ADULT CARDIAC SURGERY

in New York State

2006 – 2008

New York State Department of Health
December 2010

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INTRODUCTION

The information contained in this booklet is intended for health care providers, patients and families of patients who are considering cardiac surgery. It provides data on risk factors associated with death following coronary artery bypass graft surgery (CABG) and heart valve surgery, and lists hospital and physician-specific mortality rates which have been risk-adjusted to account for differences in patient severity of illness.

New York State (NYS) has taken a leadership role in setting standards for cardiac services, monitoring outcomes and sharing performance data with patients, hospitals and physicians. Hospitals and doctors involved in cardiac care have worked in cooperation with the NYS Department of Health (Department of Health) and the NYS Cardiac Advisory Committee (Cardiac Advisory Committee) to compile accurate and meaningful data that can and have been used to enhance quality of care. We believe that this process has been instrumental in achieving the excellent outcomes that are evidenced in this report for centers across NYS.

We are pleased to be able to continue to provide information in this year's report that encompasses outcomes for isolated CABG, valve surgery and the two procedures done in combination. Isolated CABG represents the majority of adult cardiac surgeries performed, and we have reported risk-adjusted outcomes for that procedure for nearly 20 years. However, many additional patients undergo procedures each year to repair or replace heart valves or undergo valve surgery done in combination with CABG. This report provides important information on the risk factors and outcomes for both CABG and valve surgery. In addition, this report includes information on mortality outside the hospital but within 30 days following surgery. We believe this to be an important quality indicator that will provide useful information to patients and providers.

As they develop treatment plans, we encourage doctors to discuss this information with their patients and colleagues. While these statistics are an important tool in making informed health care choices, individual treatment plans must be made by doctors and patients together after careful consideration of all pertinent factors. It is important to recognize that many factors can influence the outcome of cardiac surgery. These include the patient's health before the procedure, the skill of the operating team and general after-care. In addition, keep in mind that the information in this booklet does not include data after 2008. Important changes may have taken place in some hospitals during that time period.

In developing treatment plans, it is important that patients and physicians alike give careful consideration to the importance of healthy lifestyles for all those affected by heart disease. While some risk factors, such as heredity, gender and age cannot be controlled, others certainly can. Controllable risk factors that contribute to a higher likelihood of developing coronary artery disease are high cholesterol levels, cigarette smoking, high blood pressure, obesity and lack of exercise. Limiting these risk factors after surgery will continue to be important in minimizing the occurrence of new blockages.

Providers of this state and the Cardiac Advisory Committee are to be commended for the excellent results that have been achieved through this cooperative quality improvement system. The Department of Health will continue to work in partnership with hospitals and physicians to ensure continued high-quality cardiac surgery is available to NYS residents.

CORONARY ARTERY BYPASS GRAFT SURGERY (CABG)

Heart disease is, by far, the leading cause of death in NYS, and the most common form of heart disease is atherosclerotic coronary artery disease. Different treatments are recommended for patients with coronary artery disease. For some people, changes in lifestyle, such as dietary changes, not smoking and regular exercise, can result in great improvements in health. In other cases, medication prescribed for high blood pressure or other conditions can make a significant difference.

Sometimes, however, an interventional procedure is recommended. The two common procedures performed on patients with coronary artery disease are CABG surgery and percutaneous coronary intervention (PCI).

CABG surgery is an operation in which a vein or artery from another part of the body is used to create an alternate path for blood to flow to the heart muscle, bypassing the arterial blockage. Typically, a section of one of the large (saphenous) veins in the leg, the radial artery in the arm or the mammary artery in the chest is used to construct the bypass. One or more bypasses may be performed during a single operation, since providing several routes for the blood supply to travel is believed to improve long-term success for the procedure. Triple and quadruple bypasses are often done for this reason, not necessarily because the patient's condition is more severe. CABG surgery is one of the most common, successful major operations currently performed in the United States.

As is true of all major surgery, risks must be considered. The patient is totally anesthetized and there is generally a substantial recovery period in the hospital followed by several weeks of recuperation at home. Even in successful cases, there is a risk of relapse causing the need for another operation.

Those who have CABG surgery are not cured of coronary artery disease; the disease can still occur in the grafted blood vessels or other coronary arteries. In order to minimize new blockages, patients should continue to reduce their risk factors for heart disease.

CARDIAC VALVE PROCEDURES

Heart valves control the flow of blood as it enters the heart and is pumped from the chambers of the heart to the lungs for oxygenation and back to the body. There are four valves: the tricuspid, mitral, pulmonic and aortic valves. Heart valve disease occurs when a valve cannot open all the way because of disease or injury, thus causing a decrease in blood flow to the next heart chamber. Another type of valve problem occurs when the valve does not close completely, which leads to blood leaking backward into the previous chamber. Either of these problems causes the heart to work harder to pump blood or causes blood to back up in the lungs or lower body.

When a valve is stenotic (too narrow to allow enough blood to flow through the valve opening) or incompetent (cannot close tightly enough to prevent the backflow of blood), one of the treatment options is to repair the valve. Repair of a stenotic valve typically involves widening the valve opening, whereas repair of an incompetent valve is typically achieved by narrowing or tightening the supporting structures of the valve. The mitral valve is particularly amenable to valve repairs because its parts can frequently be repaired without having to be replaced.

In many cases, defective valves are replaced rather than repaired, using either a mechanical or biological valve. Mechanical valves are built using durable materials that generally last a lifetime. Biological valves are made from tissue taken from pigs, cows or humans. Mechanical and biological valves each have advantages and disadvantages that can be discussed with referring physicians.

The most common heart valve surgeries involve the aortic and mitral valves. Patients undergoing heart surgery are totally anesthetized and are usually placed on a heart-lung machine, whereby the heart is stopped for a short period of time using special drugs. As is the case for CABG surgery, there is a recovery period of several weeks at home after being discharged from the hospital. Some patients require replacement of more than one valve and some patients with both coronary artery disease and valve disease require valve replacement and CABG surgery. This report contains outcomes for the following valve procedures when done alone or in combination with CABG: Aortic Valve Replacement, Mitral Valve Repair, Mitral Valve Replacement and Multiple Valve Surgery.

THE DEPARTMENT OF HEALTH PROGRAM

For many years, the Department of Health has been studying the effects of patient and treatment characteristics (called risk factors) on outcomes for patients with heart disease. Detailed statistical analyses of the information received from the study have been conducted under the guidance of the Cardiac Advisory Committee, a group of independent practicing cardiac surgeons, cardiologists and other professionals in related fields.

The results have been used to create a cardiac profile system which assesses the performance of hospitals and surgeons over time, independent of the severity of each individual patient's pre-operative conditions.

Designed to improve health in people with heart disease, this program is aimed at:

- understanding the health risks of patients that adversely affect how they will fare in coronary artery bypass surgery and/or valve surgery;
- improving the results of different treatments of heart disease;
- improving cardiac care; and
- providing information to help patients make better decisions about their own care.

PATIENT POPULATION

This report is based on data for patients discharged between January 1, 2006, and December 31, 2008, provided by all non-federal hospitals in NYS where cardiac surgery is performed.

Beginning with patients discharged in 2006, the Department of Health, with the advice of the Cardiac Advisory Committee, began a trial period of excluding from publicly released reports any patients meeting the Cardiac Data System definition of pre-operative cardiogenic shock. Cardiogenic shock is a condition associated with severe hypotension (very low blood pressure). [The technical definition used in this report can be found on page 43.] Patients in cardiogenic shock are extremely high-risk, but for some, cardiac surgery may be their best chance for survival. Furthermore, the magnitude of the risk is not always easily determined using registry data. These cases were excluded after careful deliberation and input from NYS providers and others in an effort to ensure that physicians could accept these cases where appropriate without concern over a detrimental impact on their reported outcomes.

In total, 363 cases with cardiogenic shock were removed from 2006-2008 data. This accounts for 0.58 percent of all cardiac surgeries (CABG, valve surgery and other cardiac surgery reported in this data system) in the three years.

In addition, 97 records were excluded from the 2007 and 2008 databases because they belong to patients residing outside the United States, and these patients could not be followed after hospital discharge. An additional 26 records belonging to patients enrolled in a clinical trial (PARTNER) comparing outcomes for two kinds of valve replacement procedures were excluded as well.

Isolated CABG surgery represented 54.59 percent of all adult cardiac surgery for the three-year period covered by this report. Valve or combined valve/CABG surgery represented 34.33 percent of all adult cardiac surgery for the same period. Total cardiac surgery, isolated CABG, valve or valve/CABG surgery and other cardiac surgery volumes are tabulated in Table 7 by hospital and surgeon for the period 2006 through 2008.

RISK ADJUSTMENT FOR ASSESSING PROVIDER PERFORMANCE

Provider performance is directly related to patient outcomes. Whether patients recover quickly, experience complications or die following a procedure is, in part, a result of the kind of medical care they receive. It is difficult, however, to compare outcomes across hospitals when assessing provider performance because different hospitals treat different types of patients. Hospitals with sicker patients may have higher rates of complications and death than other hospitals in the state. The following describes how the Department of Health adjusts for patient risk in assessing provider outcomes.

Data Collection, Data Validation and Identifying In-Hospital/30-Day Deaths

As part of the risk-adjustment process, NYS hospitals where cardiac surgery is performed provide information to the Department of Health for each patient undergoing that procedure. Cardiac surgery departments collect data concerning patients' demographic and clinical characteristics. Approximately 40 of these characteristics (called risk factors) are collected for each patient. Along with information about the procedure, physician and the patient's status at discharge, these data are entered into a computer and sent to the Department of Health for analysis.

Data are verified through review of unusual reporting frequencies, cross-matching of cardiac surgery data with other Department of Health databases and a review of medical records for a selected sample of cases. These activities are extremely helpful in ensuring consistent interpretation of data elements across hospitals.

The analyses in this report base mortality on deaths occurring during the same hospital stay in which a patient underwent cardiac surgery and on deaths that occur after discharge but within 30 days of surgery.

An in-hospital death is defined as a patient who died subsequent to CABG or valve surgery during the same admission or was discharged to hospice care and expired within 30 days.

Deaths that occur after hospital discharge but within 30 days of surgery are also counted in the risk-adjusted mortality analyses. This is done because hospital length of stay has been decreasing and, in the opinion of the Cardiac Advisory Committee, most deaths that occur after hospital discharge but within 30 days of surgery are related to complications of surgery.

Data on deaths occurring after discharge from the hospital are obtained from the Social Security Administration Death Master File, the Department of Health and the New York City Department of Health and Mental Hygiene Bureau of Vital Statistics.

Assessing Patient Risk

Each person who develops heart disease has a unique health history. A cardiac profile system has been developed to evaluate the risk of treatment for each individual patient based on his or her history, weighing the important health factors for that person based on the experiences of thousands of patients who have undergone the same procedures in recent years. All important risk factors for each patient are combined to create a risk profile. For example, an 80-year-old patient with a history of a previous open heart surgery has a very different risk profile than a 40-year-old with no previous open heart surgery.

The statistical analyses conducted by the Department of Health consist of determining which of the risk factors collected are significantly related to death following CABG and/or valve surgery and determining how to weigh the significant risk factors to predict the chance each patient will have of dying, given his or her specific characteristics.

Doctors and patients should review individual risk profiles together. Treatment decisions must be made by doctors and patients together after consideration of all the information.

Predicting Patient Mortality Rates for Providers

The statistical methods used to predict mortality on the basis of the significant risk factors are tested to determine whether they are sufficiently accurate in predicting mortality for patients who are extremely ill prior to undergoing the procedure as well as for patients who are relatively healthy. These tests have confirmed that the models are reasonably accurate in predicting how patients of all different risk levels will fare when undergoing cardiac surgery.

The mortality rate for each hospital and surgeon is also predicted using the relevant statistical models. This is accomplished by summing the predicted probabilities of death for each of the provider's patients and dividing by the number of patients. The resulting rate is an estimate of what the provider's mortality rate would have been if the provider's performance were identical to the state performance. The percentage is called the predicted or expected mortality rate (EMR). A hospital's EMR is contrasted with its observed mortality rate (OMR), which is the number of patients who died divided by the total number of patients.

Computing the Risk-Adjusted Mortality Rate

The risk-adjusted mortality rate (RAMR) represents the best estimate, based on the associated statistical model, of what the provider's mortality rate would have been if the provider had a mix of patients identical to the statewide mix. Thus, the RAMR has, to the extent possible, ironed out differences among providers in patient severity of illness, since it arrives at a mortality rate for each provider for an identical group of patients.

To get the RAMR, the OMR is first divided by the provider's EMR. If the resulting ratio is larger than one, the provider has a higher mortality rate than expected on the basis of its patient mix; if it is smaller than one, the provider has a lower mortality rate than expected from its patient mix. For isolated CABG patients the ratio is then multiplied by the overall statewide mortality rate of 1.81 percent (in-hospital/30-day mortality in 2008) to obtain the provider's RAMR. For the three-year period 2006-2008, the ratio is multiplied by 1.89 percent (in-hospital/30-day mortality rate) for isolated CABG patients or 5.22 percent (in-hospital/30-day mortality rate) for valve or valve/CABG patients.

Interpreting the Risk-Adjusted Mortality Rate

If the RAMR is significantly lower than the statewide mortality rate, the provider has a significantly better performance than the state as a whole; if the RAMR is significantly higher than the statewide mortality rate, the provider has a significantly worse performance than the state as a whole.

The RAMR is used in this report as a measure of quality of care provided by hospitals and surgeons. However, there are reasons that a provider's RAMR may not be indicative of its true quality. For example, extreme outcome rates may occur due to chance alone. This is particularly true for low-volume providers, for whom very high or very low mortality rates are more likely to occur than for high-volume providers. To prevent misinterpretation of differences caused by chance variation, confidence intervals are reported in the results. The interpretations of those terms are provided later when the data are presented.

Differences in hospital coding of risk factors could be an additional reason that a provider's RAMR may not be reflective of quality of care. The Department of Health monitors the quality of coded data by reviewing samples of patients' medical records to ascertain the presence of key risk factors. When significant coding problems are discovered, hospitals are required to correct these data and are subjected to subsequent monitoring.

Although there are reasons that RAMRs presented here may not be a perfect reflection of quality of care, the Department of Health feels that this information is a valuable aid in choosing providers for cardiac surgery.

How This Initiative Contributes to Quality Improvement

The goal of the Department of Health and the Cardiac Advisory Committee is to improve the quality of care related to cardiac surgery in NYS. Providing the hospitals and cardiac surgeons in NYS with data about their own outcomes for these procedures allows them to examine the quality of the care they provide and to identify areas that need improvement.

The data collected and analyzed in this program are reviewed by the Cardiac Advisory Committee. Committee members assist with interpretation and advise the Department of Health regarding hospitals and surgeons that may need special attention. Committee members have also conducted site visits to particular hospitals and have recommended that some hospitals obtain the expertise of outside consultants to design improvements for their programs.

The overall results of this program of ongoing review show that significant progress is being made. In response to the program's results for surgery, facilities have refined patient criteria, evaluated patients more closely for pre–operative risks and directed them to the appropriate surgeon. More importantly, many hospitals have identified medical care process problems that have led to less than optimal outcomes, and have altered those processes to achieve improved results.

RESULTS

2008 Risk Factors for CABG Surgery

The significant pre-operative risk factors for death in the hospital during the same admission as the surgery or after hospital discharge but within 30 days of surgery (in-hospital/30-day mortality) for CABG in 2008 are presented in Table 1.

Roughly speaking, the odds ratio for a risk factor represents the number of times a patient with that risk factor is more likely to die in the hospital during or after CABG or after discharge but within 30 days of the surgery than a patient without the risk factor, all other risk factors being the same. For example, the odds ratio for the risk factor COPD is 1.539. This means that a patient who has COPD prior to surgery is approximately 1.539 times as likely to die in the hospital or after discharge within 30 days of surgery as a patient who does not have COPD but who has the same other significant risk factors.

For some of the risk factors in the table, there are only two possibilities: having the risk factor and not having it. For example, a patient either has COPD or does not have COPD. Exceptions are: Age – Number of Years Greater than 55, Ejection Fraction (which is a measure of the heart's ability to pump blood), Previous MI and Renal Failure.

For age, the odds ratio roughly represents the number of times a patient who is older than 55 is more likely to die in the hospital or after discharge but within 30 days than a patient who is one year younger. Thus, the chance of in-hospital / 30-day mortality for a patient undergoing CABG who is 56 years old is approximately 1.051 times that of a patient 55 years old undergoing CABG, if all other risk factors are the same. All patients age 55 and younger have roughly the same odds of dying in the hospital or after discharge but within 30 days if their other risk factors are identical.

The odds ratios for the categories for Ejection Fraction are relative to the reference category (40 percent and higher). Thus, patients with an ejection fraction of less than 30 percent have odds of in-hospital/30-day mortality that are 2.376 times the odds of a person with an ejection fraction of 40 percent or higher, all other risk factors being the same.

Previous MI is subdivided into three groups: occurring less than six hours prior to surgery, six hours to seven days prior and no MI within seven days prior to surgery. The last group is referred to as the reference category. The odds ratios for the Previous MI categories are relative to patients who have not had an MI within seven days prior to the procedure.

Since Renal Failure is expressed in terms of renal failure with dialysis and elevated creatinine without dialysis, the odds ratios for all Renal Failure categories are relative to patients with no dialysis and no creatinine greater than 1.3 mg/dL prior to surgery.

Table 1: Multivariable Risk Factor Equation for CABG In-Hospital/30-Day Deaths in New York State in 2008

		Logistic Regression		
Patient Risk Factor	**Prevalence (%)**	**Coefficient**	**P-Value**	**Odds Ratio**
Demographic				
Age: Number of years greater than 55	—	0.0498	<.0001	1.051
Female Gender	26.94	0.6844	<.0001	1.982
Hemodynamic State				
Unstable	0.85	1.4756	<.0001	4.374
Ventricular Function				
Ejection Fraction				
Ejection Fraction ≥ 40%	80.51	----Reference----		1.000
Ejection Fraction < 30%	8.05	0.8655	<.0001	2.376
Ejection Fraction 30-39%	11.44	0.7110	0.0002	2.036
Previous MI				
No Previous MI within 7 days	80.29	----Reference----		1.000
Previous MI less than 6 hours	0.75	1.0726	0.0428	2.923
Previous MI 6 hours – 7 days	18.96	0.4055	0.0158	1.500
Comorbidities				
COPD	22.79	0.4314	0.0059	1.539
Renal Failure				
No Renal Failure	74.65	----Reference----		1.000
Renal Failure, Creatinine 1.3 -1.5 mg/dl	14.00	0.5082	0.0108	1.662
Renal Failure, Creatinine 1.6 -3.0 mg/dl	8.92	0.7879	<.0001	2.199
Renal Failure, Creatinine > 3.0 mg/dl	0.79	1.2601	0.0109	3.526
Renal Failure, Dialysis	2.43	1.5887	<.0001	4.898
Previous Open Heart Operations	2.96	0.7004	0.0252	2.015

Intercept = - 5.7509

C Statistic = 0.769

2008 HOSPITAL OUTCOMES FOR CABG SURGERY

Table 2 and Figure 1 present the CABG surgery results for the 40 hospitals performing this operation in NYS in 2008. The table contains, for each hospital, the number of isolated CABG operations (CABG operations with no other major heart surgery earlier in the hospital stay) for patients discharged in 2008, the number of in-hospital/30-day deaths, the OMR, the EMR based on the statistical model presented in Table 1, the RAMR and a 95 percent confidence interval for the RAMR.

As indicated in Table 2, the overall in-hospital/30-day mortality rate for the 10,707 CABG procedures performed at the 40 hospitals was 1.81 percent. In-hospital/30-day OMRs ranged from 0.00 percent to 5.66 percent. The range of EMRs, which measure patient severity of illness, was 1.24 percent to 2.43 percent.

The RAMRs, which are used to measure performance, ranged from 0.00 percent to 8.24 percent. Two hospitals (Buffalo General Hospital and NY Presbyterian-Columbia in Manhattan) had RAMRs that were significantly higher than the statewide rate. No hospitals had RAMRs that were significantly lower than the statewide rate.

The 2008 in-hospital/30-day mortality rate of 1.81 percent for Isolated CABG is slightly lower than the 1.95 percent observed in 2007.

The in-hospital OMR for 2008 Isolated CABG discharges (not shown in Table 2) was 1.42 percent for all 10,707 patients included in the analysis.

Figures 1 and 2 provide a visual representation of the data displayed in Tables 2 and 3. For each hospital, the black dot represents the RAMR and the gray bar represents the confidence interval, or potential statistical error, for the RAMR. The black vertical line is the NYS in-hospital/30-day mortality rate. For any hospital where the gray bar crosses the state average line, the RAMR is not statistically different from the state as a whole. Hospitals that are statistical outliers will have gray bars (confidence intervals) that are either entirely above or entirely below the line for the statewide rate.

2006 - 2008 HOSPITAL OUTCOMES FOR VALVE SURGERY

Table 3 and Figure 2 present the combined Valve Only and Valve/CABG surgery results for the 40 hospitals performing these operations in NYS during the years 2006-2008. The table contains, for each hospital, the combined number of Valve Only and Valve/CABG operations resulting in 2006-2008 discharges, the number of in-hospital/30-day deaths, the OMR, the EMR based on the statistical models presented in Appendices 2-3, the RAMR and a 95 percent confidence interval for the RAMR.

As indicated in Table 3, the overall in-hospital/30-day mortality rate for the 21,445 combined Valve Only and Valve/CABG procedures performed at the 40 hospitals was 5.22 percent. The OMRs ranged from 1.25 percent to 9.01 percent. The range of EMRs, which measure patient severity of illness, was 2.96 percent to 6.88 percent.

The RAMRs, which are used to measure performance, ranged from 1.79 percent to 9.53 percent. Five hospitals (Maimonides Medical Center in Brooklyn, NYU Hospitals Center in Manhattan, St. Elizabeth Medical Center in Utica, Strong Memorial Hospital in Rochester, and United Health Services – Wilson Hospital Division in Johnson City) had RAMRs that were significantly higher than the statewide rate. Five hospitals (NY Presbyterian – Cornell in Manhattan, North Shore University Hospital in Manhasset, St. Francis Hospital in Roslyn, St. Peter's Hospital in Albany and Vassar Brothers Medical Center in Poughkeepsie) had RAMRs that were significantly lower than the statewide rate.

Table 4 presents valve procedures performed at the 40 cardiac surgery hospitals in NYS during 2006-2008. The table contains, for each hospital, the number of valve operations (as defined by eight separate groups: Aortic Valve Replacements, Aortic Valve Repair or Replacements plus CABG, Mitral Valve Replacement, Mitral Valve Replacement plus CABG, Mitral Valve Repair, Mitral Valve Repair plus CABG, Multiple Valve Surgery and Multiple Valve Surgery plus CABG) resulting in 2006-2008 discharges. In addition to the hospital volumes, the rate of in-hospital/30-day death for the state

(Statewide Mortality Rate) is given for each group. Unless otherwise specified, when the report refers to Valve or Valve/CABG procedures it is referring to the last column of Table 4.

The 2006-2008 in-hospital/30-day OMR of 5.22 percent for valve surgeries is lower than the 5.45 percent observed for 2005-2007. The in-hospital OMR for 2006-2008 valve surgeries (not shown in Table 3) is 4.53 percent for the 21,445 patients included in this analysis.

Note on Hospitals Not Performing Cardiac Surgery During Entire 2006-2008 Period

One hospital began performing cardiac surgery during the 2006 - 2008 time period on which this report is based: Good Samaritan Hospital of Suffern began performing cardiac surgery in January 2007.

DEFINITIONS OF KEY TERMS

The **observed mortality rate (OMR)** is the observed number of deaths divided by the total number of cases.

The **expected mortality rate (EMR)** is the sum of the predicted probabilities of death for all patients divided by the total number of patients.

The **risk-adjusted mortality rate (RAMR)** is the best estimate, based on the statistical model, of what the provider's mortality rate would have been if the provider had a mix of patients identical to the statewide mix. It is obtained by first dividing the OMR by the EMR, and then multiplying by the relevant statewide mortality rate (for example 1.81 percent for Isolated CABG patients in 2008 or 5.22 percent for Valve or Valve/CABG patients in 2006-2008).

Confidence Intervals are used to identify which hospitals had significantly more or fewer deaths than expected given the risk factors of their patients. The confidence interval identifies the range in which the RAMR may fall. Hospitals with significantly higher rates than expected after adjusting for risk are those where the confidence interval range falls entirely above the statewide mortality rate. Hospitals with significantly lower rates than expected, given the severity of illness of their patients before surgery, have confidence intervals entirely below the statewide mortality rate.

The more cases a provider performs, the narrower their confidence interval will be. This is because as a provider performs more cases, the likelihood of chance variation in the RAMR decreases.

Table 2: In-Hospital/30-Day Observed, Expected and Risk-Adjusted Mortality Rates for Isolated CABG Surgery in New York State, 2008 Discharges (Listed Alphabetically by Hospital)

Hospital	Cases	Deaths	OMR	EMR	RAMR	95% CI for RAMR
Albany Medical Center	320	4	1.25	1.44	1.57	(0.42, 4.01)
Arnot Ogden Med Ctr	142	2	1.41	1.68	1.52	(0.17, 5.47)
Bellevue Hospital Ctr	140	1	0.71	1.38	0.94	(0.01, 5.23)
Beth Israel Med Ctr	243	4	1.65	1.33	2.24	(0.60, 5.74)
Buffalo General Hosp	329	13	3.95	1.85	3.88 *	(2.06, 6.63)
Champ.Valley Phys Hosp	105	2	1.90	1.50	2.30	(0.26, 8.31)
Ellis Hospital	260	4	1.54	1.54	1.81	(0.49, 4.64)
Erie County Med Ctr	121	3	2.48	1.65	2.72	(0.55, 7.95)
Good Sam - Suffern	207	3	1.45	1.46	1.80	(0.36, 5.25)
Lenox Hill Hospital	445	8	1.80	1.77	1.84	(0.79, 3.63)
LIJ Medical Center	253	1	0.40	1.90	0.38	(0.00, 2.10)
M I Bassett Hospital	72	0	0.00	1.25	0.00	(0.00, 7.39)
Maimonides Medical Ctr	351	7	1.99	1.85	1.95	(0.78, 4.02)
Mercy Hospital	334	6	1.80	2.02	1.62	(0.59, 3.52)
Millard Fillmore Hosp	258	4	1.55	1.50	1.87	(0.50, 4.79)
Montefiore - Moses	265	5	1.89	1.84	1.86	(0.60, 4.33)
Montefiore - Weiler	168	4	2.38	1.55	2.77	(0.75, 7.10)
Mount Sinai Hospital	282	7	2.48	1.59	2.84	(1.14, 5.85)
NY Hospital - Queens	53	3	5.66	1.24	8.24	(1.66,24.08)
NY Methodist Hospital	97	3	3.09	1.61	3.49	(0.70,10.19)
NYP- Columbia Presby.	352	16	4.55	1.63	5.05 *	(2.88, 8.19)
NYP- Weill Cornell	273	2	0.73	1.80	0.74	(0.08, 2.66)
NYU Hospitals Center	118	1	0.85	1.96	0.78	(0.01, 4.37)
North Shore Univ Hosp	469	12	2.56	2.18	2.13	(1.10, 3.71)
Rochester General Hosp	492	10	2.03	2.20	1.68	(0.80, 3.08)
SVCMC- St. Vincents	97	4	4.12	1.44	5.20	(1.40,13.32)
St. Elizabeth Med Ctr	211	2	0.95	1.95	0.88	(0.10, 3.19)
St. Francis Hospital	861	14	1.63	2.22	1.33	(0.72, 2.23)
St. Josephs Hospital	528	12	2.27	2.13	1.94	(1.00, 3.38)
St. Lukes at St. Lukes	123	1	0.81	2.43	0.61	(0.01, 3.37)
St. Peters Hospital	467	8	1.71	1.77	1.75	(0.75, 3.45)
Staten Island Univ Hosp	332	4	1.20	1.46	1.49	(0.40, 3.83)
Strong Memorial Hosp	313	6	1.92	1.49	2.33	(0.85, 5.08)
United Hlth Svcs-Wilson	175	2	1.14	2.11	0.98	(0.11, 3.54)
Univ. Hosp-Brooklyn	74	2	2.70	2.20	2.23	(0.25, 8.04)
Univ. Hosp-SUNY Upstate	156	2	1.28	1.95	1.19	(0.13, 4.30)
Univ. Hosp-Stony Brook	290	4	1.38	1.80	1.39	(0.37, 3.55)
Vassar Bros. Med Ctr	221	1	0.45	1.45	0.57	(0.01, 3.15)
Westchester Med Ctr	424	5	1.18	1.80	1.19	(0.38, 2.78)
Winthrop Univ. Hosp	286	2	0.70	1.85	0.69	(0.08, 2.47)
Statewide Total	**10707**	**194**	**1.81**	**1.81**	**1.81**	

* RAMR significantly higher than statewide rate based on 95 percent confidence interval.

Figure 1: In-Hospital/30-Day Risk-Adjusted Mortality Rates for Isolated CABG in New York State, 2008 Discharges

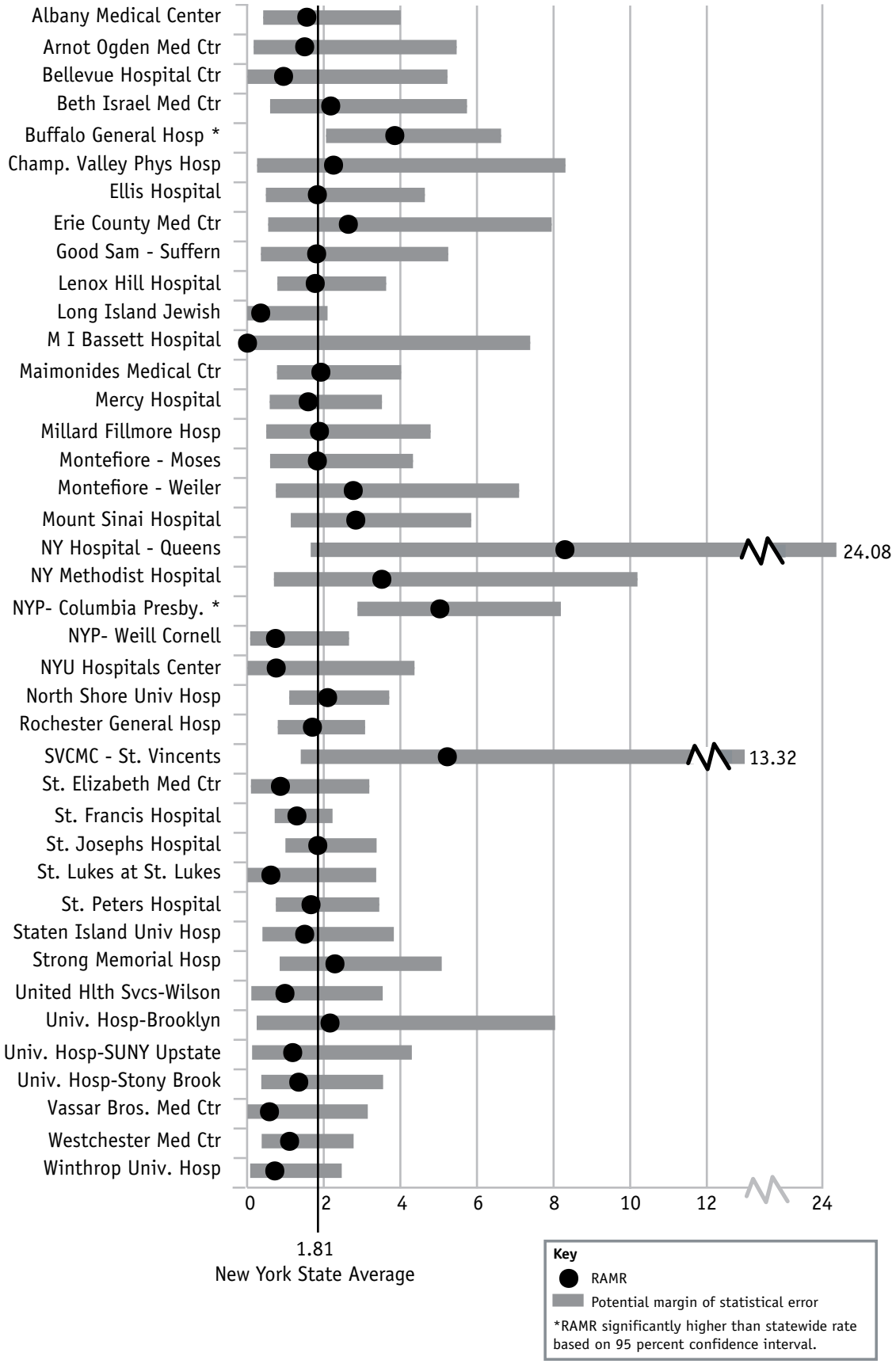

Table 3: In-Hospital/30-Day Observed, Expected and Risk-Adjusted Mortality Rates for Valve or Valve/CABG Surgery in New York State, 2006-2008 Discharges

Hospital	Cases	Deaths	OMR	EMR	RAMR	95% CI for RAMR
Albany Medical Center	409	23	5.62	4.16	7.06	(4.48,10.60)
Arnot Ogden Med Ctr	80	1	1.25	3.20	2.04	(0.03,11.34)
Bellevue Hospital Ctr	221	6	2.71	3.84	3.69	(1.35, 8.04)
Beth Israel Med Ctr	385	33	8.57	6.16	7.27	(5.00,10.21)
Buffalo General Hosp	478	28	5.86	4.47	6.85	(4.55, 9.90)
Champ.Valley Phys Hosp	87	7	8.05	4.46	9.42	(3.77,19.40)
Ellis Hospital	363	15	4.13	4.39	4.91	(2.75, 8.10)
Erie County Med Ctr	99	6	6.06	3.67	8.61	(3.15,18.75)
Good Sam - Suffern	119	2	1.68	4.65	1.89	(0.21, 6.81)
Lenox Hill Hospital	795	49	6.16	5.68	5.66	(4.19, 7.49)
LIJ Medical Center	634	28	4.42	5.10	4.52	(3.00, 6.53)
M I Bassett Hospital	88	2	2.27	2.96	4.00	(0.45,14.46)
Maimonides Medical Ctr	477	43	9.01	5.68	8.28 *	(5.99,11.16)
Mercy Hospital	189	8	4.23	4.33	5.10	(2.20,10.06)
Millard Fillmore Hosp	268	8	2.99	4.05	3.85	(1.66, 7.59)
Montefiore - Moses	517	29	5.61	6.52	4.49	(3.01, 6.45)
Montefiore - Weiler	277	19	6.86	5.07	7.07	(4.26,11.04)
Mount Sinai Hospital	1273	70	5.50	5.25	5.47	(4.26, 6.91)
NY Hospital - Queens	93	6	6.45	3.53	9.53	(3.48,20.75)
NY Methodist Hospital	140	7	5.00	5.09	5.13	(2.05,10.56)
NYP- Columbia Presby.	1696	89	5.25	4.63	5.92	(4.75, 7.29)
NYP- Weill Cornell	1058	32	3.02	4.42	3.58 **	(2.45, 5.05)
NYU Hospitals Center	1331	69	5.18	3.91	6.93 *	(5.39, 8.77)
North Shore Univ Hosp	1336	56	4.19	5.92	3.70 **	(2.79, 4.80)
Rochester General Hosp	933	60	6.43	5.87	5.72	(4.37, 7.37)
SVCMC- St. Vincents	231	12	5.19	3.81	7.13	(3.68,12.45)
St. Elizabeth Med Ctr	402	34	8.46	5.77	7.66 *	(5.30,10.70)
St. Francis Hospital	1848	91	4.92	6.31	4.08 **	(3.28, 5.01)
St. Josephs Hospital	967	55	5.69	6.50	4.57	(3.44, 5.95)
St. Lukes at St. Lukes	306	14	4.58	6.10	3.91	(2.14, 6.57)
St. Peters Hospital	821	21	2.56	5.25	2.55 **	(1.58, 3.89)
Staten Island Univ Hosp	246	7	2.85	4.02	3.70	(1.48, 7.62)
Strong Memorial Hosp	602	36	5.98	4.18	7.47 *	(5.23,10.35)
United Hlth Svcs-Wilson	249	22	8.84	5.38	8.58 *	(5.38,13.00)
Univ. Hosp-Brooklyn	185	11	5.95	4.54	6.84	(3.41,12.23)
Univ. Hosp-SUNY Upstate	259	10	3.86	3.55	5.68	(2.72,10.45)
Univ.Hosp-Stony Brook	512	43	8.40	6.88	6.38	(4.61, 8.59)
Vassar Bros. Med Ctr	470	8	1.70	4.97	1.79 **	(0.77, 3.52)
Westchester Med Ctr	503	20	3.98	5.43	3.82	(2.33, 5.90)
Winthrop Univ. Hosp	498	40	8.03	6.11	6.86	(4.90, 9.34)
Statewide Total	**21445**	**1120**	**5.22**	**5.22**	**5.22**	

* RAMR significantly higher than statewide rate based on 95 percent confidence interval.
** RAMR significantly lower than statewide rate based on 95 percent confidence interval.

Figure 2: In-Hospital/30-Day Risk-Adjusted Mortality Rates for Valve or Valve/CABG Surgery in New York State, 2006-2008 Discharges

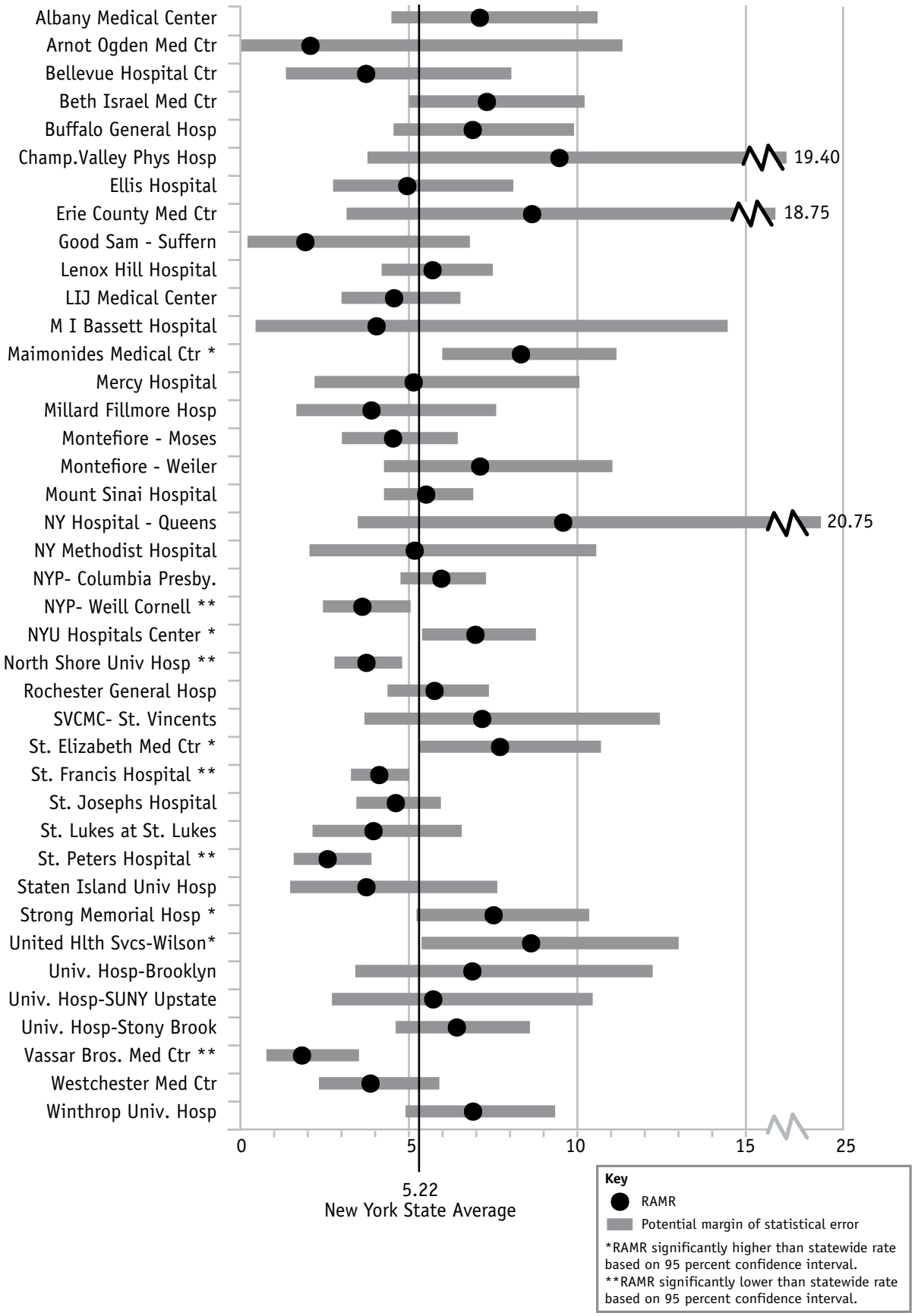

Table 4: Hospital Volume for Valve Procedures in New York State, 2006-2008 Discharges

Hospital	Aortic Valve Replace Surgery	Aortic Valve and CABG	Mitral Valve Replace Surgery	Mitral Replace and CABG	Mitral Valve Repair Surgery	Mitral Repair and CABG	Multiple Valve Surgery	Multiple Valve and CABG	Total Valve or Valve/ CABG
Albany Medical Center	115	162	37	15	19	28	24	9	409
Arnot Ogden Med Ctr	34	25	8	3	5	2	1	2	80
Bellevue Hospital Ctr	78	11	40	14	17	16	42	3	221
Beth Israel Med Ctr	76	70	37	28	31	49	67	27	385
Buffalo General Hosp	142	155	31	17	37	59	18	19	478
Champ.Valley Phys Hosp	31	24	3	3	4	10	6	6	87
Ellis Hospital	123	117	18	12	44	24	19	6	363
Erie County Med Ctr	39	21	15	7	2	1	9	5	99
Good Sam - Suffern	30	51	15	5	4	9	4	1	119
Lenox Hill Hospital	154	134	59	18	170	92	119	49	795
LIJ Medical Center	141	150	72	60	58	53	74	26	634
M I Bassett Hospital	33	31	13	3	3	3	2	0	88
Maimonides Medical Ctr	132	99	79	26	27	41	60	13	477
Mercy Hospital	52	61	15	14	13	16	14	4	189
Millard Fillmore Hosp	77	81	28	8	30	19	13	12	268
Montefiore - Moses	99	91	59	42	37	80	81	28	517
Montefiore - Weiler	61	44	56	11	20	34	38	13	277
Mount Sinai Hospital	215	154	47	17	129	73	509	129	1273
NY Hospital - Queens	29	21	24	8	6	1	2	2	93
NY Methodist Hospital	40	23	18	6	17	14	18	4	140
NYP- Columbia Presby.	500	349	177	69	257	113	176	55	1696
NYP- Weill Cornell	388	230	109	39	100	43	113	36	1058
NYU Hospitals Center	480	101	114	23	419	43	135	16	1331
North Shore Univ Hosp	435	352	159	71	98	68	122	31	1336
Rochester General Hosp	314	279	77	48	94	54	37	30	933
SVCMC- St. Vincents	79	37	23	7	39	19	19	8	231
St. Elizabeth Med Ctr	97	95	30	40	26	59	26	29	402
St. Francis Hospital	650	441	81	50	168	167	182	109	1848
St. Josephs Hospital	251	240	94	61	82	85	99	55	967
St. Lukes at St. Lukes	43	52	54	27	49	26	38	17	306
St. Peters Hospital	234	243	48	27	57	82	88	42	821
Staten Island Univ Hosp	73	55	49	22	21	12	11	3	246
Strong Memorial Hosp	199	133	71	15	82	28	60	14	602
United Hlth Svcs-Wilson	74	93	29	20	14	1	10	8	249
Univ.Hosp-Brooklyn	45	22	38	3	30	17	23	7	185
Univ.Hosp-SUNY Upstate	81	54	22	8	47	29	16	2	259
Univ.Hosp-Stony Brook	132	118	55	27	29	43	63	45	512
Vassar Bros. Med Ctr	144	136	36	25	28	55	26	20	470
Westchester Med Ctr	171	150	28	18	41	50	32	13	503
Winthrop Univ. Hosp	123	152	37	36	28	66	33	23	498
Total	**6214**	**4857**	**2005**	**953**	**2382**	**1684**	**2429**	**921**	**21445**
Statewide Mortality Rate (%)	**3.07**	**5.39**	**5.34**	**9.76**	**1.55**	**6.29**	**7.90**	**14.33**	**5.22**

Table 5 provides the number of Isolated CABG operations, number of CABG patients who died in the hospital or after discharge but within 30 days of surgery, OMR, EMR, RAMR and the 95 percent confidence interval for the RAMR for isolated CABG patients in 2006-2008. In addition, the final two columns provide the number of Isolated CABG, Valve and Valve/CABG procedures and the RAMR for these patients in 2006-2008 for each of the 40 hospitals performing these operations during the time period. Surgeons and hospitals with RAMRs that are significantly lower or higher than the statewide mortality rate (as judged by the 95 percent confidence interval) are also noted.

The hospital information is presented for each surgeon who met at least one of the following criteria: (a) performed 200 or more cardiac operations during 2006-2008, (b) performed at least one cardiac operation in each of the years, 2006-2008. A cardiac operation is defined as any reportable adult cardiac operation and may include cases not listed in Tables 5 or 6.

The results for surgeons not meeting either of the above criteria are grouped together and reported as "All Others" in the hospital in which the operations were performed. Surgeons who met the above criteria and who performed operations in more than one hospital during 2006-2008 are noted in Table 5 and listed under all hospitals in which they performed these operations.

Also, surgeons who met either criterion (a) or (b) above and have performed Isolated CABG, Valve or Valve/CABG operations in two or more NYS hospitals are listed separately in Table 6. This table contains the same information as Table 5 across all hospitals in which the surgeon performed operations.

Table 5: In-Hospital/30-Day Observed, Expected and Risk-Adjusted Mortality Rates by Surgeon for Isolated CABG and Valve Surgery (done in combination with or without CABG) in New York State, 2006 - 2008 Discharges

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
STATEWIDE TOTAL	**34108**	**646**	**1.89**	**1.89**	**1.89**		**55553**	**3.18**
Albany Medical Center								
Britton L	320	6	1.88	1.49	2.38	(0.87, 5.19)	467	2.67
Devejian N	.	.	.	.	.	(. , .)	1	0.00
Fuzesi L	332	4	1.20	1.91	1.19	(0.32, 3.06)	387	3.68
Miller S	294	4	1.36	1.77	1.46	(0.39, 3.73)	439	3.33
All Others	124	1	0.81	1.33	1.14	(0.01, 6.37)	185	5.41
Total	**1070**	**15**	**1.40**	**1.68**	**1.58**	**(0.88, 2.61)**	**1479**	**3.46**
Arnot Ogden Med Ctr								
Nast E	182	3	1.65	1.58	1.97	(0.40, 5.76)	214	2.54
Raudat C W	191	4	2.09	1.98	2.00	(0.54, 5.12)	239	2.90
Total	**373**	**7**	**1.88**	**1.79**	**1.99**	**(0.80, 4.09)**	**453**	**2.75**
Bellevue Hospital Ctr								
#Crooke G	107	0	0.00	1.44	0.00	(0.00, 4.52)	140	1.13
#Grau J B	125	2	1.60	1.02	2.97	(0.33,10.73)	185	2.82
#Meyer D B	.	.	.	.	.	(. , .)	1	0.00
#Ribakove G	103	1	0.97	1.26	1.46	(0.02, 8.11)	203	2.46
#Schwartz C F	34	0	0.00	1.26	0.00	(0.00,16.23)	53	2.40
All Others	7	0	0.00	0.62	0.00	(0.00,100.0)	15	0.00
Total	**376**	**3**	**0.80**	**1.22**	**1.24**	**(0.25, 3.62)**	**597**	**2.19**

Table 5 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Beth Israel Med Ctr								
Geller C M	100	2	2.00	1.68	2.26	(0.25, 8.16)	148	5.33
Hoffman D	202	4	1.98	1.13	3.31	(0.89, 8.47)	255	5.17
#Stelzer P	25	3	12.00	3.67	6.19	(1.24,18.10)	128	6.50 *
Tranbaugh R	411	7	1.70	1.36	2.38	(0.95, 4.90)	592	3.17
Total	**738**	**16**	**2.17**	**1.42**	**2.90**	**(1.65, 4.70)**	**1123**	**4.56 ***
Buffalo General Hosp								
##Ashraf M	28	0	0.00	2.12	0.00	(0.00,11.73)	30	0.00
Grosner G	704	16	2.27	1.65	2.61	(1.49, 4.24)	1102	4.34
#Lewin A	264	7	2.65	1.48	3.40	(1.36, 7.00)	277	5.86
##Picone A	96	4	4.17	2.35	3.36	(0.90, 8.59)	161	4.08
All Others	3	0	0.00	3.01	0.00	(0.00,77.06)	3	0.00
Total	**1095**	**27**	**2.47**	**1.69**	**2.77**	**(1.83, 4.03)**	**1573**	**4.39 ***
Champ.Valley Phys Hosp								
Abbott A E	164	3	1.83	1.44	2.41	(0.48, 7.03)	233	5.58
#Bennett E	3	0	0.00	1.05	0.00	(0.00,100.0)	3	0.00
#Canavan T	39	0	0.00	0.91	0.00	(0.00,19.49)	45	0.00
#Depan H	4	0	0.00	0.96	0.00	(0.00,100.0)	4	0.00
#Reich H	9	0	0.00	0.84	0.00	(0.00,92.14)	11	0.00
#Saifi J	1	0	0.00	1.10	0.00	(0.00,100.0)	2	0.00
#Singh C	8	0	0.00	0.91	0.00	(0.00,95.63)	9	0.00
All Others	56	0	0.00	1.12	0.00	(0.00,11.07)	64	0.00
Total	**284**	**3**	**1.06**	**1.26**	**1.59**	**(0.32, 4.65)**	**371**	**4.26**
Ellis Hospital								
#Depan H	268	2	0.75	1.82	0.78	(0.09, 2.80)	489	3.30
#Reich H	256	4	1.56	1.46	2.03	(0.54, 5.19)	340	2.45
#Singh C	287	3	1.05	1.59	1.24	(0.25, 3.63)	345	1.38
Total	**811**	**9**	**1.11**	**1.63**	**1.29**	**(0.59, 2.45)**	**1174**	**2.62**
Erie County Med Ctr								
#Bell-Thomson J	179	2	1.12	1.36	1.55	(0.17, 5.61)	255	4.45
#Datta S	52	4	7.69	1.68	8.68 *	(2.33,22.21)	53	14.45 *
#Downing S W	159	3	1.89	1.86	1.92	(0.39, 5.61)	178	3.27
All Others	55	2	3.64	1.59	4.33	(0.49,15.63)	58	6.30
Total	**445**	**11**	**2.47**	**1.61**	**2.92**	**(1.45, 5.22)**	**544**	**5.01**
Good Sam - Suffern								
Lundy E F	196	3	1.53	1.92	1.51	(0.30, 4.41)	294	1.83
Salenger R	189	2	1.06	1.26	1.59	(0.18, 5.73)	210	2.11
Total	**385**	**5**	**1.30**	**1.60**	**1.54**	**(0.50, 3.59)**	**504**	**1.90**

Table 5 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Lenox Hill Hospital								
#Ciuffo G B	156	3	1.92	2.08	1.75	(0.35, 5.11)	228	2.91
Loulmet D F	40	0	0.00	1.11	0.00	(0.00,15.60)	289	4.18
Patel N C	556	6	1.08	1.92	1.07	(0.39, 2.32)	766	2.22
#Plestis K A	3	0	0.00	0.61	0.00	(0.00,100.0)	8	0.00
#Reddy R C	59	2	3.39	1.54	4.18	(0.47,15.09)	102	2.86
Subramanian V	527	13	2.47	2.12	2.20	(1.17, 3.77)	731	3.91
#Swistel D	2	0	0.00	0.62	0.00	(0.00,100.0)	5	0.00
All Others	50	1	2.00	1.57	2.42	(0.03,13.46)	59	2.36
Total	**1393**	**25**	**1.79**	**1.96**	**1.74**	**(1.12, 2.57)**	**2188**	**3.25**
LIJ Medical Center								
Graver L	224	1	0.45	1.95	0.43	(0.01, 2.41)	540	2.94
Manetta F	150	5	3.33	2.05	3.08	(0.99, 7.19)	222	3.94
Palazzo R	252	0	0.00	1.89	0.00 **	(0.00, 1.46)	372	1.12 **
Parnell V	.	.	.	.	.	(. , .)	1	0.00
Scheinerman S J	137	2	1.46	2.18	1.27	(0.14, 4.57)	260	1.39
#Vatsia S	.	.	.	.	.	(. , .)	2	100.0
Total	**763**	**8**	**1.05**	**1.99**	**1.00**	**(0.43, 1.96)**	**1397**	**2.41**
M I Bassett Hospital								
Lancey R A	108	0	0.00	1.36	0.00	(0.00, 4.73)	156	0.00
Shortt K G	96	0	0.00	0.98	0.00	(0.00, 7.42)	136	2.75
Total	**204**	**0**	**0.00**	**1.18**	**0.00**	**(0.00, 2.89)**	**292**	**1.27**
Maimonides Medical Ctr								
Abrol S	190	4	2.11	1.99	2.00	(0.54, 5.13)	274	2.74
#Brevetti G R	7	0	0.00	1.92	0.00	(0.00,51.63)	15	4.92
Cunningham J N	40	0	0.00	1.69	0.00	(0.00,10.25)	59	3.96
#Genovesi M H	58	1	1.72	1.56	2.10	(0.03,11.66)	76	6.14
Jacobowitz I	417	5	1.20	1.97	1.15	(0.37, 2.69)	592	4.43
Lahey S J	42	2	4.76	1.53	5.90	(0.66,21.32)	62	7.31
Saltman A E	16	1	6.25	2.59	4.57	(0.06,25.45)	21	10.25
Stephens G A	64	3	4.69	1.30	6.83	(1.37,19.95)	116	6.38
Vaynblat M	218	7	3.21	2.09	2.91	(1.17, 6.01)	310	4.42
All Others	8	0	0.00	0.86	0.00	(0.00,100.0)	12	8.42
Total	**1060**	**23**	**2.17**	**1.91**	**2.16**	**(1.37, 3.23)**	**1537**	**4.43 ***
Mercy Hospital								
#Aldridge J	112	2	1.79	1.59	2.12	(0.24, 7.66)	129	3.80
##Ashraf M	1	0	0.00	1.07	0.00	(0.00,100.0)	1	0.00
#Bell-Thomson J	442	9	2.04	1.60	2.40	(1.10, 4.56)	574	3.51
#Downing S W	219	5	2.28	2.52	1.72	(0.55, 4.00)	247	2.75
All Others	82	4	4.88	1.91	4.83	(1.30,12.37)	94	7.86
Total	**856**	**20**	**2.34**	**1.87**	**2.37**	**(1.45, 3.66)**	**1045**	**3.68**

Table 5 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Millard Fillmore Hosp								
#Aldridge J	161	6	3.73	1.52	4.64	(1.70,10.11)	196	5.43
##Ashraf M	707	11	1.56	1.74	1.69	(0.84, 3.03)	926	2.59
#Datta S	14	0	0.00	0.90	0.00	(0.00,55.06)	18	0.00
Jennings L	29	0	0.00	0.93	0.00	(0.00,25.79)	29	0.00
#Lewin A	1	0	0.00	0.38	0.00	(0.00,100.0)	1	0.00
##Picone A	18	0	0.00	1.20	0.00	(0.00,32.18)	28	4.10
Total	**930**	**17**	**1.83**	**1.65**	**2.10**	**(1.22, 3.35)**	**1198**	**3.03**
Montefiore - Moses								
#D Alessandro D A	258	7	2.71	1.70	3.01	(1.21, 6.21)	395	3.61
#Deanda A	28	1	3.57	1.67	4.05	(0.05,22.55)	45	3.52
##Derose J J	72	0	0.00	1.97	0.00	(0.00, 4.91)	84	3.04
#Goldstein D J	217	4	1.84	1.38	2.52	(0.68, 6.45)	352	3.14
#Michler R E	128	3	2.34	1.58	2.81	(0.57, 8.22)	292	2.76
Weinstein S	.	.	.	.	.	(. , .)	1	0.00
All Others	120	4	3.33	1.80	3.50	(0.94, 8.96)	171	3.62
Total	**823**	**19**	**2.31**	**1.64**	**2.67**	**(1.61, 4.17)**	**1340**	**3.23**
Montefiore - Weiler								
#D Alessandro D A	14	1	7.14	1.35	10.01	(0.13,55.71)	16	6.94
#Deanda A	132	8	6.06	1.31	8.79 *	(3.79,17.32)	187	9.92 *
##Derose J J	187	6	3.21	1.91	3.19	(1.16, 6.94)	323	5.06
#Goldstein D J	32	2	6.25	1.25	9.46	(1.06,34.17)	49	6.57
#Michler R E	28	0	0.00	2.13	0.00	(0.00,11.64)	79	1.71
All Others	54	2	3.70	1.54	4.54	(0.51,16.40)	70	7.02
Total	**447**	**19**	**4.25**	**1.63**	**4.92 ***	**(2.96, 7.69)**	**724**	**5.66 ***
Mount Sinai Hospital								
Adams D H	12	0	0.00	0.95	0.00	(0.00,60.74)	612	3.75
Anyanwu A C	23	2	8.70	2.86	5.75	(0.65,20.76)	58	10.48 *
Filsoufi F	202	4	1.98	1.85	2.03	(0.55, 5.19)	306	2.24
Griepp R	1	0	0.00	2.96	0.00	(0.00,100.0)	41	3.28
Nguyen K	.	.	.	.	.	(. , .)	1	0.00
#Plestis K A	61	1	1.64	1.20	2.59	(0.03,14.40)	206	3.35
#Reddy R C	52	3	5.77	1.52	7.17	(1.44,20.95)	87	4.24
#Stelzer P	18	1	5.56	2.15	4.89	(0.06,27.23)	77	2.91
Zias E	395	9	2.28	1.90	2.27	(1.04, 4.32)	635	2.60
All Others	6	0	0.00	0.94	0.00	(0.00,100.0)	20	7.82
Total	**770**	**20**	**2.60**	**1.82**	**2.71**	**(1.65, 4.18)**	**2043**	**3.54**

Table 5 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
NY Hospital - Queens								
#Adkins M	203	10	4.93	1.45	6.43 *	(3.08,11.83)	271	9.06 *
#Isom O	1	0	0.00	0.76	0.00	(0.00,100.0)	1	0.00
##Ko W	48	1	2.08	1.71	2.31	(0.03,12.88)	67	4.25
#Mack C A	59	2	3.39	1.12	5.73	(0.64,20.67)	65	6.66
Total	**311**	**13**	**4.18**	**1.43**	**5.55 ***	**(2.95, 9.50)**	**404**	**7.82 ***
NY Methodist Hospital								
#Lee L Y	140	4	2.86	1.95	2.78	(0.75, 7.12)	218	3.49
#Tortolani A	182	2	1.10	2.01	1.03	(0.12, 3.74)	243	2.57
All Others	28	0	0.00	1.16	0.00	(0.00,21.41)	29	0.00
Total	**350**	**6**	**1.71**	**1.92**	**1.69**	**(0.62, 3.69)**	**490**	**2.99**
NYP- Columbia Presby.								
Argenziano M	112	3	2.68	1.88	2.69	(0.54, 7.86)	323	3.80
#Chen J M	.	.	.	.	.	(. , .)	1	0.00
Mosca R S	1	0	0.00	0.53	0.00	(0.00,100.0)	3	0.00
Naka Y	245	10	4.08	1.63	4.75 *	(2.28, 8.74)	470	4.87 *
Oz M	235	2	0.85	1.18	1.36	(0.15, 4.92)	591	3.40
Quaegebeur J	.	.	.	.	.	(. , .)	8	0.00
Smith C	213	5	2.35	1.10	4.03	(1.30, 9.40)	700	2.80
Stewart A S	227	11	4.85	2.48	3.70	(1.85, 6.63)	522	4.35
Williams M R	62	4	6.45	2.28	5.36	(1.44,13.73)	166	6.87 *
All Others	3	0	0.00	1.33	0.00	(0.00,100.0)	10	0.00
Total	**1098**	**35**	**3.19**	**1.67**	**3.62 ***	**(2.52, 5.04)**	**2794**	**4.07 ***
NYP- Weill Cornell								
#Adkins M	3	0	0.00	1.71	0.00	(0.00,100.0)	11	0.00
#Chen J M	.	.	.	.	.	(. , .)	2	0.00
Girardi L	408	3	0.74	2.16	0.64 **	(0.13, 1.88)	849	1.82 **
#Isom O	42	0	0.00	0.92	0.00	(0.00,18.04)	141	2.38
##Ko W	26	1	3.85	2.19	3.33	(0.04,18.50)	45	4.85
Krieger K	271	4	1.48	1.44	1.94	(0.52, 4.95)	633	2.08
#Lee L Y	85	1	1.18	2.06	1.08	(0.01, 6.01)	112	2.08
#Mack C A	.	.	.	.	.	(. , .)	1	0.00
Salemi A	142	1	0.70	2.14	0.62	(0.01, 3.47)	216	1.89
#Tortolani A	87	4	4.60	2.39	3.65	(0.98, 9.33)	112	5.72
All Others	2	0	0.00	6.78	0.00	(0.00,51.24)	2	0.00
Total	**1066**	**14**	**1.31**	**1.95**	**1.28**	**(0.70, 2.15)**	**2124**	**2.17 ** **

Table 5 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
NYU Hospitals Center								
Colvin S	27	0	0.00	0.94	0.00	(0.00,27.23)	549	5.63 *
#Crooke G	18	0	0.00	1.52	0.00	(0.00,25.36)	39	2.38
Culliford A	100	0	0.00	1.92	0.00	(0.00, 3.62)	261	3.56
Galloway A	80	5	6.25	1.41	8.41 *	(2.71,19.63)	566	3.65
#Grau J B	2	0	0.00	1.74	0.00	(0.00,100.0)	11	0.00
Grossi E	7	0	0.00	0.99	0.00	(0.00,99.98)	28	3.07
#Meyer D B	.	.	.	.	.	(. , .)	8	0.00
#Ribakove G	41	0	0.00	1.68	0.00	(0.00,10.07)	120	3.17
#Schwartz C F	38	0	0.00	2.50	0.00	(0.00, 7.31)	62	2.93
Total	**313**	**5**	**1.60**	**1.70**	**1.78**	**(0.57, 4.15)**	**1644**	**4.10 ***
North Shore Univ Hosp								
Arnofsky A	162	4	2.47	1.76	2.66	(0.72, 6.81)	219	4.10
Esposito R	378	5	1.32	2.12	1.18	(0.38, 2.76)	607	2.08
Hall M	284	9	3.17	2.77	2.17	(0.99, 4.12)	454	3.08
Hartman A	170	1	0.59	1.57	0.71	(0.01, 3.95)	615	1.54 **
Kalimi R	360	5	1.39	2.66	0.99	(0.32, 2.30)	568	1.52 **
Pogo G	225	5	2.22	2.94	1.43	(0.46, 3.35)	365	3.25
#Vatsia S	142	4	2.82	2.36	2.26	(0.61, 5.79)	229	3.50
Total	**1721**	**33**	**1.92**	**2.38**	**1.53**	**(1.05, 2.14)**	**3057**	**2.36 ****
Rochester General Hosp								
Becker E J	200	8	4.00	2.83	2.68	(1.15, 5.28)	237	5.06
Cheeran D	645	11	1.71	2.55	1.27	(0.63, 2.27)	1007	2.80
Kirshner R	621	12	1.93	2.43	1.51	(0.78, 2.64)	1155	3.11
Total	**1466**	**31**	**2.11**	**2.53**	**1.58**	**(1.07, 2.24)**	**2399**	**3.15**
SVCMC- St. Vincents								
#Ciuffo G B	44	1	2.27	1.55	2.79	(0.04,15.50)	87	7.46
Lang S	253	9	3.56	1.28	5.26 *	(2.40, 9.99)	334	6.36 *
Shin Y T	177	4	2.26	1.55	2.77	(0.74, 7.08)	283	3.02
All Others	1	0	0.00	9.19	0.00	(0.00,75.60)	2	17.49
Total	**475**	**14**	**2.95**	**1.42**	**3.93 ***	**(2.15, 6.59)**	**706**	**5.32 ***
St. Elizabeth Med Ctr								
El Amir N	186	3	1.61	1.91	1.60	(0.32, 4.66)	289	3.37
Joyce F	259	10	3.86	2.21	3.31	(1.58, 6.08)	415	5.14 *
Kelley J	285	7	2.46	2.15	2.17	(0.87, 4.47)	428	4.50
Total	**730**	**20**	**2.74**	**2.11**	**2.46**	**(1.50, 3.80)**	**1132**	**4.45 ***

Table 5 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
St. Francis Hospital								
Bercow N	327	5	1.53	2.06	1.41	(0.45, 3.28)	566	2.79
Colangelo R	628	11	1.75	2.23	1.49	(0.74, 2.66)	940	1.82 **
Damus P	123	1	0.81	1.60	0.96	(0.01, 5.36)	238	1.71
Fernandez H A	392	3	0.77	2.24	0.65 **	(0.13, 1.89)	538	2.25
Lamendola C	345	5	1.45	2.18	1.26	(0.40, 2.93)	569	2.47
Robinson N	491	13	2.65	1.74	2.88	(1.53, 4.93)	857	4.20
Taylor J	434	8	1.84	2.20	1.59	(0.68, 3.13)	880	2.02 **
Total	**2740**	**46**	**1.68**	**2.08**	**1.53**	**(1.12, 2.03)**	**4588**	**2.51 ** **
St. Josephs Hospital								
Green G R	353	11	3.12	1.88	3.14	(1.56, 5.62)	542	3.96
Marvasti M	300	5	1.67	1.83	1.72	(0.56, 4.02)	546	2.39
Nazem A	410	7	1.71	2.44	1.32	(0.53, 2.73)	571	2.35
Rosenberg J	302	5	1.66	2.25	1.39	(0.45, 3.25)	524	3.66
Zhou Z	387	7	1.81	2.26	1.52	(0.61, 3.12)	536	2.02
Total	**1752**	**35**	**2.00**	**2.15**	**1.76**	**(1.23, 2.45)**	**2719**	**2.85**
St. Lukes at St. Lukes								
Balaram S K	113	4	3.54	2.56	2.62	(0.70, 6.70)	190	2.73
##Derose J J	28	1	3.57	2.71	2.49	(0.03,13.88)	70	3.87
#Swistel D	299	4	1.34	2.57	0.99	(0.27, 2.52)	486	2.05
Total	**440**	**9**	**2.05**	**2.58**	**1.50**	**(0.69, 2.85)**	**746**	**2.44**
St. Peters Hospital								
#Bennett E	236	0	0.00	1.60	0.00 **	(0.00, 1.85)	514	1.18 **
#Canavan T	319	8	2.51	1.91	2.48	(1.07, 4.89)	361	3.56
Dal Col R	382	7	1.83	1.28	2.72	(1.09, 5.60)	649	2.04
#Saifi J	375	7	1.87	2.26	1.56	(0.63, 3.22)	609	2.16
Total	**1312**	**22**	**1.68**	**1.77**	**1.79**	**(1.12, 2.72)**	**2133**	**2.06 ** **
Staten Island Univ Hosp								
McGinn J	806	15	1.86	2.02	1.75	(0.98, 2.88)	997	2.89
Molinaro P J	63	0	0.00	1.47	0.00	(0.00, 7.50)	89	0.00
Nabagiez J P	13	0	0.00	1.49	0.00	(0.00,35.92)	16	0.00
Rosell F M	241	4	1.66	1.89	1.67	(0.45, 4.26)	267	2.33
Total	**1123**	**19**	**1.69**	**1.95**	**1.64**	**(0.99, 2.56)**	**1369**	**2.60**
Strong Memorial Hosp								
Alfieris G	.	.	.	.	.	(. , .)	9	0.00
Hicks G	273	5	1.83	1.63	2.12	(0.68, 4.95)	392	5.55 *
Knight P	515	8	1.55	1.82	1.61	(0.69, 3.18)	918	3.42
Massey H	203	9	4.43	2.50	3.36	(1.53, 6.38)	274	4.88
Total	**991**	**22**	**2.22**	**1.91**	**2.20**	**(1.38, 3.33)**	**1593**	**4.18**

Table 5 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
United Hlth Svcs-Wilson								
Wong K	276	1	0.36	1.90	0.36	(0.00, 2.00)	409	2.65
Yousuf M	246	9	3.66	2.34	2.97	(1.35, 5.63)	332	6.10 *
All Others	101	4	3.96	2.16	3.47	(0.93, 8.89)	131	4.59
Total	**623**	**14**	**2.25**	**2.12**	**2.01**	**(1.10, 3.37)**	**872**	**4.31**
Univ.Hosp-Brooklyn								
#Brevetti G R	5	0	0.00	2.90	0.00	(0.00,47.98)	13	0.00
Burack J H	31	0	0.00	1.63	0.00	(0.00,13.73)	48	0.00
#Genovesi M H	50	1	2.00	2.21	1.72	(0.02, 9.56)	59	5.15
##Ko W	94	4	4.26	2.33	3.46	(0.93, 8.86)	191	4.39
Lowery R C	21	0	0.00	1.40	0.00	(0.00,23.61)	44	5.97
All Others	36	1	2.78	1.89	2.79	(0.04,15.50)	67	3.78
Total	**237**	**6**	**2.53**	**2.07**	**2.31**	**(0.84, 5.03)**	**422**	**4.06**
Univ.Hosp-SUNY Upstate								
Fink G W	252	0	0.00	1.46	0.00 **	(0.00, 1.89)	378	1.54
Lutz C J	341	6	1.76	2.05	1.62	(0.59, 3.54)	471	3.33
##Picone A	8	0	0.00	1.58	0.00	(0.00,54.82)	11	0.00
Total	**601**	**6**	**1.00**	**1.80**	**1.05**	**(0.38, 2.29)**	**860**	**2.54**
Univ.Hosp-Stony Brook								
Bilfinger T	109	1	0.92	2.44	0.71	(0.01, 3.97)	164	2.76
McLarty A	88	1	1.14	2.09	1.03	(0.01, 5.73)	130	1.36
Rosengart T	305	5	1.64	1.63	1.91	(0.61, 4.45)	547	4.08
Seifert F	386	5	1.30	1.70	1.44	(0.47, 3.37)	545	3.20
All Others	21	1	4.76	1.44	6.25	(0.08,34.78)	35	9.17
Total	**909**	**13**	**1.43**	**1.80**	**1.51**	**(0.80, 2.58)**	**1421**	**3.45**
Vassar Bros. Med Ctr								
Sarabu M	195	1	0.51	1.64	0.59	(0.01, 3.30)	463	0.77 **
Shahani R	190	1	0.53	1.41	0.71	(0.01, 3.94)	265	2.23
Zakow P	251	1	0.40	1.79	0.42	(0.01, 2.34)	364	0.86 **
All Others	63	2	3.17	1.68	3.57	(0.40,12.90)	77	4.21
Total	**699**	**5**	**0.72**	**1.64**	**0.83**	**(0.27, 1.93)**	**1169**	**1.19 ****
Westchester Med Ctr								
Fleisher A	233	3	1.29	2.12	1.15	(0.23, 3.36)	278	3.22
Lafaro R	267	5	1.87	1.85	1.92	(0.62, 4.47)	365	3.23
Lansman S	466	5	1.07	1.96	1.03	(0.33, 2.41)	605	1.42 **
Malekan R	22	0	0.00	2.17	0.00	(0.00,14.52)	27	4.50
Spielvogel D	469	5	1.07	1.95	1.04	(0.33, 2.42)	683	1.81 **
All Others	.	.	.	.	.	(. , .)	2	0.00
Total	**1457**	**18**	**1.24**	**1.97**	**1.19 ****	**(0.70, 1.88)**	**1960**	**2.16 ****

Table 5 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Winthrop Univ. Hosp								
Goncalves J A	331	5	1.51	2.05	1.40	(0.45, 3.26)	503	3.59
Kokotos W J	254	7	2.76	1.89	2.77	(1.11, 5.70)	392	4.97
Schubach S	270	1	0.37	1.32	0.53	(0.01, 2.95)	455	2.38
All Others	16	0	0.00	1.12	0.00	(0.00,38.94)	19	0.00
Total	**871**	**13**	**1.49**	**1.76**	**1.61**	**(0.86, 2.75)**	**1369**	**3.68**
STATEWIDE TOTAL	**34108**	**646**	**1.89**	**1.89**	**1.89**		**55553**	**3.18**

* RAMR significantly higher than statewide rate based on 95 percent confidence interval.

** RAMR significantly lower than statewide rate based on 95 percent confidence interval.

\# Performed operations in one other NYS hospital.

Performed operations in two or more other NYS hospitals.

Table 6: Summary Information for Surgeons Practicing at More than One Hospital, 2006-2008

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Adkins M	**206**	**10**	**4.85**	**1.45**	**6.32 ***	**(3.03,11.62)**	**282**	**8.22 ***
NY Hospital - Queens	203	10	4.93	1.45	6.43 *	(3.08,11.83)	271	9.06 *
NYP- Weill Cornell	3	0	0.00	1.71	0.00	(0.00,100.0)	11	0.00
Aldridge J	**273**	**8**	**2.93**	**1.55**	**3.58**	**(1.54, 7.05)**	**325**	**4.81**
Mercy Hospital	112	2	1.79	1.59	2.12	(0.24, 7.66)	129	3.80
Millard Fillmore Hosp	161	6	3.73	1.52	4.64	(1.70,10.11)	196	5.43
Ashraf M	**736**	**11**	**1.49**	**1.75**	**1.61**	**(0.80, 2.89)**	**957**	**2.51**
Buffalo General Hosp	28	0	0.00	2.12	0.00	(0.00,11.73)	30	0.00
Mercy Hospital	1	0	0.00	1.07	0.00	(0.00,100.0)	1	0.00
Millard Fillmore Hosp	707	11	1.56	1.74	1.69	(0.84, 3.03)	926	2.59
Bell-Thomson J	**621**	**11**	**1.77**	**1.53**	**2.19**	**(1.09, 3.91)**	**829**	**3.78**
Erie County Med Ctr	179	2	1.12	1.36	1.55	(0.17, 5.61)	255	4.45
Mercy Hospital	442	9	2.04	1.60	2.40	(1.10, 4.56)	574	3.51
Bennett E	**239**	**0**	**0.00**	**1.59**	**0.00 ****	**(0.00, 1.83)**	**517**	**1.18 ****
Champ.Valley Phys Hosp	3	0	0.00	1.05	0.00	(0.00,100.0)	3	0.00
St. Peters Hospital	236	0	0.00	1.60	0.00 **	(0.00, 1.85)	514	1.18 **
Brevetti G R	**12**	**0**	**0.00**	**2.33**	**0.00**	**(0.00,24.87)**	**28**	**3.00**
Maimonides Medical Ctr	7	0	0.00	1.92	0.00	(0.00,51.63)	15	4.92
Univ.Hosp-Brooklyn	5	0	0.00	2.90	0.00	(0.00,47.98)	13	0.00
Canavan T	**358**	**8**	**2.23**	**1.80**	**2.35**	**(1.01, 4.62)**	**406**	**3.37**
Champ.Valley Phys Hosp	39	0	0.00	0.91	0.00	(0.00,19.49)	45	0.00
St. Peters Hospital	319	8	2.51	1.91	2.48	(1.07, 4.89)	361	3.56
Chen J M	**.**	**.**	**.**	**.**	**.**	**(. , .)**	**3**	**0.00**
NYP- Columbia Presby.	.	.	.	.	.	**(. , .)**	1	0.00
NYP- Weill Cornell	.	.	.	.	.	**(. , .)**	2	0.00
Ciuffo G B	**200**	**4**	**2.00**	**1.96**	**1.93**	**(0.52, 4.94)**	**315**	**4.19**
Lenox Hill Hospital	156	3	1.92	2.08	1.75	(0.35, 5.11)	228	2.91
SVCMC- St. Vincents	44	1	2.27	1.55	2.79	(0.04,15.50)	87	7.46
Crooke G	**125**	**0**	**0.00**	**1.45**	**0.00**	**(0.00, 3.83)**	**179**	**1.54**
Bellevue Hospital Ctr	107	0	0.00	1.44	0.00	(0.00, 4.52)	140	1.13
NYU Hospitals Center	18	0	0.00	1.52	0.00	(0.00,25.36)	39	2.38
D Alessandro D A	**272**	**8**	**2.94**	**1.69**	**3.30**	**(1.42, 6.51)**	**411**	**3.73**
Montefiore - Moses	258	7	2.71	1.70	3.01	(1.21, 6.21)	395	3.61
Montefiore - Weiler	14	1	7.14	1.35	10.01	(0.13,55.71)	16	6.94
Datta S	**66**	**4**	**6.06**	**1.51**	**7.58 ***	**(2.04,19.41)**	**71**	**11.50**
Erie County Med Ctr	52	4	7.69	1.68	8.68 *	(2.33,22.21)	53	14.45 *
Millard Fillmore Hosp	14	0	0.00	0.90	0.00	(0.00,55.06)	18	0.00

Table 6 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Deanda A	**160**	**9**	**5.63**	**1.37**	**7.78 ***	**(3.55,14.77)**	**232**	**7.88 ***
Montefiore - Moses	28	1	3.57	1.67	4.05	(0.05,22.55)	45	3.52
Montefiore - Weiler	132	8	6.06	1.31	8.79 *	(3.79,17.32)	187	9.92 *
Depan H	**272**	**2**	**0.74**	**1.81**	**0.77**	**(0.09, 2.78)**	**493**	**3.30**
Champ.Valley Phys Hosp	4	0	0.00	0.96	0.00	(0.00,100.0)	4	0.00
Ellis Hospital	268	2	0.75	1.82	0.78	(0.09, 2.80)	489	3.30
Derose J J	**287**	**7**	**2.44**	**2.00**	**2.31**	**(0.93, 4.76)**	**477**	**4.53**
Montefiore - Moses	72	0	0.00	1.97	0.00	(0.00, 4.91)	84	3.04
Montefiore - Weiler	187	6	3.21	1.91	3.19	(1.16, 6.94)	323	5.06
St. Lukes at St. Lukes	28	1	3.57	2.71	2.49	(0.03,13.88)	70	3.87
Downing S W	**378**	**8**	**2.12**	**2.24**	**1.79**	**(0.77, 3.52)**	**425**	**2.93**
Erie County Med Ctr	159	3	1.89	1.86	1.92	(0.39, 5.61)	178	3.27
Mercy Hospital	219	5	2.28	2.52	1.72	(0.55, 4.00)	247	2.75
Genovesi M H	**108**	**2**	**1.85**	**1.86**	**1.89**	**(0.21, 6.82)**	**135**	**5.60**
Maimonides Medical Ctr	58	1	1.72	1.56	2.10	(0.03,11.66)	76	6.14
Univ.Hosp-Brooklyn	50	1	2.00	2.21	1.72	(0.02, 9.56)	59	5.15
Goldstein D J	**249**	**6**	**2.41**	**1.37**	**3.34**	**(1.22, 7.26)**	**401**	**3.51**
Montefiore - Moses	217	4	1.84	1.38	2.52	(0.68, 6.45)	352	3.14
Montefiore - Weiler	32	2	6.25	1.25	9.46	(1.06,34.17)	49	6.57
Grau J B	**127**	**2**	**1.57**	**1.03**	**2.89**	**(0.32,10.45)**	**196**	**2.49**
Bellevue Hospital Ctr	125	2	1.60	1.02	2.97	(0.33,10.73)	185	2.82
NYU Hospitals Center	2	0	0.00	1.74	0.00	(0.00,100.0)	11	0.00
Isom O	**43**	**0**	**0.00**	**0.91**	**0.00**	**(0.00,17.69)**	**142**	**2.38**
NY Hospital - Queens	1	0	0.00	0.76	0.00	(0.00,100.0)	1	0.00
NYP- Weill Cornell	42	0	0.00	0.92	0.00	(0.00,18.04)	141	2.38
Ko W	**168**	**6**	**3.57**	**2.13**	**3.18**	**(1.16, 6.92)**	**303**	**4.43**
NY Hospital - Queens	48	1	2.08	1.71	2.31	(0.03,12.88)	67	4.25
NYP- Weill Cornell	26	1	3.85	2.19	3.33	(0.04,18.50)	45	4.85
Univ.Hosp-Brooklyn	94	4	4.26	2.33	3.46	(0.93, 8.86)	191	4.39
Lee L Y	**225**	**5**	**2.22**	**1.99**	**2.11**	**(0.68, 4.93)**	**330**	**3.07**
NY Methodist Hospital	140	4	2.86	1.95	2.78	(0.75, 7.12)	218	3.49
NYP- Weill Cornell	85	1	1.18	2.06	1.08	(0.01, 6.01)	112	2.08
Lewin A	**265**	**7**	**2.64**	**1.47**	**3.40**	**(1.36, 7.00)**	**278**	**5.85**
Buffalo General Hosp	264	7	2.65	1.48	3.40	(1.36, 7.00)	277	5.86
Millard Fillmore Hosp	1	0	0.00	0.38	0.00	(0.00,100.0)	1	0.00
Mack C A	**59**	**2**	**3.39**	**1.12**	**5.73**	**(0.64,20.67)**	**66**	**5.15**
NY Hospital - Queens	59	2	3.39	1.12	5.73	(0.64,20.67)	65	6.66
NYP- Weill Cornell	.	.	.	.	.	**(. , .)**	1	0.00

Table 6 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Meyer D B	**.**	**.**	**.**	**.**	**.**	**(. , .)**	**9**	**0.00**
Bellevue Hospital Ctr	.	.	.	.	.	(. , .)	1	0.00
NYU Hospitals Center	.	.	.	.	.	(. , .)	8	0.00
Michler R E	**156**	**3**	**1.92**	**1.68**	**2.17**	**(0.44, 6.35)**	**371**	**2.52**
Montefiore - Moses	128	3	2.34	1.58	2.81	(0.57, 8.22)	292	2.76
Montefiore - Weiler	28	0	0.00	2.13	0.00	(0.00,11.64)	79	1.71
Picone A	**122**	**4**	**3.28**	**2.13**	**2.91**	**(0.78, 7.46)**	**200**	**3.92**
Buffalo General Hosp	96	4	4.17	2.35	3.36	(0.90, 8.59)	161	4.08
Millard Fillmore Hosp	18	0	0.00	1.20	0.00	(0.00,32.18)	28	4.10
Univ.Hosp-SUNY Upstate	8	0	0.00	1.58	0.00	(0.00,54.82)	11	0.00
Plestis K A	**64**	**1**	**1.56**	**1.17**	**2.52**	**(0.03,14.05)**	**214**	**3.27**
Lenox Hill Hospital	3	0	0.00	0.61	0.00	(0.00,100.0)	8	0.00
Mount Sinai Hospital	61	1	1.64	1.20	2.59	(0.03,14.40)	206	3.35
Reddy R C	**111**	**5**	**4.50**	**1.53**	**5.57**	**(1.80,13.01)**	**189**	**3.41**
Lenox Hill Hospital	59	2	3.39	1.54	4.18	(0.47,15.09)	102	2.86
Mount Sinai Hospital	52	3	5.77	1.52	7.17	(1.44,20.95)	87	4.24
Reich H	**265**	**4**	**1.51**	**1.44**	**1.99**	**(0.53, 5.08)**	**351**	**2.40**
Champ.Valley Phys Hosp	9	0	0.00	0.84	0.00	(0.00,92.14)	11	0.00
Ellis Hospital	256	4	1.56	1.46	2.03	(0.54, 5.19)	340	2.45
Ribakove G	**144**	**1**	**0.69**	**1.38**	**0.95**	**(0.01, 5.30)**	**323**	**2.77**
Bellevue Hospital Ctr	103	1	0.97	1.26	1.46	(0.02, 8.11)	203	2.46
NYU Hospitals Center	41	0	0.00	1.68	0.00	(0.00,10.07)	120	3.17
Saifi J	**376**	**7**	**1.86**	**2.26**	**1.56**	**(0.63, 3.22)**	**611**	**2.15**
Champ.Valley Phys Hosp	1	0	0.00	1.10	0.00	(0.00,100.0)	2	0.00
St. Peters Hospital	375	7	1.87	2.26	1.56	(0.63, 3.22)	609	2.16
Schwartz C F	**72**	**0**	**0.00**	**1.92**	**0.00**	**(0.00, 5.04)**	**115**	**2.73**
Bellevue Hospital Ctr	34	0	0.00	1.26	0.00	(0.00,16.23)	53	2.40
NYU Hospitals Center	38	0	0.00	2.50	0.00	(0.00, 7.31)	62	2.93
Singh C	**295**	**3**	**1.02**	**1.57**	**1.22**	**(0.25, 3.58)**	**354**	**1.36**
Champ.Valley Phys Hosp	8	0	0.00	0.91	0.00	(0.00,95.63)	9	0.00
Ellis Hospital	287	3	1.05	1.59	1.24	(0.25, 3.63)	345	1.38
Stelzer P	**43**	**4**	**9.30**	**3.03**	**5.81**	**(1.56,14.87)**	**205**	**5.22 ***
Beth Israel Med Ctr	25	3	12.00	3.67	6.19	(1.24,18.10)	128	6.50 *
Mount Sinai Hospital	18	1	5.56	2.15	4.89	(0.06,27.23)	77	2.91
Swistel D	**301**	**4**	**1.33**	**2.56**	**0.98**	**(0.26, 2.52)**	**491**	**2.04**
Lenox Hill Hospital	2	0	0.00	0.62	0.00	(0.00,100.0)	5	0.00
St. Lukes at St. Lukes	299	4	1.34	2.57	0.99	(0.27, 2.52)	486	2.05

Table 6 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Tortolani A	**269**	**6**	**2.23**	**2.13**	**1.98**	**(0.72, 4.31)**	**355**	**3.67**
NY Methodist Hospital	182	2	1.10	2.01	1.03	(0.12, 3.74)	243	2.57
NYP- Weill Cornell	87	4	4.60	2.39	3.65	(0.98, 9.33)	112	5.72
Vatsia S	**142**	**4**	**2.82**	**2.36**	**2.26**	**(0.61, 5.79)**	**231**	**3.88**
LIJ Medical Center	.	.	.	.	.	**(. , .)**	2	100.0
North Shore Univ Hosp	142	4	2.82	2.36	2.26	(0.61, 5.79)	229	3.50

* RAMR significantly higher than statewide rate based on 95 percent confidence interval.

** RAMR significantly lower than statewide rate based on 95 percent confidence interval.

SURGEON AND HOSPITAL VOLUMES FOR TOTAL ADULT CARDIAC SURGERY, 2006-2008

Table 7 presents, for each hospital and for each surgeon performing at least 200 cardiac operations in any hospital in 2006 – 2008 and/or performing one or more cardiac operations in each of the years 2006 – 2008, the total number of Isolated CABG operations, the total number of Valve or Valve/CABG operations, the total number of Other Cardiac operations and Total Cardiac operations. As in Table 5, results for surgeons not meeting the above criteria are grouped together in an "All Others" category.

The Isolated CABG column includes patients who undergo bypass of one or more of the coronary arteries with no other major heart surgery earlier in the same admission. Valve or Valve/CABG volumes include the total number of cases for the eight Valve or Valve/CABG groups that were identified in Table 4. Other Cardiac Surgery refers to cardiac procedures not represented by Isolated CABG, and Valve or Valve/CABG operations and includes, but is not limited to: repairs of congenital conditions, heart transplants, aneurysm repairs, ventricular reconstruction and ventricular assist device insertions. Total Cardiac Surgery is the sum of the previous three columns and includes any procedure to the heart or great vessels.

Table 7: Surgeon and Hospital Volume for Isolated CABG, Valve or Valve/CABG, Other Cardiac Surgery and Total Adult Cardiac Surgery, 2006-2008

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Albany Medical Center				
Britton L	320	147	55	522
Devejian N	0	1	24	25
Fuzesi L	332	55	24	411
Miller S	294	145	19	458
All Others	124	61	16	201
Total	**1070**	**409**	**138**	**1617**
Arnot Ogden Med Ctr				
Nast E	182	32	13	227
Raudat C W	191	48	8	247
Total	**373**	**80**	**21**	**474**
Bellevue Hospital Ctr				
Crooke G	107	33	43	183
Grau J B	125	60	23	208
Meyer D B	0	1	5	6
Ribakove G	103	100	23	226
Schwartz C F	34	19	13	66
All Others	7	8	3	18
Total	**376**	**221**	**110**	**707**

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Beth Israel Med Ctr				
Geller C M	100	48	9	157
Hoffman D	202	53	11	266
Stelzer P	25	103	53	181
Tranbaugh R	411	181	37	629
Total	**738**	**385**	**110**	**1233**
Buffalo General Hosp				
Ashraf M	28	2	0	30
Grosner G	704	398	60	1162
Lewin A	264	13	6	283
Picone A	96	65	18	179
All Others	3	0	4	7
Total	**1095**	**478**	**88**	**1661**
Champ.Valley Phys Hosp				
Abbott A E	164	69	17	250
Bennett E	3	0	0	3
Canavan T	39	6	0	45
Depan H	4	0	0	4
Reich H	9	2	0	11
Saifi J	1	1	0	2
Singh C	8	1	0	9
All Others	56	8	1	65
Total	**284**	**87**	**18**	**389**
Ellis Hospital				
Depan H	268	221	42	531
Reich H	256	84	10	350
Singh C	287	58	7	352
Total	**811**	**363**	**59**	**1233**
Erie County Med Ctr				
Bell-Thomson J	179	76	10	265
Datta S	52	1	23	76
Downing S W	159	19	17	195
All Others	55	3	7	65
Total	**445**	**99**	**57**	**601**
Good Sam - Suffern				
Lundy E F	196	98	7	301
Salenger R	189	21	2	212
Total	**385**	**119**	**9**	**513**

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Lenox Hill Hospital				
Ciuffo G B	156	72	24	252
Loulmet D F	40	249	31	320
Patel N C	556	210	37	803
Plestis K A	3	5	11	19
Reddy R C	59	43	25	127
Subramanian V	527	204	45	776
Swistel D	2	3	0	5
All Others	50	9	19	78
Total	**1393**	**795**	**192**	**2380**
Long Island Jewish				
Graver L	224	316	68	608
Manetta F	150	72	24	246
Palazzo R	252	120	14	386
Parnell V	0	1	4	5
Scheinerman S J	137	123	14	274
Vatsia S	0	2	6	8
Total	**763**	**634**	**130**	**1527**
M I Bassett Hospital				
Lancey R A	108	48	10	166
Shortt K G	96	40	13	149
Total	**204**	**88**	**23**	**315**
Maimonides Medical Ctr				
Abrol S	190	84	77	351
Brevetti G R	7	8	2	17
Cunningham J N	40	19	8	67
Genovesi M H	58	18	6	82
Jacobowitz I	417	175	29	621
Lahey S J	42	20	4	66
Saltman A E	16	5	12	33
Stephens G A	64	52	10	126
Vaynblat M	218	92	46	356
All Others	8	4	2	14
Total	**1060**	**477**	**196**	**1733**
Mercy Hospital				
Aldridge J	112	17	3	132
Ashraf M	1	0	0	1
Bell-Thomson J	442	132	39	613
Downing S W	219	28	23	270
All Others	82	12	9	103
Total	**856**	**189**	**74**	**1119**

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Millard Fillmore Hosp				
Aldridge J	161	35	31	227
Ashraf M	707	219	33	959
Datta S	14	4	0	18
Jennings L	29	0	0	29
Lewin A	1	0	0	1
Picone A	18	10	2	30
Total	**930**	**268**	**66**	**1264**
Montefiore - Moses				
D Alessandro D A	258	137	54	449
Deanda A	28	17	38	83
Derose J J	72	12	11	95
Goldstein D J	217	135	63	415
Michler R E	128	164	25	317
Weinstein S	0	1	21	22
All Others	120	51	10	181
Total	**823**	**517**	**222**	**1562**
Montefiore - Weiler				
D Alessandro D A	14	2	1	17
Deanda A	132	55	43	230
Derose J J	187	136	26	349
Goldstein D J	32	17	3	52
Michler R E	28	51	4	83
All Others	54	16	3	73
Total	**447**	**277**	**80**	**804**
Mount Sinai Hospital				
Adams D H	12	600	76	688
Anyanwu A C	23	35	71	129
Filsoufi F	202	104	28	334
Griepp R	1	40	143	184
Nguyen K	0	1	41	42
Plestis K A	61	145	181	387
Reddy R C	52	35	13	100
Stelzer P	18	59	85	162
Zias E	395	240	39	674
All Others	6	14	60	80
Total	**770**	**1273**	**737**	**2780**

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
NY Hospital - Queens				
Adkins M	203	68	14	285
Isom O	1	0	0	1
Ko W	48	19	8	75
Mack C A	59	6	5	70
Total	**311**	**93**	**27**	**431**
NY Methodist Hospital				
Lee L Y	140	78	48	266
Tortolani A	182	61	4	247
All Others	28	1	2	31
Total	**350**	**140**	**54**	**544**
NYP- Columbia Presby.				
Argenziano M	112	211	106	429
Chen J M	0	1	16	17
Mosca R S	1	2	35	38
Naka Y	245	225	199	669
Oz M	235	356	61	652
Quaegebeur J	0	8	89	97
Smith C	213	487	90	790
Stewart A S	227	295	345	867
Williams M R	62	104	62	228
All Others	3	7	159	169
Total	**1098**	**1696**	**1162**	**3956**
NYP- Weill Cornell				
Adkins M	3	8	1	12
Chen J M	0	2	15	17
Girardi L	408	441	575	1424
Isom O	42	99	11	152
Ko W	26	19	3	48
Krieger K	271	362	15	648
Lee L Y	85	27	11	123
Mack C A	0	1	1	2
Salemi A	142	74	18	234
Tortolani A	87	25	4	116
All Others	2	0	2	4
Total	**1066**	**1058**	**656**	**2780**

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
NYU Hospitals Center				
Colvin S	27	522	54	603
Crooke G	18	21	10	49
Culliford A	100	161	32	293
Galloway A	80	486	63	629
Grau J B	2	9	6	17
Grossi E	7	21	8	36
Meyer D B	0	8	12	20
Ribakove G	41	79	25	145
Schwartz C F	38	24	13	75
Total	**313**	**1331**	**223**	**1867**
North Shore Univ Hosp				
Arnofsky A	162	57	49	268
Esposito R	378	229	42	649
Hall M	284	170	16	470
Hartman A	170	445	110	725
Kalimi R	360	208	35	603
Pogo G	225	140	54	419
Vatsia S	142	87	25	254
Total	**1721**	**1336**	**331**	**3388**
Rochester General Hosp				
Becker E J	200	37	15	252
Cheeran D	645	362	82	1089
Kirshner R	621	534	75	1230
Total	**1466**	**933**	**172**	**2571**
SVCMC- St. Vincents				
Ciuffo G B	44	43	7	94
Lang S	253	81	17	351
Shin Y T	177	106	32	315
All Others	1	1	2	4
Total	**475**	**231**	**58**	**764**
St. Elizabeth Med Ctr				
El Amir N	186	103	27	316
Joyce F	259	156	24	439
Kelley J	285	143	37	465
Total	**730**	**402**	**88**	**1220**

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
St. Francis Hospital				
Bercow N	327	239	27	593
Colangelo R	628	312	24	964
Damus P	123	115	7	245
Fernandez H A	392	146	17	555
Lamendola C	345	224	27	596
Robinson N	491	366	23	880
Taylor J	434	446	42	922
Total	**2740**	**1848**	**167**	**4755**
St. Josephs Hospital				
Green G R	353	189	40	582
Marvasti M	300	246	55	601
Nazem A	410	161	49	620
Rosenberg J	302	222	89	613
Zhou Z	387	149	39	575
Total	**1752**	**967**	**272**	**2991**
St. Lukes at St. Lukes				
Balaram S K	113	77	25	215
Derose J J	28	42	18	88
Swistel D	299	187	32	518
Total	**440**	**306**	**75**	**821**
St. Peters Hospital				
Bennett E	236	278	49	563
Canavan T	319	42	1	362
Dal Col R	382	267	44	693
Saifi J	375	234	27	636
Total	**1312**	**821**	**121**	**2254**
Staten Island Univ Hosp				
McGinn J	806	191	27	1024
Molinaro P J	63	26	2	91
Nabagiez J P	13	3	1	17
Rosell F M	241	26	25	292
Total	**1123**	**246**	**55**	**1424**
Strong Memorial Hosp				
Alfieris G	0	9	53	62
Hicks G	273	119	53	445
Knight P	515	403	149	1067
Massey H	203	71	123	397
All Others	0	0	12	12
Total	**991**	**602**	**390**	**1983**

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
United Hlth Svcs-Wilson				
Wong K	276	133	2	411
Yousuf M	246	86	20	352
All Others	101	30	6	137
Total	**623**	**249**	**28**	**900**
Univ.Hosp-Brooklyn				
Brevetti G R	5	8	2	15
Burack J H	31	17	7	55
Genovesi M H	50	9	2	61
Ko W	94	97	20	211
Lowery R C	21	23	11	55
All Others	36	31	12	79
Total	**237**	**185**	**54**	**476**
Univ.Hosp-SUNY Upstate				
Fink G W	252	126	49	427
Lutz C J	341	130	31	502
Picone A	8	3	1	12
All Others	0	0	7	7
Total	**601**	**259**	**88**	**948**
Univ.Hosp-Stony Brook				
Bilfinger T	109	55	23	187
McLarty A	88	42	44	174
Rosengart T	305	242	28	575
Seifert F	386	159	25	570
All Others	21	14	5	40
Total	**909**	**512**	**125**	**1546**
Vassar Bros. Med Ctr				
Sarabu M	195	268	73	536
Shahani R	190	75	11	276
Zakow P	251	113	12	376
All Others	63	14	1	78
Total	**699**	**470**	**97**	**1266**
Westchester Med Ctr				
Fleisher A	233	45	18	296
Lafaro R	267	98	45	410
Lansman S	466	139	20	625
Malekan R	22	5	10	37
Spielvogel D	469	214	153	836
All Others	0	2	7	9
Total	**1457**	**503**	**253**	**2213**

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Winthrop Univ. Hosp				
Goncalves J A	331	172	62	565
Kokotos W J	254	138	23	415
Schubach S	270	185	11	466
All Others	16	3	0	19
Total	**871**	**498**	**96**	**1465**
Statewide Total	**34108**	**21445**	**6922**	**62475**

Criteria Used in Reporting Significant Risk Factors (2008)

Based on Documentation in Medical Records

Patient Risk Factor	Definitions
Hemodynamic State	**Determined just prior to surgery.**
• Unstable	Patient requires pharmacologic or mechanical support to maintain blood pressure or cardiac index.
• Shock	Acute hypotension (systolic blood pressure < 80 mmHg) or low cardiac index (< 2.0 liters/min/m^2), despite pharmacologic or mechanical support. Records with this risk factor were excluded from all analyses in this report.
Comorbidities	
• COPD	Patients who require chronic (longer than three months) bronchodilator therapy to avoid disability from obstructive airway disease, or have forced expiratory volume in one second of less than 75 percent of the predicted value or less than 1.25 liters or have a room air PO_2 <60 or a PCO_2 >50.
• Renal Failure, Creatinine	Highest pre-operative creatinine during the hospital admission was in the indicated range.
• Renal Failure Requiring Dialysis	The patient is on chronic peritoneal or hemodialysis.
Ventricular Function	
• Ejection Fraction	Value of the ejection fraction taken closest to the procedure. When a calculated measure is unavailable the ejection fraction should be estimated visually from the ventriculogram or by echocardiography. Intraoperative direct observation of the heart is not an adequate basis for a visual estimate of the ejection fraction. If no ejection fraction is reported, the ejection fraction is considered "normal" for purposes of analysis and is classified with the reference category.
• Previous MI	One or more myocardial infarctions (MI) in the specified time period prior to surgery.
Previous Open Heart Operations	Open heart surgery performed prior to the current operating room visit. Minimally invasive procedures are included.

angina pectoris - The pain or discomfort felt when blood and oxygen flow to the heart are impeded by blockages in the coronary arteries. Can also be caused by an arterial spasm.

angioplasty - Also known as *percutaneous transluminal coronary angioplasty* (PTCA) or *percutaneous coronary intervention* (PCI). In this procedure, a balloon catheter is threaded up to the site of blockage in an artery in the heart, and is then inflated to push arterial plaque against the wall of the artery to create a wider channel in the artery. Other procedures or devices are frequently used in conjunction with, or in place of, the balloon catheter. In particular, stents are used for most patients and devices such as rotoblaters and ultrasound are sometimes used.

arteriosclerosis - Also called *atherosclerotic coronary artery disease* or *coronary artery disease,* the group of diseases characterized by thickening and loss of elasticity of the arterial walls, popularly called "hardening of the arteries."

atherosclerosis - One form of arteriosclerosis in which plaques or fatty deposits form in the inner layer of the arteries.

coronary artery bypass graft surgery (CABG) - A procedure in which a vein or artery from another part of the body is used to create an alternate path for blood to flow to the heart muscle, bypassing the arterial blockage. Typically, a section of one of the large saphenous veins in the leg, the radial artery in the arm or the mammary artery in the chest is used to construct the bypass. One or more bypasses may be performed during a single operation. When no other major heart surgery (such as valve replacement) is included, the operation is referred to as an isolated CABG.

The average number of bypass grafts created during CABG is three or four. Generally, all significantly blocked arteries are bypassed unless they enter areas of the heart that are permanently damaged by previous heart attacks. Five or more bypasses are occasionally created. Multiple bypasses are often performed to provide several alternate routes for the blood flow and to improve the long-term success of the procedure, not necessarily because the patient's condition is more severe.

cardiac catheterization - Also known as *coronary angiography*, a procedure for diagnosing the condition of the heart and the arteries connecting to it. A thin tube threaded through an artery to the heart releases a dye, which allows doctors to observe blockages with an X-ray camera. This procedure is generally required before coronary bypass surgery.

cardiovascular disease - Disease of the heart and blood vessels, the most common form is coronary artery disease.

coronary arteries - The arteries that supply the heart muscle with blood. When they are narrowed or blocked, oxygen-rich blood cannot flow freely to the heart muscle or myocardium.

heart valve- Gates that connect the different chambers of the heart so that there is a one-way flow of blood between the chambers. The heart has four valves: the tricuspid, mitral, pulmonic and aortic valves.

incompetent valves - A valve that does not close tightly.

ischemic heart disease (ischemia) - Heart disease that occurs as a result of inadequate blood supply to the heart muscle or myocardium.

myocardial infarction (MI) - Also called a *heart attack,* partial destruction of the heart muscle due to interrupted blood supply.

plaque - Also called *atheroma,* this is the fatty deposit in the coronary artery that can block blood flow.

risk factors for heart disease - Certain risk factors have been found to increase the likelihood of developing heart disease. Some are controllable or avoidable and some cannot be controlled. The biggest heart disease risk factors are heredity, gender and age, none of which can be controlled. Men are much more likely to develop heart disease than women before the age of 55, although it is the number one killer of both men and women.

Some controllable risk factors that contribute to a higher likelihood of developing coronary artery disease are high cholesterol levels, cigarette smoking, high blood pressure (hypertension), obesity, a sedentary lifestyle or lack of exercise, diabetes and poor stress management.

stenosis - The narrowing of an artery due to blockage. Restenosis is when the narrowing recurs after surgery.

stenotic valve- A valve that does not open fully.

valve disease- Occurs when a valve cannot open all of the way (reducing flow to the next heart chamber) or cannot close all of the way (causing blood to leak backwards into the previous heart chamber).

valve repair- Widening valve openings for stenotic valves or narrowing or tightening valve openings for incompetent valves without having to replace the valves.

valve replacement- Replacement of a diseased valve. New valves are either mechanical (durable materials such as Dacron or titanium) or biological (tissues taken from pigs, cows or human donors).

Appendix 1. 2006-2008 Risk Factors For Isolated CABG In-Hospital/30-Day Mortality

The significant pre-procedural risk factors for in-hospital/30-day mortality following isolated CABG in the 2006-2008 time period are presented in the table that follows.

Roughly speaking, the odds ratio for a risk factor represents the number of times a patient with that risk factor is more likely to die in the hospital during or after CABG or after discharge but within 30 days of the operation than a patient without the risk factor, all other risk factors being the same. For example, the odds ratio for the risk factor COPD is 1.573. This means that a patient with COPD is approximately 1.573 times as likely to die in the hospital during or after undergoing CABG or after discharge but within 30 days as a patient without COPD who has the same other significant risk factors.

For all risk factors in the table except Age, Body Surface Area, Ejection Fraction, Previous MI and Renal Failure, there are only two possibilities – having the risk factor and not having it. For example, a patient either has COPD or does not have it. Since Renal Failure is expressed in terms of Renal Failure with dialysis and without dialysis, the odds ratios are relative to patients with no dialysis prior to surgery and no pre-operative creatinine greater than 1.3 mg/dL.

Previous MI is subdivided into four groups: occurring less than six hours prior to surgery; occurring six to twenty-three hours prior to surgery; occurring one to seven days prior to surgery; and no MI within seven days prior to the procedure. The last range is referred to as the reference category. The odds ratios for the Previous MI ranges listed above are relative to patients who have not had a previous MI within seven days prior to the procedure.

Ejection Fraction, which is the percentage of blood in the heart's left ventricle that is expelled when it contracts (with more denoting a healthier heart), is subdivided into four ranges (less than 20 percent, 20-29 percent, 30-39 percent and 40 percent or more). The last range is referred to as the reference category. This means that the odds ratios that appear for the other Ejection Fraction categories in the table are relative to patients with an ejection fraction of 40 percent or more. Thus, a patient with an ejection fraction less than 20 percent is about 3.036 times as likely to die in the hospital or after discharge but within 30 days as a patient with an ejection fraction of 40 percent or higher, all other significant risk factors being the same.

With regard to age, the odds ratio roughly represents the number of times a patient who is over age 55 is more likely to die in the hospital than another patient who is one year younger, all other significant risk factors being the same. Thus, the chance of in-hospital/30-day mortality for a patient undergoing CABG surgery who is 56 years old is approximately 1.054 times that of a 55 year-old patient undergoing CABG, all other risk factors being the same. All patients age 55 or under have roughly the same odds of dying in the hospital or after discharge but within 30 days if their risk factors are identical.

Body surface area (BSA) is a function of height and weight and is a proxy for vessel size. Since larger vessels are easier to work with, larger BSA is associated with decreased likelihood of mortality. This model includes terms for both BSA and BSA^2, reflecting the fact that for these patients, the lowest and highest body surface areas were related to higher mortality, all other risk factors remaining the same.

Appendix 1: Multivariable Risk Factor Equation for Isolated CABG In-Hospital / 30-Day Deaths in New York State in 2006-2008

		Logistic Regression		
Patient Risk Factor	**Prevalence (%)**	**Coefficient**	**P-Value**	**Odds Ratio**
Demographic				
Age: Number of years greater than 55	—	0.0527	<.0001	1.054
Female Gender	26.53	0.5507	<.0001	1.734
Body Surface Area	—	-0.9559	<.0001	0.384
Body Surface Area - squared	—	0.0235	<.0001	1.024
Hemodynamic State				
Unstable	1.24	1.1892	<.0001	3.284
Ventricular Function				
Ejection Fraction				
Ejection Fraction ≥ 40%	80.44	---Reference---		1.000
Ejection Fraction < 20%	1.65	1.1106	<.0001	3.036
Ejection Fraction 20-29%	6.41	0.9403	<.0001	2.561
Ejection Fraction 30-39%	11.50	0.5263	<.0001	1.693
Previous MI				
No Previous MI within 7 days	81.38	---Reference---		1.000
Previous MI less than 6 hours	0.88	1.3084	<.0001	3.700
Previous MI 6 – 23 hours	1.49	0.6979	0.0056	2.009
Previous MI 1 – 7 days	16.26	0.4180	<.0001	1.519
Comorbidities				
COPD	21.39	0.4528	<.0001	1.573
Extensive Aortic Atherosclerosis	5.91	0.5116	<.0001	1.668
Peripheral Vascular Disease	12.61	0.2668	0.0077	1.306
Renal Failure				
No Renal Failure	73.58	---Reference---		1.000
Renal Failure, Creatinine 1.3 -1.5 mg/dl	14.29	0.6730	<.0001	1.960
Renal Failure, Creatinine 1.6 -3.0 mg/dl	9.02	1.0437	<.0001	2.840
Renal Failure, Creatinine > 3.0 mg/dl	0.80	1.6160	<.0001	5.033
Renal Failure, Dialysis	2.31	2.0459	<.0001	7.736
Previous Open Heart Operations	3.29	0.8788	<.0001	2.408

Intercept = 3.5615

C Statistic = 0.806

Appendix 2. 2006-2008 Risk Factors For Valve Surgery In-Hospital/30-Day Mortality

The significant pre-procedural risk factors for in-hospital/30-day mortality following valve surgery in the 2006-2008 time period are presented in the table that follows.

Roughly speaking, the odds ratio for a risk factor represents the number of times a patient with that risk factor is more likely to die in the hospital during or after valve surgery or after discharge but within 30 days than a patient without the risk factor, all other risk factors being the same. For example, the odds ratio for the risk factor COPD is 1.356. This means that a patient with COPD is approximately 1.356 times as likely to die in the hospital during or after undergoing valve surgery or after discharge but within 30 days as a patient without COPD who has the same other significant risk factors.

The odds ratio for type of valve surgery represents the number of times a patient with a specific valve surgery is more likely to die in the hospital during or after that particular surgery or after discharge but within 30 days than a patient who has had aortic valve replacement surgery, all other risk factors being the same. For example, a patient who has a mitral valve replacement surgery is 1.588 times as likely to die in the hospital during or after surgery or after discharge but within 30 days as a patient with aortic valve replacement surgery, all other significant risk factors being the same.

Left Main Disease refers to patients with a blockage of at least 50 percent in their Left Main Coronary Artery. This group is compared to patients who do not have a blockage of at least 50 percent in their Left Main Coronary Artery.

For all other risk factors in the table except Age, Body Surface Area and Renal Failure there are only two possibilities – having the risk factor and not having it. For example, a patient either has COPD or does not have it. Age and Renal Failure are interpreted in the same way as previously described. Body surface area was found to be inversely related to mortality, meaning that as body surface increased, mortality was found to decrease, all other factors remaining the same.

Appendix 2: Multivariable Risk Factor Equation for Valve Surgery In-Hospital / 30-Day Deaths In NYS, 2006-2008

		Logistic Regression		
Patient Risk Factor	**Prevalence (%)**	**Coefficient**	**P-Value**	**Odds Ratio**
Demographic				
Age: number of years greater than 50	—	0.0436	<.0001	1.045
Female Gender	48.48	0.4112	0.0001	1.509
Body Surface Area	—	-0.0557	0.0062	0.946
Type of Valve Surgery				
Aortic Valve Replacement	47.69	---Reference---		1.000
Mitral Valve Replacement	15.39	0.4626	0.0006	1.588
Mitral Valve Repair	18.28	-0.2763	0.1402	0.759
Multiple Valve Repair/Replacement	18.64	0.8700	<.0001	2.387
Hemodynamic State				
Unstable	0.98	1.2548	<.0001	3.507
Comorbidities				
COPD	22.05	0.3046	0.0027	1.356
Endocarditis	5.40	0.8630	<.0001	2.370
Renal Failure				
No Renal Failure	86.98	---Reference---		1.000
Renal Failure, Creatinine 1.3 -1.5 mg/dl	12.30	0.7263	<.0001	2.067
Renal Failure, Creatinine 1.6 -3.0 mg/dl	9.26	0.9628	<.0001	2.619
Renal Failure, Creatinine > 3.0 mg/dl	0.78	1.5304	<.0001	4.620
Renal Failure, requiring dialysis	2.97	1.8468	<.0001	6.340
Vessels Diseased				
Left Main Disease	0.77	1.1335	<.0001	3.106
Previous Open Heart Operations	17.94	0.5053	<.0001	1.658

Intercept = -4.2057

C Statistic = 0.778

Appendix 3. 2006-2008 Risk Factors For Valve and CABG Surgery In-Hospital/30-Day Mortality

The significant pre-procedural risk factors for in-hospital/30-day mortality following valve and CABG surgery in the 2006-2008 time period are presented in the table that follows.

Roughly speaking, the odds ratio for a risk factor represents the number of times a patient with that risk factor is more likely to die in the hospital during or after valve and CABG surgery or after discharge but within 30 days than a patient without the risk factor, all other risk factors being the same. For example, the odds ratio for the risk factor COPD is 1.292. This means that a patient with COPD is approximately 1.292 times as likely to die in the hospital during or after undergoing valve and CABG surgery or after discharge but within 30 days as a patient without COPD who has the same other significant risk factors. Female Gender, Unstable, Endocarditis, Extensive Aortic Atherosclerosis, Peripheral Vascular Disease, Previous PCI Before this Admission and Previous Open Heart Operations are also interpreted in this way. The interpretation for Ejection Fraction, Body Surface Area, Previous MI and Renal Failure is similar to that described in Appendix 1.

The odds ratio for Type of Valve with CABG surgery represents the number of times a patient with a specific Valve with CABG surgery is more likely to die in the hospital during or after that particular surgery or after discharge but within 30 days than a patient who has had aortic valve repair or replacement and CABG surgery, all other risk factors being the same. For example, a patient who has a mitral valve replacement and CABG surgery is 1.649 times as likely to die in the hospital during or after surgery as a patient with aortic valve repair or replacement and CABG surgery, all other significant risk factors being the same.

The interpretation for Age is similar to that described in Appendix 1. In this case, the odds ratio for age roughly represents the number of times a patient who is over age 70 is more likely to die in the hospital or after discharge but within 30 days than another patient who is one year younger with all the other significant risk factors the same.

Appendix 3: Multivariable Risk Factor Equation for Valve and CABG Surgery In-Hospital/ 30-Day Deaths in NYS, 2006-2008

		Logistic Regression		
Patient Risk Factor	**Prevalence (%)**	**Coefficient**	**P-Value**	**Odds Ratio**
Demographic				
Age: Number of years greater than 70	—	0.0694	<.0001	1.072
Female Gender	37.87	0.3032	0.0034	1.354
Body Surface Area	—	-0.7665	<.0001	0.465
Body Surface Area – squared	—	0.0193	<.0001	1.019
Type of Valve (with CABG)				
Aortic Valve Replacement	57.72	---Reference---		1.000
Mitral Valve Replacement	11.33	0.5004	0.0002	1.649
Mitral Valve Repair	20.01	0.1478	0.2578	1.159
Multiple Valve Repair/Replacement	10.94	0.9718	<.0001	2.643
Hemodynamic State				
Unstable	1.63	0.6527	0.0083	1.921
Ventricular Function				
Ejection Fraction				
Ejection Fraction ≥ 30%	86.93	---Reference---		1.000
Ejection Fraction < 30 %	13.07	0.6273	<.0001	1.873
Previous MI				
No MI within 20 days	86.13	---Reference---		1.000
Previous MI < 24 hours	0.92	1.3002	<.0001	3.670
Previous MI 1 – 20 days	12.95	0.3085	0.0099	1.361
Comorbidities				
COPD	27.51	0.2559	0.0070	1.292
Endocarditis	1.21	0.9055	0.0014	2.473
Extensive Aortic Atherosclerosis	10.43	0.3429	0.0065	1.409
Peripheral Vascular Disease	14.05	0.5039	<.0001	1.655
Renal Failure				
No Renal Failure	63.76	---Reference---		1.000
Renal Failure, Creatinine 1.6 – 3.0 mg/dl	14.44	0.4061	0.0003	1.501
Renal Failure, Creatinine > 3.0 mg/dl	0.88	1.1782	0.0002	3.248
Renal Failure Requiring Dialysis	3.17	1.4861	<.0001	4.420
Previous Cardiac Procedures				
Previous PCI before this Admission	18.92	0.3330	0.0019	1.395
Previous Open Heart Operations	8.64	0.5291	<.0001	1.697

Intercept = 3.3228

C Statistic = 0.743

NEW YORK STATE CARDIAC SURGERY CENTERS

Albany Medical Center Hospital
New Scotland Avenue
Albany, New York 12208

Arnot Ogden Medical Center
600 Roe Avenue
Elmira, New York 14905

Bellevue Hospital Center
First Avenue and 27th Street
New York, New York 10016

Beth Israel Medical Center
10 Nathan D. Perlman Place
New York, New York 10003

Buffalo General Hospital
100 High Street
Buffalo, New York 14203

Champlain Valley Physicians Hospital
Medical Center
75 Beekman Street
Plattsburgh, New York 12901

Columbia Presbyterian Medical Center
– NY Presbyterian
161 Fort Washington Avenue
New York, New York 10032

Ellis Hospital
1101 Nott Street
Schenectady, New York 12308

Erie County Medical Center
462 Grider Street
Buffalo, New York 14215

Good Samaritan Hospital of Suffern
255 Lafayette Avenue
Suffern, New York 10901

Lenox Hill Hospital
100 East 77th Street
New York, New York 10021

Long Island Jewish
Medical Center
270-05 76th Avenue
New Hyde Park, New York 11040

Maimonides Medical Center
4802 Tenth Avenue
Brooklyn, New York 11219

Mary Imogene Bassett Healthcare
Atwell Road
Cooperstown, New York 13326

Mercy Hospital
565 Abbott Road
Buffalo, New York 14220

Millard Fillmore Hospital
3 Gates Circle
Buffalo, New York 14209

Montefiore Medical Center
Henry & Lucy Moses Division
111 East 210th Street
Bronx, New York 11219

Montefiore Medical Center-
Weiler Hospital of
A. Einstein College
1825 Eastchester Road
Bronx, New York 10461

Mount Sinai Medical Center
One Gustave L. Levy Place
New York, New York 10019

NYU Hospitals Center
550 First Avenue
New York, New York 10016

New York Hospital Medical
Center-Queens
56-45 Main Street
Flushing, New York 11355

New York Methodist Hospital
506 Sixth Street
Brooklyn, New York 11215

North Shore University Hospital
300 Community Drive
Manhasset, New York 11030

Rochester General Hospital
1425 Portland Avenue
Rochester, New York 14621

St. Elizabeth Medical Center
2209 Genesee Street
Utica, New York 13413

St. Francis Hospital
Port Washington Boulevard
Roslyn, New York 11576

St. Joseph's Hospital
Health Center
301 Prospect Avenue
Syracuse, New York 13203

St. Luke's Roosevelt
Hospital Center
11-11 Amsterdam Avenue at
114th Street
New York, New York 10025

St. Peter's Hospital
315 South Manning Boulevard
Albany, New York 12208

SVCMC - St. Vincent's Manhattan *
Center of NY
153 West 11th Street
New York, New York 10011

Staten Island
University Hospital – North
475 Seaview Avenue
Staten Island, New York 10305

Strong Memorial Hospital
601 Elmwood Avenue
Rochester, New York 14642

United Health Services
Wilson Hospital Division
33-57 Harrison Street
Johnson City, New York 13790

University Hospital at Stony Brook
Stony Brook, New York 11794-8410

University Hospital of Brooklyn
450 Lenox Road
Brooklyn, New York 11203

University Hospital SUNY Health
Sciences Center
750 East Adams Street
Syracuse, New York 13210

Vassar Brother's Medical Center
45 Reade Place
Poughkeepsie, New York 12601

Weill-Cornell Medical Center –
NY Presbyterian
525 East 68th Street
New York, New York 10021

Westchester Medical Center
Grasslands Road
Valhalla, New York 10595

Winthrop University Hospital
259 First Street
Mineola, New York 11501

* Hospital closed in 2010

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