINT PROSTH
480.8	VIRAL PNEUMONIA NEC	996.43	PROSTH JOINT FAILURE
480.9	VIRAL PNEUMONIA NOS	996.44	PERI-PROSTHETIC FRACTURE
481	PNEUMOCOCCAL PNEUMONIA	996.47	MECH COMP JT PROSTH NEC
482	OTHER BACT PNEUMONIA	996.49	MECH COMP INT ORTH NEC
482.0	K. PNEUMONIAE PNEUMONIA	996.77	COMP NEC D/T JT PROSTH
482.1	PSEUDOMONAL PNEUMONIA	996.78	COMP NEC ORTH DEV NEC
482.2	H. INFLUENZAE PNEUMONIA	997.00	NERV SYST SURG COMP NOS
482.3	STREPTOCOCCAL PNEUMONIA	997.02	IATROGEN CV INFARCT/HEM
482.30	STREP PNEUMONIA NOS	997.09	NERV SYST SURG COMP NEC
482.31	GROUP A STREP PNEUMONIA	997.1	SURG COMP-HEART
482.32	GROUP B STREP PNEUMONIA	997.3	SURG COMP-RESP NEC
482.39	STREP PNEUMONIA NEC	997.4	SURG COMP-DIGESTIVE
482.4	STAPHYLOCOCCAL PNEUMONIA	997.5	SURG COMP-URINARY NEC
482.40	STAPH PNEUMONIA NOS	998.11	HEMORRHAGE COMP PX
482.41	STAPH AUREUS PNEUMONIA	998.2	ACCIDENTAL OP LACERATION
482.49	STAPH PNEUMONIA NEC	998.59	POSTOP INFECTION NEC

Dependent Complications – Back and Neck Surgery (except Spinal Fusion)

Must occur with 997.1 Cardiac Complications			
427.0	PSVT	428.23	AC & CHR SYSTOLIC HF
427.1	PVT	428.3	DIASTOLIC HEART FAILURE
427.31	ATRIAL FIBRILLATION	428.30	DIASTOLIC HF NOS
427.89	OTH CARDIAC DYSRHYTHMIAS	428.31	ACUTE DIASTOLIC HF
427.9	CARDIAC DYSRHYTHMIA NOS	428.33	AC & CHR DIASTOLIC HF
428.0	CHF NOS	428.4	SYSTOLIC & DIASTOLIC HF
428.1	LEFT HEART FAILURE	428.40	SYS & DIASTOLIC HF NOS
428.2	SYSTOLIC HEART FAILURE	428.41	AC SYS & DIASTOLIC HF
428.20	SYSTOLIC HF NOS	428.9	HEART FAILURE NOS
428.21	ACUTE SYSTOLIC HF		
Must occur with 997.4 Digestive System Complications			
560.1	PARALYTIC ILEUS		
Must occur with 997.5 Urinary Complications			
593.9	KIDNEY & URETER DIS, NOS	788.20	RETENTION OF URINE, NOS
599.0	URINARY TRACT INF NOS	788.29	RETENTION OF URINE, NEC

Major Complications – Carotid Surgery

Major Complications – Carotid Surgery			
410.01	ANTEROLAT AMI-INITIAL	482.89	BACTERIAL PNEUMONIA NEC
410.11	ANT AMI NEC-INITIAL	482.9	BACTERIAL PNEUMONIA NOS
410.21	INFEROLAT AMI-INITIAL	483	PNEUMONIA ORGANISM NEC
410.51	LAT AMI NEC-INITIAL	483.0	M. PNEUMONIAE PNEUMONIA
410.61	POSTERIOR AMI-INITIAL	483.1	CHLAMYDIAL PNEUMONIA
410.71	SUBEND INFARCT-INITIAL	483.8	PNEUMONIA D/T ORG NEC
410.81	AMI NEC-INITIAL EPISODE	484	PNEUM IN OTH INF DIS
410.91	AMI NOS-INITIAL EPISODE	484.1	PNEUMONIA IN CMV DISEASE
427.5	CARDIAC ARREST	484.3	PNEUMONIA IN WHOOP COUGH
480	VIRAL PNEUMONIA	484.5	PNEUMONIA IN ANTHRAX
480.0	ADENOVIRAL PNEUMONIA	484.6	PNEUM IN ASPERGILLOSIS
480.1	RSV PNEUMONIA	484.7	PNEUM IN SYST MYCOSESNEC
480.2	PARINFLUENZA VIRAL PNEUM	484.8	PNEUM IN INFECT DIS NEC
480.3	SARS PNEUMONIA	485	BRONCHOPNEUMONIA ORG NOS
480.8	VIRAL PNEUMONIA NEC	486	PNEUMONIA ORGANISM NOS
480.9	VIRAL PNEUMONIA NOS	507.0	FOOD/VOMIT PNEUMONITIS
481	PNEUMOCOCCAL PNEUMONIA	518.5	POSTTR PULMON INSUFF
482	OTHER BACT PNEUMONIA	518.7	TRALI
482.0	K. PNEUMONIAE PNEUMONIA	518.81	AC RESPIRATORY FAILURE
482.1	PSEUDOMONAL PNEUMONIA	780.01	COMA
482.2	H. INFLUENZAE PNEUMONIA	951.7	INJURY HYPOGLOSSAL NERVE
482.3	STREPTOCOCCAL PNEUMONIA	957.1	INJURY TO NERVE NEC
482.30	STREP PNEUMONIA NOS	997.00	NERV SYST SURG COMP NOS
482.31	GROUP A STREP PNEUMONIA	997.01	CNS SURG COMP
482.32	GROUP B STREP PNEUMONIA	997.02	IATROGEN CV INFARCT/HEM
482.39	STREP PNEUMONIA NEC	997.09	NERV SYST SURG COMP NEC
482.4	STAPHYLOCOCCAL PNEUMONIA	997.1	SURG COMP-HEART
482.40	STAPH PNEUMONIA NOS	997.3	SURG COMP-RESP NEC
482.41	STAPH AUREUS PNEUMONIA	997.4	SURG COMP-DIGESTIVE
482.49	STAPH PNEUMONIA NEC	997.5	SURG COMP-URINARY NEC
482.8	BACTERIAL PNEUMONIA NEC	997.91	SURG COMP-HYPERTENSION
482.81	PNEUMONIA D/T ANAEROBES	998.0	POSTOPERATIVE SHOCK
482.82	E. COLI PNEUMONIA	998.11	HEMORRHAGE COMP PX
482.83	GRAM-NEG PNEUMONIA NEC	998.2	ACCIDENTAL OP LACERATION
482.84	LEGIONNAIRES' DISEASE	998.59	POSTOP INFECTION NEC

Dependent Complications – Carotid Surgery

Must occur with 997.02 Nervous System Complications			
434.11	CEREBRAL EMBOLISM-INFRACT	434.91	CEREBR ART OCCL-INFRACTN
Must occur with 997.1 Cardiac Complications			
427.1	PVT	428.3	DIASTOLIC HEART FAILURE
427.31	ATRIAL FIBRILLATION	428.30	DIASTOLIC HF NOS
427.89	OTH CARDIAC DYSRHYTHMIAS	428.31	ACUTE DIASTOLIC HF
428.0	CHF NOS	428.33	AC & CHR DIASTOLIC HF
428.1	LEFT HEART FAILURE	428.4	SYSTOLIC & DIASTOLIC HF
428.2	SYSTOLIC HEART FAILURE	428.40	SYS & DIASTOLIC HF NOS
428.20	SYSTOLIC HF NOS	428.41	AC SYS & DIASTOLIC HF
428.21	ACUTE SYSTOLIC HF	428.43	ACCHR SYS & DIASTOLIC HF
428.23	AC & CHR SYSTOLIC HF	428.9	HEART FAILURE NOS

Dependent Complications – Carotid Surgery (continued)

Must occur with 997.4 Digestive System Complications			
560.1	PARALYTIC ILEUS		
Must occur with 997.5 Urinary Complications			
584.5	AC RF W TUBULAR NEPHR	593.9	RENAL/URETER DISORD NOS
584.8	ACUTE RENAL FAILURE NEC	599.0	URINARY TRACT INF NOS
584.9	ACUTE RENAL FAILURE NOS	788.20	RETENTION OF URINE NOS
Must occur with 998.59 Postoperative Infection			
038	SEPTICEMIA	038.40	GRAM-NEG SEPTICEMIA NOS
038.0	STREPTOCOCCAL SEPTICEMIA	038.41	H. INFLUENZAE SEPTICEMIA
038.1	STAPH SEPTICEMIA	038.42	E. COLI SEPTICEMIA
038.10	STAPH SEPTICEMIA NOS	038.43	PSEUDOMONAS SEPTICEMIA
038.11	STAPH AUREUS SEPTICEMIA	038.44	SERRATIA SEPTICEMIA
038.19	STAPH SEPTICEMIA NEC	038.49	GRAM-NEG SEPTICEMIA NEC
038.2	PNEUMOCOCCAL SEPTICEMIA	038.8	SEPTICEMIA NEC
038.3	ANAEROBIC SEPTICEMIA	038.9	SEPTICEMIA NOS
038.4	OTH GRAM-NEG SEPTICEMIA		

Major Complications – Hip Fracture Repair

Major Complications – Hip Fracture Repair			
292.81	DRUG-INDUCED DELIRIUM	996.78	COMP NEC ORTH DEV NEC
293.0	DELIRIUM D/T CCE	997.02	IATROGEN CV INFARCT/HEM
415.11	IATRO PULM EMBOL/INFARCT	997.1	SURG COMP-HEART
415.19	PULMON EMBOL/INFARCT NEC	997.3	SURG COMP-RESP NEC
512.1	IATROGENIC PNEUMOTHORAX	997.4	SURG COMP-DIGESTIVE
518.5	POSTTR PULMON INSUFF	997.5	SURG COMP-URINARY NEC
518.7	TRALI	998.0	POSTOPERATIVE SHOCK
785.59	SHOCK W/O TRAUMA NEC	998.11	HEMORRHAGE COMP PX
996.77	COMP NEC D/T JT PROSTH	998.59	POSTOP INFECTION NEC

Dependent Complications – Hip Fracture Repair

Must occur with 997.1 Cardiac Complications			
410.01	ANTEROLAT AMI-INITIAL	427.89	OTH CARDIAC DYSRHYTHMIAS
410.11	ANT AMI NEC-INITIAL	428.0	CHF NOS
410.21	INFEROLAT AMI-INITIAL	428.1	LEFT HEART FAILURE
410.31	INFEROPOST AMI-INITIAL	428.20	SYSTOLIC HF NOS
410.41	INF AMI NEC-INITIAL	428.21	ACUTE SYSTOLIC HF
410.51	LAT AMI NEC-INITIAL	428.23	AC & CHR SYSTOLIC HF
410.61	POSTERIOR AMI-INITIAL	428.30	DIASTOLIC HF NOS
410.71	SUBEND INFARCT-INITIAL	428.31	ACUTE DIASTOLIC HF
410.81	AMI NEC-INITIAL EPISODE	428.33	AC & CHR DIASTOLIC HF
410.91	AMI NOS-INITIAL EPISODE	428.40	SYS & DIASTOLIC HF NOS
427.0	PSVT	428.41	AC SYS & DIASTOLIC HF
427.1	PVT	428.43	ACCHR SYS & DIASTOLIC HF
427.31	ATRIAL FIBRILLATION	428.9	HEART FAILURE NOS
427.32	ATRIAL FLUTTER		

Dependent Complications – Hip Fracture Repair (continued)

Must occur with 997.3 Respiratory Complications			
480	VIRAL PNEUMONIA	482.81	PNEUMONIA D/T ANAEROBES
480.0	ADENOVIRAL PNEUMONIA	482.82	E. COLI PNEUMONIA
480.1	RSV PNEUMONIA	482.83	GRAM-NEG PNEUMONIA NEC
480.2	PARINFLUENZA VIRAL PNEUM	482.84	LEGIONNAIRES' DISEASE
480.3	SARS PNEUMONIA	482.89	BACTERIAL PNEUMONIA NEC
480.8	VIRAL PNEUMONIA NEC	482.9	BACTERIAL PNEUMONIA NOS
480.9	VIRAL PNEUMONIA NOS	483	PNEUMONIA ORGANISM NEC
481	PNEUMOCOCCAL PNEUMONIA	483.0	M. PNEUMONIAE PNEUMONIA
482	OTH BACTERIAL PNEUMONIA	483.1	CHLAMYDIAL PNEUMONIA
482.0	K. PNEUMONIAE PNEUMONIA	483.8	PNEUMONIA D/T ORG NEC
482.1	PSEUDOMONAL PNEUMONIA	484	PNEUM IN OTH INF DIS
482.2	H. INFLUENZAE PNEUMONIA	484.1	PNEUM IN CMV DISEASE
482.3	STREPTOCOCCAL PNEUMONIA	484.3	PNEUMONIA IN WHOOP COUGH
482.30	STREP PNEUMONIA NOS	484.5	PNEUMONIA IN ANTHRAX
482.31	GROUP A STREP PNEUMONIA	484.6	PNEUM IN ASPERGILLOSIS
482.32	GROUP B STREP PNEUMONIA	484.7	PNEUM IN SYST MYCOSESNEC
482.39	STREP PNEUMONIA NEC	484.8	PNEUM IN INFECT DIS NEC
482.4	STAPHYLOCOCCAL PNEUMONIA	485	BRONCHOPNEUMONIA ORG NOS
482.40	STAPH PNEUMONIA NOS	486	PNEUMONIA ORGANISM NOS
482.41	STAPH AUREUS PNEUMONIA	507.0	FOOD/VOMIT PNEUMONITIS
482.49	STAPH PNEUMONIA NEC	518.82	OTHER PULMONARY INSUFF
482.8	BACTERIAL PNEUMONIA NEC	518.84	AC & CHR RESP FAILURE
Must occur with 997.4 Digestive System Complications with Accidental Puncture			
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	599.0	URINARY TRACT INF NOS
584.9	ACUTE RENAL FAILURE, NOS	788.20	RETENTION OF URINE, NOS
Must occur with 998.59 Postoperative Infection			
038	SEPTICEMIA	038.42	E. COLI SEPTICEMIA
038.0	STREPTOCOCCAL SEPTICEMIA	038.43	PSEUDOMONAS SEPTICEMIA
038.1	STAPH SEPTICEMIA	038.44	SERRATIA SEPTICEMIA
038.10	STAPH SEPTICEMIA NOS	038.49	GRAM-NEG SEPTICEMIA NEC
038.11	STAPH AUREUS SEPTICEMIA	038.8	SEPTICEMIA NEC
038.19	STAPH SEPTICEMIA NEC	038.9	SEPTICEMIA NOS
038.2	PNEUMOCOCCAL SEPTICEMIA	041.4	E. COLI INFECT NOS
038.3	ANAEROBIC SEPTICEMIA	785.52	SEPTIC SHOCK
038.40	GRAM-NEG SEPTICEMIA NOS	995.91	SEPSIS
038.41	H. INFLUENZAE SEPTICEMIA		

Major Complications – Peripheral Vascular Bypass

Major Complications – Peripheral Vascular Bypass			
518.5	POSTTR PULMON INSUFF	997.5	SURG COMP-URINARY NEC
518.7	TRALI	998.0	POSTOPERATIVE SHOCK
997.1	SURG COMP-HEART	998.11	HEMORRHAGE COMP PX
997.3	SURG COMP-RESP NEC	998.2	ACCIDENTAL OP LACERATION
997.4	SURG COMP-DIGESTIVE	998.59	POSTOP INFECTION NEC
Must occur with 997.1 Cardiac Complications			
410.01	ANTEROLAT AMI-INITIAL	428.2	SYSTOLIC HEART FAILURE
410.11	ANT AMI NEC-INITIAL	428.20	SYSTOLIC HF NOS
410.21	INFEROLAT AMI-INITIAL	428.21	ACUTE SYSTOLIC HF
410.51	LAT AMI NEC-INITIAL	428.23	AC & CHR SYSTOLIC HF
410.61	POSTERIOR AMI-INITIAL	428.3	DIASTOLIC HEART FAILURE
410.71	SUBEND INFARCT-INITIAL	428.30	DIASTOLIC HF NOS
410.81	AMI NEC-INITIAL EPISODE	428.31	ACUTE DIASTOLIC HF
410.91	AMI NOS-INITIAL EPISODE	428.33	AC & CHR DIASTOLIC HF
427.1	PVT	428.4	SYSTOLIC & DIASTOLIC HF
427.31	ATRIAL FIBRILLATION	428.40	SYS & DIASTOLIC HF NOS
427.32	ATRIAL FLUTTER	428.41	AC SYS & DIASTOLIC HF
427.89	OTH CARDIAC DYSRHYTHMIAS	428.43	ACCHR SYS & DIASTOLIC HF
428.0	CHF NOS	428.9	HEART FAILURE NOS
428.1	LEFT HEART FAILURE		

Dependent Complications – Peripheral Vascular Bypass

Must occur with 997.3 Respiratory Complications			
480	VIRAL PNEUMONIA	482.81	PNEUMONIA D/T ANAEROBES
480.0	ADENOVIRAL PNEUMONIA	482.82	E. COLI PNEUMONIA
480.1	RSV PNEUMONIA	482.83	GRAM-NEG PNEUMONIA NEC
480.2	PARINFLUENZA VIRAL PNEUM	482.84	LEGIONNAIRES' DISEASE
480.3	SARS PNEUMONIA	482.89	BACTERIAL PNEUMONIA NEC
480.8	VIRAL PNEUMONIA NEC	482.9	BACTERIAL PNEUMONIA NOS
480.9	VIRAL PNEUMONIA NOS	483	PNEUMONIA ORGANISM NEC
481	PNEUMOCOCCAL PNEUMONIA	483.0	M. PNEUMONIAE PNEUMONIA
482	OTHER BACT PNEUMONIA	483.1	CHLAMYDIAL PNEUMONIA
482.0	K. PNEUMONIAE PNEUMONIA	483.8	PNEUMONIA D/T ORG NEC
482.1	PSEUDOMONAL PNEUMONIA	484	PNEUM IN OTH INF DIS
482.2	H. INFLUENZAE PNEUMONIA	484.1	PNEUMONIA IN CMV DISEASE
482.3	STREPTOCOCCAL PNEUMONIA	484.3	PNEUMONIA IN WHOOP COUGH
482.30	STREP PNEUMONIA NOS	484.5	PNEUMONIA IN ANTHRAX
482.31	GROUP A STREP PNEUMONIA	484.6	PNEUM IN ASPERGILLOSIS
482.32	GROUP B STREP PNEUMONIA	484.7	PNEUM IN SYST MYCOSESNEC
482.39	STREP PNEUMONIA NEC	484.8	PNEUM IN INFECT DIS NEC
482.4	STAPHYLOCOCCAL PNEUMONIA	485	BRONCHOPNEUMONIA ORG NOS
482.40	STAPH PNEUMONIA NOS	486	PNEUMONIA ORGANISM NOS
482.41	STAPH AUREUS PNEUMONIA	507.0	FOOD/VOMIT PNEUMONITIS
482.49	STAPH PNEUMONIA NEC	518.81	AC RESPIRATORY FAILURE
482.8	BACTERIAL PNEUMONIA NEC		

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 RF W TUBULAR NEPHR	593.9	RENAL/URETER DISORD NOS
584.8	ACUTE RENAL FAILURE NEC	599.0	URINARY TRACT INF NOS
584.9	ACUTE RENAL FAILURE NOS	788.20	RETENTION OF URINE NOS
Must occur with 998.59 and 998.51 Postoperative Infection with Infected Postoperative Seroma			
041.04	GROUP D STREP INFECTION	041.7	PSEUDOMONAS INFECT NOS
041.11	S. AUREUS INFECTION		
Must occur with 998.59 Postoperative Infection			
038	SEPTICEMIA	038.40	GRAM-NEG SEPTICEMIA NOS
038.0	STREPTOCOCCAL SEPTICEMIA	038.41	H. INFLUENZAE SEPTICEMIA
038.1	STAPH SEPTICEMIA	038.42	E. COLI SEPTICEMIA
038.10	STAPH SEPTICEMIA NOS	038.43	PSEUDOMONAS SEPTICEMIA
038.11	STAPH AUREUS SEPTICEMIA	038.44	SERRATIA SEPTICEMIA
038.19	STAPH SEPTICEMIA NEC	038.49	GRAM-NEG SEPTICEMIA NEC
038.2	PNEUMOCOCCAL SEPTICEMIA	038.8	SEPTICEMIA NEC
038.3	ANAEROBIC SEPTICEMIA	038.9	SEPTICEMIA NOS
038.4	GRAM-NEG SEPTICEMIA NEC	995.92	SEVERE SEPSIS

Major Complications – Total Hip Replacement

Major Complications – Total Hip Replacement			
292.81	DRUG-INDUCED DELIRIUM	484.1	PNEUMONIA IN CMV DISEASE
410.01	ANTEROLAT AMI-INITIAL	484.3	PNEUMONIA IN WHOOP COUGH
410.11	ANT AMI NEC-INITIAL	484.5	PNEUMONIA IN ANTHRAX
410.21	INFEROLAT AMI-INITIAL	484.6	PNEUM IN ASPERGILLOSIS
410.31	INFEROPOST AMI-INITIAL	484.7	PNEUM IN SYST MYCOSESNEC
410.41	INF AMI NEC-INITIAL	484.8	PNEUM IN INFECT DIS NEC
410.51	LAT AMI NEC-INITIAL	485	BRONCHOPNEUMONIA ORG NOS
410.61	POSTERIOR AMI-INITIAL	486	PNEUMONIA ORGANISM NOS
410.71	SUBEND INFARCT-INITIAL	507.0	FOOD/VOMIT PNEUMONITIS
410.81	AMI NEC-INITIAL EPISODE	518.5	POSTTR PULMON INSUFF
410.91	AMI NOS-INITIAL EPISODE	518.7	TRALI
415.11	IATRO PULM EMBOL/INFARCT	518.81	AC RESPIRATORY FAILURE
415.19	PULMON EMBOL/INFARCT NEC	584.5	AC RF W TUBULAR NEPHR
480	VIRAL PNEUMONIA	584.8	ACUTE RENAL FAILURE NEC
480.0	ADENOVIRAL PNEUMONIA	584.9	ACUTE RENAL FAILURE NOS
480.1	RSV PNEUMONIA	707.0	DECUBITUS ULCER
480.2	PARINFLUENZA VIRAL PNEUM	707.00	DECUBITUS ULCER-SITE NOS
480.3	SARS PNEUMONIA	707.01	DECUBITUS ULCER-ELBOW
480.8	VIRAL PNEUMONIA NEC	707.02	DECUBITUS ULCER-UP BACK
480.9	VIRAL PNEUMONIA NOS	707.03	DECUBITUS ULCER-LOW BACK
481	PNEUMOCOCCAL PNEUMONIA	707.04	DECUBITUS ULCER-HIP
482	OTHER BACT PNEUMONIA	707.05	DECUBITUS ULCER-BUTTOCK
482.0	K. PNEUMONIAE PNEUMONIA	707.06	DECUBITUS ULCER-ANKLE
482.1	PSEUDOMONAL PNEUMONIA	707.07	DECUBITUS ULCER-HEEL
482.2	H. INFLUENZAE PNEUMONIA	707.09	DECUBITUS ULCER-SITE NEC
482.3	STREPTOCOCCAL PNEUMONIA	799.1	RESPIRATORY ARREST
482.30	STREP PNEUMONIA NOS	995.92	SEVERE SEPSIS
482.31	GROUP A STREP PNEUMONIA	996.4	MECH COMP INT ORTH DEV
482.32	GROUP B STREP PNEUMONIA	996.40	MECH COMP INT ORTH NOS
482.39	STREP PNEUMONIA NEC	996.41	MECH LOOSENING JT PROSTH
482.4	STAPHYLOCOCCAL PNEUMONIA	996.42	DISLOCATION JOINT PROSTH
482.40	STAPH PNEUMONIA NOS	996.43	PROSTH JOINT FAILURE
482.41	STAPH AUREUS PNEUMONIA	996.44	PERI-PROSTHETIC FRACTURE
482.49	STAPH PNEUMONIA NEC	996.47	MECH COMP JT PROSTH NEC
482.8	BACTERIAL PNEUMONIA NEC	996.77	COMP NEC D/T JT PROSTH
482.81	PNEUMONIA D/T ANAEROBES	996.78	COMP NEC ORTH DEV NEC
482.82	E. COLI PNEUMONIA	997.02	IATROGEN CV INFARCT/HEM
482.83	GRAM-NEG PNEUMONIA NEC	997.1	SURG COMP-HEART
482.84	LEGIONNAIRES' DISEASE	997.3	SURG COMP-RESP NEC
482.89	BACTERIAL PNEUMONIA NEC	997.4	SURG COMP-DIGESTIVE
482.9	BACTERIAL PNEUMONIA NOS	997.5	SURG COMP-URINARY NEC
483	PNEUMONIA ORGANISM NEC	998.0	POSTOPERATIVE SHOCK
483.0	M. PNEUMONIAE PNEUMONIA	998.11	HEMORRHAGE COMP PX
483.1	CHLAMYDIAL PNEUMONIA	998.59	POSTOP INFECTION NEC
483.8	PNEUMONIA D/T ORG NEC	999.8	TRANSFUSION REACTION NEC
484	PNEUM IN OTH INF DIS		

Dependent Complications – Total Hip Replacement

Must occur with 997.1 Cardiac Complications			
427.0	PSVT	428.23	AC & CHR SYSTOLIC HF
427.1	PVT	428.3	DIASTOLIC HEART FAILURE
427.31	ATRIAL FIBRILLATION	428.30	DIASTOLIC HF NOS
427.89	OTH CARDIAC DYSRHYTHMIAS	428.31	ACUTE DIASTOLIC HF
427.9	CARDIAC DYSRHYTHMIA NOS	428.33	AC & CHR DIASTOLIC HF
428.0	CHF NOS	428.4	SYSTOLIC & DIASTOLIC HF
428.1	LEFT HEART FAILURE	428.40	SYS & DIASTOLIC HF NOS
428.2	SYSTOLIC HEART FAILURE	428.41	AC SYS & DIASTOLIC HF
428.20	SYSTOLIC HF NOS	428.43	ACCHR SYS & DIASTOLIC HF
428.21	ACUTE SYSTOLIC HF	428.9	HEART FAILURE NOS
Must occur with 997.4 Digestive Complications			
560.1	PARALYTIC ILEUS		
Must occur with 997.5 Urinary Complications			
593.9	KIDNEY & URETER DIS, NOS	788.20	RETENTION OF URINE, NOS
599.0	URINARY TRACT INFECT, NOS	788.29	RETENTION OF URINE, NEC
Must not occur with any of the following: v1588 HX Fall, v424 Bone Transplant Status, v4364 Hip Replacement Status, v4365 Knee Replacement Status, v454 Arthrodesis Status, v5401 Removal INT Fixation DEV, v5402 Adjust Growth Rod, v5409 INT FIX DEV AFTCARE NEC			
996.49	MECH COMP INT ORTH NEC		

Major Complications – Total Knee Replacement

Major Complications – Total Knee Replacement			
292.81	DRUG-INDUCED DELIRIUM	484.1	PNEUMONIA IN CMV DISEASE
410.01	ANTEROLAT AMI-INITIAL	484.3	PNEUMONIA IN WHOOP COUGH
410.11	ANT AMI NEC-INITIAL	484.5	PNEUMONIA IN ANTHRAX
410.21	INFEROLAT AMI-INITIAL	484.6	PNEUM IN ASPERGILLOSIS
410.31	INFEROPOST AMI-INITIAL	484.7	PNEUM IN SYST MYCOSESNEC
410.41	INF AMI NEC-INITIAL	484.8	PNEUM IN INFECT DIS NEC
410.51	LAT AMI NEC-INITIAL	485	BRONCHOPNEUMONIA ORG NOS
410.61	POSTERIOR AMI-INITIAL	486	PNEUMONIA ORGANISM NOS
410.71	SUBEND INFARCT-INITIAL	507.0	FOOD/VOMIT PNEUMONITIS
410.81	AMI NEC-INITIAL EPISODE	518.5	POSTTR PULMON INSUFF
410.91	AMI NOS-INITIAL EPISODE	518.7	TRALI
415.11	IATRO PULM EMBOL/INFARCT	518.81	AC RESPIRATORY FAILURE
415.19	PULMON EMBOL/INFARCT NEC	584.5	AC RF W TUBULAR NEPHR
480	VIRAL PNEUMONIA	584.8	ACUTE RENAL FAILURE NEC
480.0	ADENOVIRAL PNEUMONIA	584.9	ACUTE RENAL FAILURE NOS
480.1	RSV PNEUMONIA	707.0	DECUBITUS ULCER
480.2	PARINFLUENZA VIRAL PNEUM	707.00	DECUBITUS ULCER-SITE NOS
480.3	SARS PNEUMONIA	707.01	DECUBITUS ULCER-ELBOW
480.8	VIRAL PNEUMONIA NEC	707.02	DECUBITUS ULCER-UP BACK
480.9	VIRAL PNEUMONIA NOS	707.03	DECUBITUS ULCER-LOW BACK
481	PNEUMOCOCCAL PNEUMONIA	707.04	DECUBITUS ULCER-HIP
482	OTHER BACT PNEUMONIA	707.05	DECUBITUS ULCER-BUTTOCK
482.0	K. PNEUMONIAE PNEUMONIA	707.06	DECUBITUS ULCER-ANKLE
482.1	PSEUDOMONAL PNEUMONIA	707.07	DECUBITUS ULCER-HEEL
482.2	H. INFLUENZAE PNEUMONIA	707.09	DECUBITUS ULCER-SITE NEC
482.3	STREPTOCOCCAL PNEUMONIA	799.1	RESPIRATORY ARREST
482.30	STREP PNEUMONIA NOS	995.92	SEVERE SEPSIS
482.31	GROUP A STREP PNEUMONIA	996.4	MECH COMP INT ORTH DEV
482.32	GROUP B STREP PNEUMONIA	996.40	MECH COMP INT ORTH NOS
482.39	STREP PNEUMONIA NEC	996.41	MECH LOOSENING JT PROSTH
482.4	STAPHYLOCOCCAL PNEUMONIA	996.42	DISLOCATION JOINT PROSTH
482.40	STAPH PNEUMONIA NOS	996.43	PROSTH JOINT FAILURE
482.41	STAPH AUREUS PNEUMONIA	996.44	PERI-PROSTHETIC FRACTURE
482.49	STAPH PNEUMONIA NEC	996.47	MECH COMP JT PROSTH NEC
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482.81	PNEUMONIA D/T ANAEROBES	996.78	COMP NEC ORTH DEV NEC
482.82	E. COLI PNEUMONIA	997.02	IATROGEN CV INFARCT/HEM
482.83	GRAM-NEG PNEUMONIA NEC	997.1	SURG COMP-HEART
482.84	LEGIONNAIRES' DISEASE	997.3	SURG COMP-RESP NEC
482.89	BACTERIAL PNEUMONIA NEC	997.4	SURG COMP-DIGESTIVE
482.9	BACTERIAL PNEUMONIA NOS	997.5	SURG COMP-URINARY NEC
483	PNEUMONIA ORGANISM NEC	998.0	POSTOPERATIVE SHOCK
483.0	M. PNEUMONIAE PNEUMONIA	998.11	HEMORRHAGE COMP PX
483.1	CHLAMYDIAL PNEUMONIA	998.59	POSTOP INFECTION NEC
483.8	PNEUMONIA D/T ORG NEC	999.8	TRANSFUSION REACTION NEC
484	PNEUM IN OTH INF DIS		

Dependent Complications – Total Knee Replacement

Must occur with 997.1 Cardiac Complications			
427.0	PSVT	428.23	AC & CHR SYSTOLIC HF
427.1	PVT	428.3	DIASTOLIC HEART FAILURE
427.31	ATRIAL FIBRILLATION	428.30	DIASTOLIC HF NOS
427.89	OTH CARDIAC DYSRHYTHMIAS	428.31	ACUTE DIASTOLIC HF
427.9	CARDIAC DYSRHYTHMIA NOS	428.33	AC & CHR DIASTOLIC HF
428.0	CHF NOS	428.4	SYSTOLIC & DIASTOLIC HF
428.1	LEFT HEART FAILURE	428.40	SYS & DIASTOLIC HF NOS
428.2	SYSTOLIC HEART FAILURE	428.41	AC SYS & DIASTOLIC HF
428.20	SYSTOLIC HF NOS	428.43	ACCHR SYS & DIASTOLIC HF
428.21	ACUTE SYSTOLIC HF	428.9	HEART FAILURE NOS
Must occur with 997.4 Digestive System Complications			
560.1	PARALYTIC ILEUS		
Must occur with 997.5 Urinary Complications			
593.9	KIDNEY & URETER DIS, NOS	788.20	RETENTION OF URINE, NOS
599.0	URINARY TRACT INFECT, NOS	788.29	RETENTION OF URINE, NEC
Must not occur with any of the following: v1588 HX Fall, v424 Bone Transplant Status, v4364 Hip Replacement Status, v4365 Knee Replacement Status, v454 Arthrodesis Status, v5401 Removal INT Fixation DEV, v5402 Adjust Growth Rod, v5409 INT FIX DEV AFTCARE NEC			
996.49	MECH COMP INT ORTH NEC		