

**ADULT  
CARDIAC  
SURGERY**

**in  
New York State**

**2007 – 2009**



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# INTRODUCTION

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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, or CABG without any other major cardiac procedure done at the same time, is the most common of the many types of cardiac surgery performed on adults. We have reported risk-adjusted outcomes for isolated CABG surgery for over twenty 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 2009. 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)

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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

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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

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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

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This report is based on data for patients discharged between January 1, 2007, and December 31, 2009, provided by all non-federal hospitals in NYS where cardiac surgery is performed. In total there were 61,782 cardiac surgical procedures performed during this time period. For various reasons, some of these cases are excluded from analysis in this report. The reasons for exclusion and number of cases affected are described below.

At the time St. Vincent's Hospital in Manhattan closed in April of 2010, the cardiac data validation process for 2009 cases was incomplete. Because the accuracy of risk factors, procedural information and outcomes for these cases cannot be verified, the 117 cases reported by this hospital with a discharge in 2009 are excluded from all analyses involving risk factors or mortality rates. These cases are included in Table 7 which presents volume by hospital and surgeon.

In addition, 129 records were excluded from the 2007 - 2009 data because they belong to patients residing outside the United States, and these patients could not be followed after hospital discharge. There were 15 cases excluded from analysis because each 30-day mortality can only be associated with a single cardiac surgery. An additional 43 records belonging to patients enrolled in a clinical trial (PARTNER) comparing outcomes for two kinds of valve replacement procedures were excluded as well.

Beginning with patients discharged in 2007, 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 42.] 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, 357 cases with cardiogenic shock were removed from 2007-2009 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.

After all of the above exclusions, there were 61,121 cardiac surgeries analyzed in this report. Isolated CABG surgery represented 52.85 percent of all adult cardiac surgery for the three-year period covered by this report. Valve or combined valve/CABG surgery represented 35.71 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 2007 through 2009.

# 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 renal failure requiring dialysis has a very different risk profile than a 40-year-old with no renal failure.

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 calculate 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 1.79 percent (in-hospital/30-day mortality in 2009) to obtain the provider's RAMR. For the three-year period 2007-2009, the ratio is multiplied by 1.85 percent (in-hospital/30-day mortality rate) for isolated CABG patients or 5.02 percent (in-hospital/30-day mortality rate) for valve or valve/CABG patients.

There is no Statewide EMR or RAMR, because the statewide data is not risk-adjusted. The Statewide OMR (number of total cases divided by number of total deaths) serves as the basis for comparison for each hospital's EMR and RAMR.

### **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

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### 2009 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 2009 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 Peripheral Vascular Disease is 1.831. This means that a patient who has Peripheral Vascular Disease prior to surgery is approximately 1.831 times as likely to die in the hospital or after discharge within 30 days of surgery as a patient who does not have Peripheral Vascular Disease 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 Peripheral Vascular Disease or does not have Peripheral Vascular Disease. Exceptions are: Age – Number of Years Greater than 60, 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 60 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 61 years old is approximately 1.070 times that of a patient 60 years old undergoing CABG, if all other risk factors are the same. All patients age 60 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 20 percent have odds of in-hospital/30-day mortality that are 2.562 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 four groups: occurring less than one day prior to surgery, one to fourteen days prior, 15 days or more prior, and no MI 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 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 1.5 mg/dL prior to surgery.

**Table 1:** Multivariable Risk Factor Equation for CABG In-Hospital/30-Day Deaths in New York State in 2009

Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
<b>Demographic</b>				
Age: Number of years greater than 60	—	0.0680	<.0001	1.070
Female Gender	27.26	0.4581	0.0040	1.581
<b>Hemodynamic State</b>				
Unstable	0.73	1.7589	<.0001	5.806
<b>Ventricular Function</b>				
Ejection Fraction				
Ejection Fraction $\geq$ 40%	80.86	----Reference----		1.000
Ejection Fraction < 20%	1.74	0.9407	0.0141	2.562
Ejection Fraction 20 – 29%	6.32	0.6093	0.0125	1.839
Ejection Fraction 30 – 39%	11.08	0.4551	0.0292	1.576
Previous MI				
No Previous MI	52.53	----Reference----		1.000
Previous MI less than 1 day	2.52	1.0319	0.0049	2.806
Previous MI 1 – 14 days	21.63	0.5728	0.0036	1.773
Previous MI 15 days or more	23.32	0.5231	0.0089	1.687
<b>Comorbidities</b>				
Peripheral Vascular Disease	12.17	0.6047	0.0007	1.831
Renal Failure				
No Renal Failure	87.24	----Reference----		1.000
Renal Failure, Creatinine 1.6- 2.5 mg/dl	8.37	0.6852	0.0009	1.984
Renal Failure, Creatinine > 2.5 mg/dl	1.52	1.0972	0.0047	2.996
Renal Failure, Dialysis	2.87	1.3580	<.0001	3.889
Intercept = -5.6865				
C Statistic = 0.775				

## 2009 HOSPITAL OUTCOMES FOR CABG SURGERY

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Table 2 and Figure 1 present the CABG surgery results for the 39 hospitals performing this operation in NYS in 2009 for which data could be analyzed. As previously noted, St. Vincent's in Manhattan also performed CABG surgery in 2009 but these cases are excluded from analysis. 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 2009, 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 10,148 CABG was 1.79 percent. In-hospital/30-day OMRs ranged from 0.00 percent to 4.86 percent. The range of EMRs, which measure patient severity of illness, was 1.12 percent to 3.15 percent.

The RAMRs, which are used to measure performance, ranged from 0.00 percent to 3.67 percent. One hospital (Mount Sinai Hospital in Manhattan) had a RAMR that was significantly higher than the statewide

rate. No hospitals had RAMRs that were significantly lower than the statewide rate.

The 2009 in-hospital/30-day mortality rate of 1.79 percent for Isolated CABG is slightly lower than the 1.81 percent observed in 2008.

The in-hospital OMR for 2009 Isolated CABG discharges (not shown in Table 2) was 1.28 percent for all 10,148 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.

## 2007 - 2009 HOSPITAL OUTCOMES FOR VALVE SURGERY

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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 2007-2009. The table contains, for each hospital, the combined number of Valve Only and Valve/CABG operations resulting in 2007-2009 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 21,828 combined Valve Only and Valve/CABG procedures performed at the 40 hospitals was 5.02 percent. The OMRs ranged from 1.11 percent to 8.49 percent. The range of EMRs, which measure patient severity of illness, was 3.30 percent to 7.59 percent.

The RAMRs, which are used to measure performance, ranged from 1.67 percent to 11.37 percent. Two hospitals (Champlain Valley Physicians Hospital in Plattsburgh and United Health Services – Wilson

Division in Johnson City) had RAMRs that were significantly higher than the statewide rate. Four hospitals (Long Island Jewish Medical Center in New Hyde Park, NY Presbyterian – Weil Cornell Medical Center in Manhattan, 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 2007-2009. 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 2007-2009 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 2007-2009 in-hospital/30-day OMR of 5.02 percent for Valve and Valve/CABG surgeries is lower than the 5.22 percent observed for 2005-2007. The in-hospital OMR for 2006-2008 valve surgeries (not shown in Table 3) is 4.27 percent for the 21,828 patients included in this analysis.

As previously described, data for 2009 discharges at St. Vincent's hospital are excluded from these analyses due to incomplete validation and inability to confirm accuracy of risk factor and outcome information.

## DEFINITIONS OF KEY TERMS

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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 1.79 percent for Isolated CABG patients in 2009 or 5.02 percent for Valve or Valve/CABG patients in 2007-2009).

Only cases discharged in 2007 and 2008 are included in Table 3 and Table 4 for this hospital.

### **Note on Hospitals Not Performing Cardiac Surgery During Entire 2007-2009 Period**

One hospital began performing cardiac surgery during the 2007 - 2009 time period on which this report is based: Good Samaritan Hospital of Suffern began performing cardiac surgery in late January 2007.

**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.

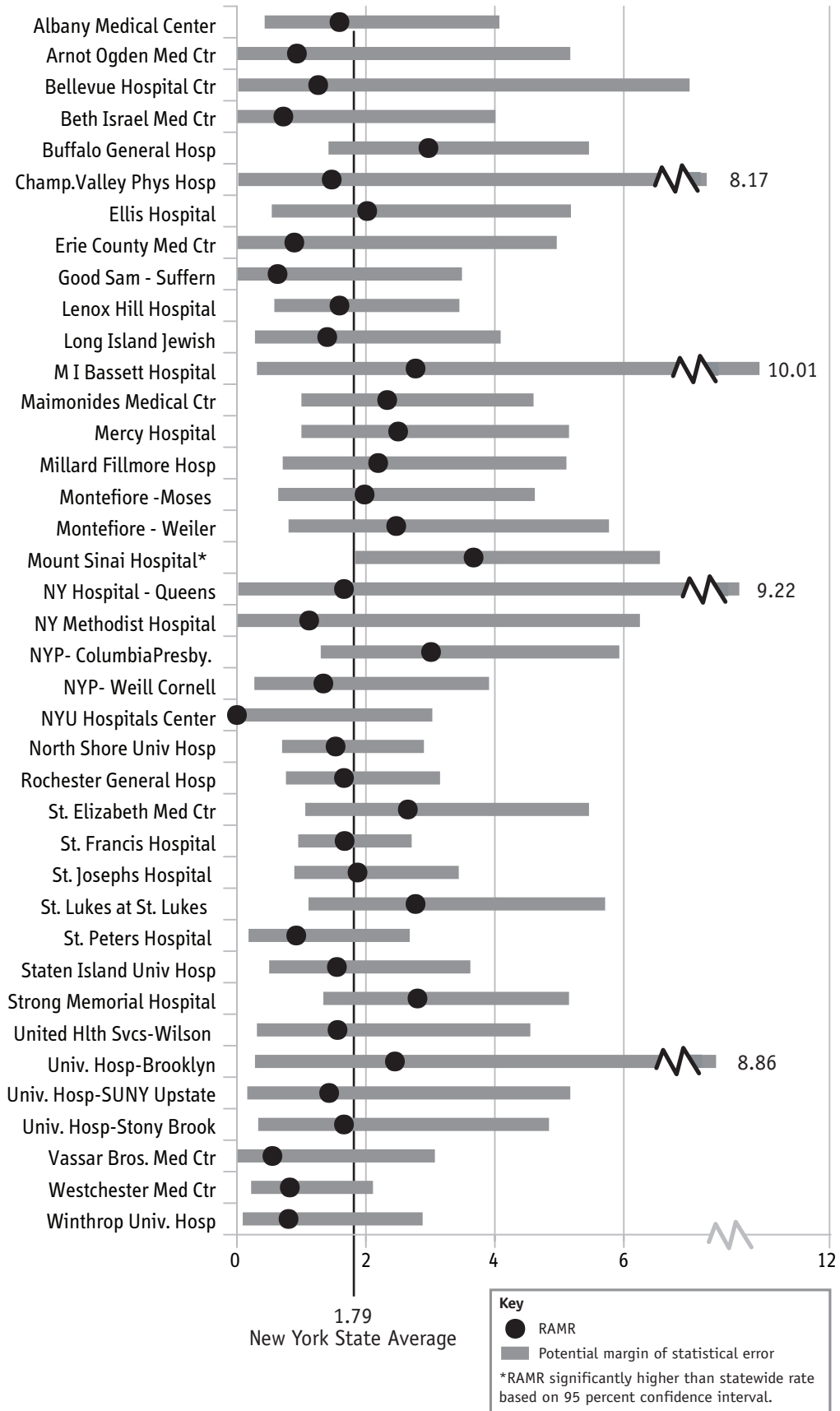
**Table 2:** In-hospital/30-Day Observed, Expected and Risk-Adjusted Mortality Rates for Isolated CABG Surgery in New York State, 2009 Discharges (Listed Alphabetically by Hospital)

Hospital	Cases	Deaths	OMR	EMR	RAMR	95% CI for RAMR
Albany Medical Center	295	4	1.36	1.53	1.59	(0.43, 4.07)
Arnot Ogden Med Ctr	133	1	0.75	1.45	0.93	(0.01, 5.17)
Bellevue Hospital Ctr	127	1	0.79	1.12	1.26	(0.02, 7.02)
Beth Israel Med Ctr	204	1	0.49	1.22	0.72	(0.01, 4.01)
Buffalo General Hosp	380	10	2.63	1.59	2.97	(1.42, 5.46)
Champ.Valley Phys Hosp	98	1	1.02	1.25	1.47	(0.02, 8.17)
Ellis Hospital	199	4	2.01	1.78	2.02	(0.54, 5.18)
Erie County Med Ctr	131	1	0.76	1.54	0.89	(0.01, 4.96)
Good Sam - Suffern	179	1	0.56	1.60	0.63	(0.01, 3.49)
Lenox Hill Hospital	359	6	1.67	1.89	1.59	(0.58, 3.45)
Long Island Jewish	240	3	1.25	1.60	1.40	(0.28, 4.09)
M I Bassett Hospital	77	2	2.60	1.68	2.77	(0.31,10.01)
Maimonides Medical Ctr	284	8	2.82	2.17	2.33	(1.00, 4.60)
Mercy Hospital	311	7	2.25	1.61	2.50	(1.00, 5.15)
Millard Fillmore Hosp	271	5	1.85	1.51	2.19	(0.71, 5.11)
Montefiore - Moses	225	5	2.22	2.01	1.98	(0.64, 4.62)
Montefiore - Weiler	159	5	3.14	2.28	2.47	(0.80, 5.77)
Mount Sinai Hospital	311	11	3.54	1.73	3.67 *	(1.83, 6.56)
NY Hospital - Queens	89	1	1.12	1.22	1.66	(0.02, 9.22)
NY Methodist Hospital	112	1	0.89	1.43	1.12	(0.01, 6.25)
NYP- Columbia Presby.	315	8	2.54	1.51	3.01	(1.30, 5.93)
NYP- Weill Cornell	240	3	1.25	1.68	1.34	(0.27, 3.91)
NYU Hospitals Center	154	0	0.00	1.41	0.00	(0.00, 3.03)
North Shore Univ Hosp	468	9	1.92	2.26	1.53	(0.70, 2.90)
Rochester General Hosp	449	9	2.00	2.17	1.66	(0.76, 3.15)
St. Elizabeth Med Ctr	271	7	2.58	1.75	2.65	(1.06, 5.46)
St. Francis Hospital	808	16	1.98	2.13	1.67	(0.95, 2.71)
St. Josephs Hospital	500	10	2.00	1.92	1.87	(0.89, 3.44)
St. Lukes at St. Lukes	144	7	4.86	3.15	2.77	(1.11, 5.71)
St. Peters Hospital	385	3	0.78	1.53	0.92	(0.18, 2.68)
Staten Island Univ Hosp	344	5	1.45	1.68	1.55	(0.50, 3.62)
Strong Memorial Hosp	397	10	2.52	1.61	2.80	(1.34, 5.15)
United Hlth Svcs-Wilson	202	3	1.49	1.71	1.56	(0.31, 4.55)
Univ. Hosp-Brooklyn	63	2	3.17	2.32	2.45	(0.28, 8.86)
Univ. Hosp-SUNY Upstate	149	2	1.34	1.68	1.43	(0.16, 5.17)
Univ. Hosp-Stony Brook	218	3	1.38	1.49	1.66	(0.33, 4.84)
Vassar Bros. Med Ctr	221	1	0.45	1.47	0.55	(0.01, 3.07)
Westchester Med Ctr	363	4	1.10	2.40	0.82	(0.22, 2.11)
Winthrop Univ. Hosp	273	2	0.73	1.65	0.80	(0.09, 2.88)
<b>Statewide Total</b>	<b>10148</b>	<b>182</b>	<b>1.79</b>			

\* Risk-adjusted mortality rate 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, 2009 Discharges**



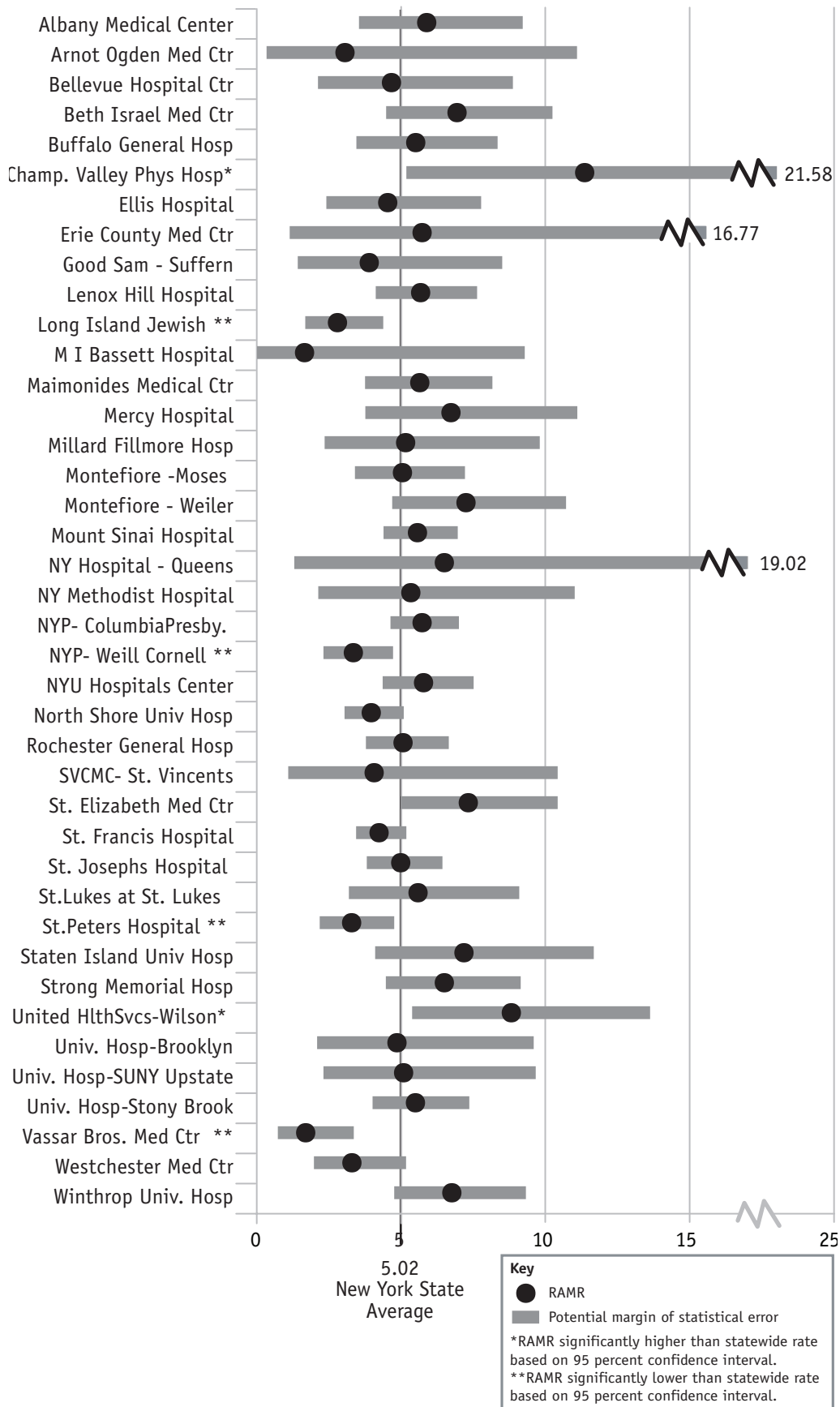
**Table 3:** In-hospital/30-Day Observed, Expected, and Risk-Adjusted Mortality Rates for Valve or Valve/CABG Surgery in New York State, 2007-2009 Discharges.

Hospital	Cases	Deaths	OMR	EMR	RAMR	95% CI for RAMR
Albany Medical Center	405	19	4.69	3.99	5.90	(3.55, 9.22)
Arnot Ogden Med Ctr	94	2	2.13	3.47	3.07	(0.35,11.10)
Bellevue Hospital Ctr	249	9	3.61	3.88	4.68	(2.13, 8.88)
Beth Israel Med Ctr	337	25	7.42	5.36	6.95	(4.49,10.25)
Buffalo General Hosp	498	22	4.42	4.02	5.52	(3.46, 8.35)
Champ.Valley Phys Hosp	106	9	8.49	3.75	11.37 *	(5.19,21.58)
Ellis Hospital	341	13	3.81	4.21	4.55	(2.42, 7.78)
Erie County Med Ctr	50	3	6.00	5.24	5.74	(1.15,16.77)
Good Sam - Suffern	179	6	3.35	4.30	3.91	(1.43, 8.51)
Lenox Hill Hospital	731	44	6.02	5.31	5.69	(4.13, 7.64)
Long Island Jewish	676	19	2.81	5.01	2.81 **	(1.69, 4.39)
M I Bassett Hospital	90	1	1.11	3.34	1.67	(0.02, 9.29)
Maimonides Medical Ctr	451	28	6.21	5.51	5.66	(3.76, 8.17)
Mercy Hospital	279	15	5.38	4.00	6.74	(3.77,11.11)
Millard Fillmore Hosp	251	9	3.59	3.48	5.17	(2.36, 9.81)
Montefiore - Moses	488	30	6.15	6.10	5.06	(3.41, 7.22)
Montefiore - Weiler	331	25	7.55	5.22	7.26	(4.70,10.72)
Mount Sinai Hospital	1414	77	5.45	4.90	5.58	(4.40, 6.97)
NY Hospital - Queens	70	3	4.29	3.30	6.51	(1.31,19.02)
NY Methodist Hospital	145	7	4.83	4.53	5.35	(2.14,11.02)
NYP- Columbia Presby.	1718	95	5.53	4.84	5.74	(4.64, 7.01)
NYP- Weill Cornell	1136	33	2.90	4.33	3.36 **	(2.32, 4.73)
NYU Hospitals Center	1265	56	4.43	3.83	5.79	(4.37, 7.52)
North Shore Univ Hosp	1406	62	4.41	5.56	3.98	(3.05, 5.10)
Rochester General Hosp	947	52	5.49	5.42	5.08	(3.79, 6.66)
SVCMC- St. Vincents	137	4	2.92	3.59	4.08	(1.10,10.43)
St. Elizabeth Med Ctr	384	31	8.07	5.51	7.34	(4.99,10.43)
St. Francis Hospital	1910	97	5.08	5.99	4.25	(3.45, 5.19)
St. Josephs Hospital	1026	60	5.85	5.86	5.00	(3.82, 6.44)
St. Lukes at St. Lukes	258	16	6.20	5.55	5.60	(3.20, 9.10)
St. Peters Hospital	848	28	3.30	5.02	3.30 **	(2.19, 4.77)
Staten Island Univ Hosp	265	16	6.04	4.21	7.19	(4.11,11.68)
Strong Memorial Hosp	617	33	5.35	4.12	6.51	(4.48, 9.15)
United Hlth Svcs-Wilson	238	20	8.40	4.78	8.83 *	(5.39,13.63)
Univ. Hosp-Brooklyn	179	8	4.47	4.60	4.87	(2.10, 9.60)
Univ. Hosp-SUNY Upstate	242	9	3.72	3.66	5.10	(2.32, 9.67)
Univ. Hosp-Stony Brook	540	45	8.33	7.59	5.51	(4.02, 7.37)
Vassar Bros. Med Ctr	499	8	1.60	4.71	1.71 **	(0.74, 3.37)
Westchester Med Ctr	494	19	3.85	5.82	3.31	(1.99, 5.18)
Winthrop Univ. Hosp	534	37	6.93	5.13	6.77	(4.77, 9.33)
<b>Statewide Total</b>	<b>21828</b>	<b>1095</b>	<b>5.02</b>			

\*Risk-adjusted mortality rate significantly higher than the statewide rate based on 95 percent confidence interval.

\*\* Risk-adjusted mortality rate significantly lower than the 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, 2007-2009 Discharges



**Table 4:** Hospital Volume for Valve Procedures in New York State, 2007-2009 Discharges

<b>Hospital</b>	<b>Aortic Valve Replace Surgery</b>	<b>Aortic Valve and CABG</b>	<b>Mitral Valve Replace Surgery</b>	<b>Mitral Replace and CABG</b>	<b>Mitral Valve Repair Surgery</b>	<b>Mitral Repair and CABG</b>	<b>Multiple Valve Surgery</b>	<b>Multiple Valve and CABG</b>	<b>Total Valve or Valve/ CABG</b>
Albany Medical Center	124	156	25	17	20	25	29	9	405
Arnot Ogden Med Ctr	43	30	7	3	5	0	5	1	94
Bellevue Hospital Ctr	71	14	55	15	12	19	60	3	249
Beth Israel Med Ctr	70	73	34	18	25	45	52	20	337
Buffalo General Hosp	155	165	35	18	42	49	16	18	498
Champ.Valley Phys Hosp	36	33	0	3	4	17	7	6	106
Ellis Hospital	125	95	14	11	43	33	13	7	341
Erie County Med Ctr	15	12	11	3	1	0	7	1	50
Good Sam - Suffern	57	66	20	8	7	14	5	2	179
Lenox Hill Hospital	168	134	51	14	137	83	106	38	731
Long Island Jewish	151	160	76	60	58	62	76	33	676
M I Bassett Hospital	31	33	11	7	3	2	2	1	90
Maimonides Medical Ctr	141	82	82	20	19	32	61	14	451
Mercy Hospital	69	80	22	22	28	25	22	11	279
Millard Fillmore Hosp	76	82	21	10	24	17	11	10	251
Montefiore - Moses	110	88	52	39	33	75	69	22	488
Montefiore - Weiler	76	49	65	16	29	35	46	15	331
Mount Sinai Hospital	234	152	40	13	159	62	615	139	1414
NY Hospital - Queens	22	17	15	4	4	0	6	2	70
NY Methodist Hospital	37	23	17	9	20	12	23	4	145
NYP- Columbia Presby.	526	387	177	59	220	110	178	61	1718
NYP- Weill Cornell	411	231	110	39	128	46	132	39	1136
NYU Hospitals Center	463	113	99	17	362	45	146	20	1265
North Shore Univ Hosp	453	374	173	75	103	63	133	32	1406
Rochester General Hosp	356	263	79	26	97	63	36	27	947
SVCMC- St. Vincents	46	25	15	1	31	8	10	1	137
St. Elizabeth Med Ctr	105	100	29	30	21	50	24	25	384
St. Francis Hospital	675	458	89	48	190	152	206	92	1910
St. Josephs Hospital	277	257	97	44	91	83	111	66	1026
St. Lukes at St. Lukes	40	50	37	23	49	21	30	8	258
St. Peters Hospital	243	267	45	24	51	70	100	48	848
Staten Island Univ Hosp	82	59	40	20	31	14	13	6	265
Strong Memorial Hosp	219	145	55	14	89	30	54	11	617
Unitd Hlth Svcs-Wilson	69	87	28	20	16	2	8	8	238
Univ.Hosp-Brooklyn	44	21	37	4	30	14	21	8	179
Univ.Hosp-SUNY Upstate	78	49	18	7	45	17	27	1	242
Univ.Hosp-Stony Brook	131	113	59	26	35	43	80	53	540
Vassar Bros. Med Ctr	149	150	45	25	26	54	27	23	499
Westchester Med Ctr	175	148	34	13	45	35	33	11	494
Winthrop Univ. Hosp	137	146	48	33	27	80	38	25	534
<b>Total</b>	<b>6490</b>	<b>4987</b>	<b>1967</b>	<b>858</b>	<b>2360</b>	<b>1607</b>	<b>2638</b>	<b>921</b>	<b>21828</b>
<b>Statewide Mortality Rate (%)</b>	<b>3.20</b>	<b>5.09</b>	<b>5.24</b>	<b>9.44</b>	<b>1.61</b>	<b>4.92</b>	<b>7.32</b>	<b>15.09</b>	<b>5.02</b>

## 2007 – 2009 HOSPITAL AND SURGEON OUTCOMES

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 2007-2009. In addition, the final two columns provide the number of Isolated CABG, Valve and Valve/CABG procedures and the RAMR for these patients in 2007-2009 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 2007-2009, (b) performed at least one cardiac operation in each of the years, 2007-2009. 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 2007-2009 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, 2007-2009 Discharges

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
<b>Statewide Total</b>	<b>32300</b>	<b>599</b>	<b>1.85</b>				<b>54128</b>	<b>3.13</b>
<b>Albany Medical Center</b>								
Britton L	328	5	1.52	1.44	1.96	(0.63, 4.58)	483	3.17
##Depan H	18	0	0.00	1.52	0.00	(0.00,24.92)	30	0.00
Fuzesi L	286	2	0.70	1.75	0.74	(0.08, 2.67)	345	2.75
Miller S	293	4	1.37	1.53	1.66	(0.45, 4.24)	454	3.00
All Others	21	1	4.76	1.49	5.93	(0.08,33.02)	39	9.54
<b>Total</b>	<b>946</b>	<b>12</b>	<b>1.27</b>	<b>1.56</b>	<b>1.50</b>	<b>(0.78, 2.63)</b>	<b>1351</b>	<b>3.13</b>
<b>Arnot Ogden Med Ctr</b>								
Nast E	190	2	1.05	1.58	1.24	(0.14, 4.47)	229	2.85
Raudat C W	210	4	1.90	1.69	2.09	(0.56, 5.35)	265	2.31
<b>Total</b>	<b>400</b>	<b>6</b>	<b>1.50</b>	<b>1.64</b>	<b>1.70</b>	<b>(0.62, 3.70)</b>	<b>494</b>	<b>2.55</b>
<b>Bellevue Hospital Ctr</b>								
##Crooke G <sup>1</sup>	161	0	0.00	1.27	0.00	(0.00, 3.34)	224	1.96
##Ribakove G	105	2	1.90	1.36	2.61	(0.29, 9.41)	223	3.76
##Schwartz C F	4	0	0.00	0.66	0.00	(0.00,100.0)	5	0.00
All Others	133	1	0.75	0.96	1.45	(0.02, 8.07)	200	1.68
<b>Total</b>	<b>403</b>	<b>3</b>	<b>0.74</b>	<b>1.18</b>	<b>1.17</b>	<b>(0.23, 3.41)</b>	<b>652</b>	<b>2.61</b>

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
<b>Beth Israel Med Ctr</b>								
Geller C M	113	2	1.77	1.57	2.09	(0.24, 7.56)	163	4.50
Hoffman D	208	3	1.44	1.10	2.43	(0.49, 7.09)	269	3.58
#Stelzer P	8	1	12.50	5.47	4.24	(0.06,23.60)	30	4.70
Tranbaugh R	360	3	0.83	1.29	1.20	(0.24, 3.51)	563	3.82
All Others	3	0	0.00	0.30	0.00	(0.00,100.0)	4	0.00
<b>Total</b>	<b>692</b>	<b>9</b>	<b>1.30</b>	<b>1.32</b>	<b>1.83</b>	<b>(0.83, 3.47)</b>	<b>1029</b>	<b>3.91</b>
<b>Buffalo General Hosp</b>								
##Ashraf M	5	0	0.00	2.47	0.00	(0.00,55.19)	5	0.00
Grosner G	662	17	2.57	1.64	2.91	(1.69, 4.65)	1055	3.98
#Lewin A	236	10	4.24	1.67	4.72 *	(2.26, 8.68)	247	7.87 *
##Picone A	160	5	3.13	2.30	2.52	(0.81, 5.87)	254	3.84
<b>Total</b>	<b>1063</b>	<b>32</b>	<b>3.01</b>	<b>1.75</b>	<b>3.19 *</b>	<b>(2.18, 4.51)</b>	<b>1561</b>	<b>4.38 *</b>
<b>Champ.Valley Phys Hosp</b>								
Abbott A E	218	3	1.38	1.31	1.95	(0.39, 5.70)	310	5.85
#Bennett E	3	0	0.00	1.35	0.00	(0.00,100.0)	3	0.00
#Canavan T	28	0	0.00	0.96	0.00	(0.00,25.18)	33	0.00
##Depan H	4	0	0.00	1.09	0.00	(0.00,100.0)	4	0.00
#Reich H	4	0	0.00	0.91	0.00	(0.00,100.0)	5	0.00
#Saifi J	1	0	0.00	1.09	0.00	(0.00,100.0)	2	0.00
#Singh C	48	1	2.08	1.47	2.63	(0.03,14.61)	54	3.63
All Others	.	.	.	.	.	(. , .)	1	0.00
<b>Total</b>	<b>306</b>	<b>4</b>	<b>1.31</b>	<b>1.29</b>	<b>1.87</b>	<b>(0.50, 4.80)</b>	<b>412</b>	<b>5.13</b>
<b>Ellis Hospital</b>								
##Depan H	266	4	1.50	2.03	1.38	(0.37, 3.52)	460	2.91
#Reich H	269	5	1.86	1.42	2.42	(0.78, 5.66)	373	3.58
#Singh C	191	0	0.00	1.41	0.00	(0.00, 2.53)	234	0.00 **
<b>Total</b>	<b>726</b>	<b>9</b>	<b>1.24</b>	<b>1.64</b>	<b>1.40</b>	<b>(0.64, 2.66)</b>	<b>1067</b>	<b>2.62</b>
<b>Erie County Med Ctr</b>								
#Bell-Thomson J	62	0	0.00	1.92	0.00	(0.00, 5.73)	80	3.12
#Downing S W	236	3	1.27	1.93	1.22	(0.25, 3.58)	258	1.70
##Picone A	6	0	0.00	0.94	0.00	(0.00,100.0)	10	0.00
All Others	106	4	3.77	1.65	4.25	(1.14,10.89)	112	7.47
<b>Total</b>	<b>410</b>	<b>7</b>	<b>1.71</b>	<b>1.84</b>	<b>1.72</b>	<b>(0.69, 3.55)</b>	<b>460</b>	<b>3.08</b>
<b>Good Sam - Suffern</b>								
Lundy E F	276	3	1.09	2.01	1.00	(0.20, 2.93)	416	2.04
Salenger R	288	3	1.04	1.28	1.51	(0.30, 4.41)	327	2.67
<b>Total</b>	<b>564</b>	<b>6</b>	<b>1.06</b>	<b>1.64</b>	<b>1.20</b>	<b>(0.44, 2.62)</b>	<b>743</b>	<b>2.22</b>

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
<b>Lenox Hill Hospital</b>								
#Ciuffo G B	154	3	1.95	2.35	1.54	(0.31, 4.50)	226	2.57
#Loulmet D F	25	0	0.00	1.22	0.00	(0.00,22.28)	195	4.83
Patel N C	568	7	1.23	1.91	1.20	(0.48, 2.47)	781	1.92
#Plestis K A	36	1	2.78	1.42	3.62	(0.05,20.16)	95	1.23
#Reddy R C	25	1	4.00	1.58	4.68	(0.06,26.05)	37	6.00
Subramanian V	462	13	2.81	1.96	2.66	(1.42, 4.55)	663	4.66 *
#Swistel D	2	0	0.00	0.65	0.00	(0.00,100.0)	5	0.00
All Others	4	0	0.00	3.51	0.00	(0.00,48.45)	5	0.00
<b>Total</b>	<b>1276</b>	<b>25</b>	<b>1.96</b>	<b>1.95</b>	<b>1.86</b>	<b>(1.21, 2.75)</b>	<b>2007</b>	<b>3.39</b>
<b>Long Island Jewish</b>								
Graver L	215	3	1.40	1.92	1.35	(0.27, 3.95)	529	2.37
Manetta F	151	2	1.32	1.91	1.29	(0.14, 4.65)	214	2.57
Palazzo R	225	0	0.00	1.73	0.00 **	(0.00, 1.75)	347	0.00 **
Parnell V	.	.	.	.	.	(. , .)	1	0.00
Scheinerman S J	192	3	1.56	2.05	1.41	(0.28, 4.12)	367	1.32 **
#Vatsia S	.	.	.	.	.	(. , .)	1	100.0
<b>Total</b>	<b>783</b>	<b>8</b>	<b>1.02</b>	<b>1.89</b>	<b>1.00</b>	<b>(0.43, 1.97)</b>	<b>1459</b>	<b>1.73 **</b>
<b>M I Bassett Hospital</b>								
#Kelley J	5	0	0.00	0.98	0.00	(0.00,100.0)	6	0.00
Lancey R A	126	2	1.59	1.64	1.80	(0.20, 6.49)	171	1.78
Shortt K G	86	0	0.00	1.22	0.00	(0.00, 6.49)	130	1.23
<b>Total</b>	<b>217</b>	<b>2</b>	<b>0.92</b>	<b>1.46</b>	<b>1.17</b>	<b>(0.13, 4.24)</b>	<b>307</b>	<b>1.52</b>
<b>Maimonides Medical Ctr</b>								
Abrol S	219	5	2.28	2.03	2.09	(0.67, 4.88)	321	2.45
#Brevetti G R	6	0	0.00	2.30	0.00	(0.00,49.35)	12	0.00
#Genovesi M H	46	1	2.17	1.61	2.50	(0.03,13.93)	61	7.41
Jacobowitz I	391	6	1.53	1.92	1.48	(0.54, 3.23)	547	3.68
Lahey S J	36	2	5.56	2.11	4.89	(0.55,17.64)	43	6.13
#Saltman A E <sup>1</sup>	12	0	0.00	2.41	0.00	(0.00,23.52)	16	4.18
Stephens G A	72	4	5.56	1.33	7.74 *	(2.08,19.83)	123	7.02
Vaynblat M	191	5	2.62	1.97	2.47	(0.80, 5.76)	291	3.64
All Others	16	0	0.00	1.25	0.00	(0.00,34.05)	26	0.00
<b>Total</b>	<b>989</b>	<b>23</b>	<b>2.33</b>	<b>1.90</b>	<b>2.27</b>	<b>(1.44, 3.41)</b>	<b>1440</b>	<b>3.66</b>
<b>Mercy Hospital</b>								
#Aldridge J	153	3	1.96	1.93	1.88	(0.38, 5.49)	180	3.62
##Ashraf M	1	0	0.00	0.94	0.00	(0.00,100.0)	1	0.00
#Bell-Thomson J	498	13	2.61	1.69	2.87	(1.53, 4.91)	716	4.66
#Downing S W	195	3	1.54	2.34	1.22	(0.25, 3.57)	219	2.28
All Others	87	1	1.15	1.60	1.34	(0.02, 7.43)	97	1.67
<b>Total</b>	<b>934</b>	<b>20</b>	<b>2.14</b>	<b>1.85</b>	<b>2.14</b>	<b>(1.31, 3.31)</b>	<b>1213</b>	<b>3.85</b>

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
<b>Millard Fillmore Hosp</b>								
#Aldridge J	149	3	2.01	1.46	2.56	(0.51, 7.47)	183	4.36
##Ashraf M	693	14	2.02	1.68	2.24	(1.22, 3.75)	907	3.49
Jennings L	17	0	0.00	1.08	0.00	(0.00,37.21)	17	0.00
#Lewin A	1	0	0.00	0.52	0.00	(0.00,100.0)	1	0.00
##Picone A	3	0	0.00	1.33	0.00	(0.00,100.0)	6	0.00
<b>Total</b>	<b>863</b>	<b>17</b>	<b>1.97</b>	<b>1.62</b>	<b>2.25</b>	<b>(1.31, 3.60)</b>	<b>1114</b>	<b>3.58</b>
<b>Montefiore - Moses</b>								
#Bello R A	58	0	0.00	2.25	0.00	(0.00, 5.22)	79	2.24
#D'Alessandro D A	261	6	2.30	1.66	2.57	(0.94, 5.60)	412	3.04
#Deanda A	39	1	2.56	1.57	3.03	(0.04,16.83)	63	2.90
#Derose J J	93	1	1.08	2.63	0.76	(0.01, 4.22)	107	2.86
#Goldstein D J	201	5	2.49	1.59	2.90	(0.94, 6.78)	346	3.17
#Michler R E	110	4	3.64	1.55	4.34	(1.17,11.12)	239	4.99
Weinstein S	.	.	.	.	.	( . , . )	1	0.00
All Others	8	0	0.00	0.98	0.00	(0.00,86.80)	11	0.00
<b>Total</b>	<b>770</b>	<b>17</b>	<b>2.21</b>	<b>1.77</b>	<b>2.31</b>	<b>(1.34, 3.69)</b>	<b>1258</b>	<b>3.39</b>
<b>Montefiore - Weiler</b>								
#Bello R A	123	5	4.07	1.85	4.08	(1.32, 9.53)	170	5.75
#D Alessandro D A	9	0	0.00	1.49	0.00	(0.00,50.70)	12	0.00
#Deanda A	55	4	7.27	1.35	9.99 *	(2.69,25.56)	78	14.60 *
#Derose J J	238	6	2.52	1.69	2.77	(1.01, 6.04)	444	4.44
#Goldstein D J	30	0	0.00	1.37	0.00	(0.00,16.50)	44	0.00
#Michler R E	20	1	5.00	4.28	2.17	(0.03,12.06)	58	2.67
<b>Total</b>	<b>475</b>	<b>16</b>	<b>3.37</b>	<b>1.77</b>	<b>3.52 *</b>	<b>(2.01, 5.72)</b>	<b>806</b>	<b>4.99 *</b>
<b>Mount Sinai Hospital</b>								
Adams D H	8	0	0.00	0.91	0.00	(0.00,93.67)	728	3.21
Anyanwu A C	43	2	4.65	2.32	3.71	(0.42,13.41)	91	8.01 *
#Ciuffo G B	59	4	6.78	2.43	5.18	(1.39,13.25)	101	5.22
DiLuozzo G	5	0	0.00	0.98	0.00	(0.00,100.0)	20	9.06
Filsoufi F	213	6	2.82	1.68	3.11	(1.14, 6.78)	311	3.92
Griep R	.	.	.	.	.	( . , . )	30	2.30
#Plestis K A	31	0	0.00	1.48	0.00	(0.00,14.87)	112	3.55
#Reddy R C	108	5	4.63	1.33	6.45 *	(2.08,15.06)	174	6.43 *
#Stelzer P	36	1	2.78	1.39	3.70	(0.05,20.61)	159	2.69
#Zias E	284	7	2.46	1.59	2.88	(1.15, 5.93)	459	3.34
All Others	34	1	2.94	2.50	2.19	(0.03,12.16)	50	1.91
<b>Total</b>	<b>821</b>	<b>26</b>	<b>3.17</b>	<b>1.69</b>	<b>3.47 *</b>	<b>(2.27, 5.09)</b>	<b>2235</b>	<b>3.88 *</b>
<b>NY Hospital - Queens</b>								
#Adkins M	118	7	5.93	1.45	7.58 *	(3.04,15.62)	158	11.10 *
#Isom O	1	0	0.00	1.08	0.00	(0.00,100.0)	1	0.00
##Lang S <sup>1</sup>	85	0	0.00	1.24	0.00	(0.00, 6.44)	111	0.00
#Mack C A	45	3	6.67	0.92	13.43 *	(2.70,39.25)	49	14.81
<b>Total</b>	<b>249</b>	<b>10</b>	<b>4.02</b>	<b>1.28</b>	<b>5.81 *</b>	<b>(2.78,10.68)</b>	<b>319</b>	<b>7.39 *</b>



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
<b>NY Methodist Hospital</b>								
#Hedeshian M H	49	0	0.00	1.20	0.00	(0.00,11.55)	52	0.00
#Lee L Y	127	4	3.15	1.60	3.66	(0.98, 9.37)	221	4.09
#Tortolani A	157	3	1.91	1.63	2.17	(0.44, 6.34)	205	3.74
<b>Total</b>	<b>333</b>	<b>7</b>	<b>2.10</b>	<b>1.56</b>	<b>2.51</b>	<b>(1.00, 5.16)</b>	<b>478</b>	<b>3.73</b>
<b>NYP- Columbia Presby.</b>								
Argenziano M	125	4	3.20	1.74	3.41	(0.92, 8.74)	347	4.58
#Mosca R S	.	.	.	.	.	( . , . )	2	0.00
#Naka Y	272	9	3.31	1.60	3.84	(1.75, 7.29)	522	4.15
Oz M	168	2	1.19	1.14	1.94	(0.22, 7.00)	419	4.23
Quaegebeur J	.	.	.	.	.	( . , . )	6	0.00
Smith C	163	5	3.07	1.23	4.62	(1.49,10.77)	666	2.31
Stewart A S	198	11	5.56	2.16	4.78 *	(2.38, 8.55)	516	4.63 *
Williams M R	110	3	2.73	1.80	2.81	(0.56, 8.21)	276	5.15 *
All Others	1	0	0.00	1.05	0.00	(0.00,100.0)	1	0.00
<b>Total</b>	<b>1037</b>	<b>34</b>	<b>3.28</b>	<b>1.61</b>	<b>3.78 *</b>	<b>(2.61, 5.28)</b>	<b>2755</b>	<b>4.05 *</b>
<b>NYP- Weill Cornell</b>								
#Adkins M	2	0	0.00	2.58	0.00	(0.00,100.0)	9	0.00
Chen J M	.	.	.	.	.	( . , . )	3	0.00
Girardi L	345	2	0.58	2.04	0.53	(0.06, 1.90)	872	1.81 **
#Hedeshian M H	2	0	0.00	8.64	0.00	(0.00,39.38)	2	0.00
#Isom O	38	0	0.00	0.87	0.00	(0.00,20.61)	127	3.39
Krieger K	236	3	1.27	1.38	1.71	(0.34, 4.99)	619	2.26
##Lang S <sup>1</sup>	.	.	.	.	.	( . , . )	4	0.00
#Lee L Y	51	1	1.96	2.28	1.59	(0.02, 8.85)	65	1.83
#Mack C A	.	.	.	.	.	( . , . )	2	0.00
#Naka Y	2	0	0.00	0.92	0.00	(0.00,100.0)	2	0.00
Salemi A	153	3	1.96	2.11	1.73	(0.35, 5.05)	247	2.30
#Tortolani A	40	3	7.50	1.79	7.76	(1.56,22.69)	53	6.44
<b>Total</b>	<b>869</b>	<b>12</b>	<b>1.38</b>	<b>1.84</b>	<b>1.39</b>	<b>(0.72, 2.44)</b>	<b>2005</b>	<b>2.16 **</b>
<b>NYU Hospitals Center</b>								
Colvin S	19	0	0.00	1.03	0.00	(0.00,34.86)	294	5.83 *
##Crooke G <sup>1</sup>	17	0	0.00	1.36	0.00	(0.00,29.50)	37	0.00
Culliford A	98	0	0.00	1.63	0.00	(0.00, 4.27)	226	3.36
Galloway A	74	3	4.05	1.43	5.28	(1.06,15.41)	629	2.93
Grossi E	10	0	0.00	1.12	0.00	(0.00,60.67)	28	0.00
#Loulmet D F	7	0	0.00	1.48	0.00	(0.00,65.86)	60	1.46
Meyer D B	.	.	.	.	.	( . , . )	8	0.00
#Mosca R S	1	0	0.00	0.38	0.00	(0.00,100.0)	2	0.00
#Ribakove G	49	0	0.00	1.65	0.00	(0.00, 8.40)	141	3.27
#Schwartz C F	80	0	0.00	1.89	0.00	(0.00, 4.49)	139	3.36
#Zias E	22	0	0.00	1.48	0.00	(0.00,20.95)	72	2.08
All Others	2	0	0.00	2.16	0.00	(0.00,100.0)	8	0.00
<b>Total</b>	<b>379</b>	<b>3</b>	<b>0.79</b>	<b>1.58</b>	<b>0.93</b>	<b>(0.19, 2.72)</b>	<b>1644</b>	<b>3.39</b>

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
<b>North Shore Univ Hosp</b>								
Arnofsky A	135	4	2.96	1.53	3.59	(0.97, 9.20)	181	4.55
Esposito R	327	6	1.83	2.39	1.42	(0.52, 3.10)	579	3.09
Hall M	255	5	1.96	2.87	1.27	(0.41, 2.96)	415	2.65
Hartman A	114	2	1.75	1.74	1.87	(0.21, 6.74)	546	1.79 **
Kalimi R	344	5	1.45	2.64	1.02	(0.33, 2.39)	610	1.16 **
Pogo G	197	4	2.03	2.53	1.49	(0.40, 3.81)	346	3.52
#Vatsia S	161	3	1.86	1.78	1.95	(0.39, 5.68)	262	3.42
<b>Total</b>	<b>1533</b>	<b>29</b>	<b>1.89</b>	<b>2.36</b>	<b>1.49</b>	<b>(1.00, 2.14)</b>	<b>2939</b>	<b>2.49 **</b>
<b>Rochester General Hosp</b>								
Becker E J	192	7	3.65	2.31	2.92	(1.17, 6.02)	233	4.55
Cheeran D	637	10	1.57	2.15	1.35	(0.65, 2.49)	976	3.14
Kirshner R	588	13	2.21	2.22	1.85	(0.98, 3.17)	1155	2.83
<b>Total</b>	<b>1417</b>	<b>30</b>	<b>2.12</b>	<b>2.20</b>	<b>1.78</b>	<b>(1.20, 2.55)</b>	<b>2364</b>	<b>3.11</b>
<b>SVCMC- St. Vincents<sup>1</sup></b>								
##Lang S <sup>1</sup>	144	7	4.86	1.19	7.58 *	(3.04,15.62)	199	6.35
Stavropoulos C I <sup>1</sup>	1	0	0.00	8.29	0.00	(0.00,82.09)	2	15.06
All Others	94	2	2.13	1.61	2.46	(0.28, 8.87)	175	3.07
<b>Total</b>	<b>239</b>	<b>9</b>	<b>3.77</b>	<b>1.38</b>	<b>5.05 *</b>	<b>(2.30, 9.59)</b>	<b>376</b>	<b>4.94</b>
<b>St. Elizabeth Med Ctr</b>								
El Amir N	193	3	1.55	1.81	1.59	(0.32, 4.65)	293	3.56
Joyce F	272	7	2.57	1.97	2.42	(0.97, 4.99)	428	4.45
#Kelley J	256	7	2.73	2.03	2.49	(1.00, 5.14)	384	4.54
<b>Total</b>	<b>721</b>	<b>17</b>	<b>2.36</b>	<b>1.95</b>	<b>2.24</b>	<b>(1.31, 3.59)</b>	<b>1105</b>	<b>4.26 *</b>
<b>St. Francis Hospital</b>								
Bercow N	319	3	0.94	2.27	0.77	(0.15, 2.24)	560	2.79
Colangelo R	620	11	1.77	2.14	1.54	(0.77, 2.75)	994	1.92 **
Fernandez H A	364	2	0.55	2.37	0.43 **	(0.05, 1.55)	515	2.11
Lamendola C	352	9	2.56	2.36	2.01	(0.92, 3.82)	572	3.79
Robinson N	465	15	3.23	1.86	3.22	(1.80, 5.31)	879	4.43 *
Taylor J	402	7	1.74	2.01	1.60	(0.64, 3.31)	887	1.65 **
All Others	33	0	0.00	1.24	0.00	(0.00,16.58)	58	1.73
<b>Total</b>	<b>2555</b>	<b>47</b>	<b>1.84</b>	<b>2.14</b>	<b>1.60</b>	<b>(1.17, 2.12)</b>	<b>4465</b>	<b>2.67</b>
<b>St. Josephs Hospital</b>								
Green G R	296	8	2.70	1.85	2.71	(1.16, 5.33)	517	3.25
Marvasti M	245	4	1.63	1.85	1.64	(0.44, 4.19)	506	2.43
Nazem A	377	9	2.39	2.13	2.08	(0.95, 3.95)	551	3.31
Rosenberg J	294	9	3.06	2.45	2.32	(1.06, 4.40)	489	4.28
Zhou Z	386	7	1.81	2.51	1.34	(0.54, 2.76)	561	2.63
<b>Total</b>	<b>1598</b>	<b>37</b>	<b>2.32</b>	<b>2.18</b>	<b>1.97</b>	<b>(1.38, 2.71)</b>	<b>2624</b>	<b>3.19</b>

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
<b>St. Lukes at St. Lukes</b>								
Balaram S K	116	4	3.45	2.13	3.00	(0.81, 7.68)	188	2.88
#Swistel D	315	7	2.22	2.79	1.48	(0.59, 3.04)	501	3.45
<b>Total</b>	<b>431</b>	<b>11</b>	<b>2.55</b>	<b>2.61</b>	<b>1.81</b>	<b>(0.90, 3.24)</b>	<b>689</b>	<b>3.30</b>
<b>St. Peters Hospital</b>								
#Bennett E	213	0	0.00	1.38	0.00	(0.00, 2.31)	531	1.39 **
#Canavan T	369	5	1.36	1.75	1.43	(0.46, 3.34)	440	1.58
Dal Col R	307	3	0.98	1.48	1.23	(0.25, 3.59)	510	2.01
##Depan H	.	.	.	.	.	(. , .)	1	0.00
#Saifi J	365	4	1.10	2.12	0.96	(0.26, 2.46)	620	2.41
<b>Total</b>	<b>1254</b>	<b>12</b>	<b>0.96</b>	<b>1.73</b>	<b>1.03 **</b>	<b>(0.53, 1.79)</b>	<b>2102</b>	<b>1.95 **</b>
<b>Staten Island Univ Hosp</b>								
McGinn J	667	12	1.80	1.80	1.86	(0.96, 3.24)	829	3.33
Nabagiez J P	10	0	0.00	1.87	0.00	(0.00,36.35)	10	0.00
Rosell F M	288	3	1.04	1.68	1.15	(0.23, 3.36)	324	2.40
All Others	98	2	2.04	1.71	2.22	(0.25, 8.01)	165	5.73
<b>Total</b>	<b>1063</b>	<b>17</b>	<b>1.60</b>	<b>1.76</b>	<b>1.69</b>	<b>(0.98, 2.70)</b>	<b>1328</b>	<b>3.46</b>
<b>Strong Memorial Hosp</b>								
Alfieris G	.	.	.	.	.	(. , .)	5	0.00
Hicks G	302	8	2.65	1.69	2.91	(1.25, 5.74)	416	5.33 *
Knight P	532	12	2.26	1.62	2.59	(1.34, 4.52)	965	3.89
Massey H	210	7	3.33	1.61	3.83	(1.54, 7.90)	275	4.94
<b>Total</b>	<b>1044</b>	<b>27</b>	<b>2.59</b>	<b>1.64</b>	<b>2.93 *</b>	<b>(1.93, 4.27)</b>	<b>1661</b>	<b>4.42 *</b>
<b>Unitd Hlth Svcs-Wilson</b>								
Wong K	291	3	1.03	1.81	1.05	(0.21, 3.08)	424	2.96
Yousuf M	260	6	2.31	2.29	1.87	(0.68, 4.07)	354	5.34
All Others	43	0	0.00	1.82	0.00	(0.00, 8.68)	54	1.75
<b>Total</b>	<b>594</b>	<b>9</b>	<b>1.52</b>	<b>2.02</b>	<b>1.39</b>	<b>(0.63, 2.64)</b>	<b>832</b>	<b>3.88</b>
<b>Univ.Hosp-Brooklyn</b>								
#Brevetti G R	1	0	0.00	12.53	0.00	(0.00,54.31)	4	0.00
Burack J H	22	0	0.00	2.12	0.00	(0.00,14.58)	33	0.00
#Genovesi M H	3	0	0.00	0.92	0.00	(0.00,100.0)	3	0.00
#Ko W <sup>1</sup>	107	4	3.74	2.35	2.95	(0.79, 7.54)	216	3.90
Tak V M	66	1	1.52	1.87	1.50	(0.02, 8.37)	113	2.92
All Others	11	1	9.09	2.64	6.39	(0.08,35.57)	20	6.30
<b>Total</b>	<b>210</b>	<b>6</b>	<b>2.86</b>	<b>2.22</b>	<b>2.39</b>	<b>(0.87, 5.20)</b>	<b>389</b>	<b>3.40</b>
<b>Univ.Hosp-SUNY Upstate</b>								
Fink G W	176	0	0.00	1.65	0.00	(0.00, 2.35)	274	0.49 **
Lutz C J	316	5	1.58	1.99	1.48	(0.48, 3.45)	460	3.48
<b>Total</b>	<b>492</b>	<b>5</b>	<b>1.02</b>	<b>1.87</b>	<b>1.01</b>	<b>(0.33, 2.36)</b>	<b>734</b>	<b>2.43</b>

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
<b>Univ.Hosp-Stony Brook</b>								
Bilfinger T	119	2	1.68	2.48	1.25	(0.14, 4.53)	176	2.80
McLarty A	118	2	1.69	2.02	1.56	(0.17, 5.62)	173	3.00
Rosengart T	239	2	0.84	1.54	1.01	(0.11, 3.63)	517	3.00
Seifert F	328	5	1.52	1.62	1.75	(0.56, 4.08)	461	3.62
All Others	10	0	0.00	1.53	0.00	(0.00,44.36)	27	3.05
<b>Total</b>	<b>814</b>	<b>11</b>	<b>1.35</b>	<b>1.78</b>	<b>1.41</b>	<b>(0.70, 2.52)</b>	<b>1354</b>	<b>3.16</b>
<b>Vassar Bros. Med Ctr</b>								
Bhutani A K	106	1	0.94	1.35	1.29	(0.02, 7.20)	117	1.83
Sarabu M	159	0	0.00	1.93	0.00	(0.00, 2.22)	449	0.54 **
Shahani R	190	1	0.53	1.57	0.62	(0.01, 3.46)	272	0.99
Zakow P	224	2	0.89	1.89	0.88	(0.10, 3.16)	340	1.88
All Others	1	0	0.00	0.53	0.00	(0.00,100.0)	1	0.00
<b>Total</b>	<b>680</b>	<b>4</b>	<b>0.59</b>	<b>1.72</b>	<b>0.63 **</b>	<b>(0.17, 1.62)</b>	<b>1179</b>	<b>1.07 **</b>
<b>Westchester Med Ctr</b>								
Fleisher A	137	1	0.73	2.05	0.66	(0.01, 3.67)	168	2.27
Lafaro R	302	3	0.99	1.70	1.09	(0.22, 3.17)	383	2.22
Lansman S	379	4	1.06	2.12	0.93	(0.25, 2.37)	492	1.93
Malekan R	41	0	0.00	2.18	0.00	(0.00, 7.63)	55	1.58
Saunders P	1	0	0.00	0.42	0.00	(0.00,100.0)	2	0.00
Spielvogel D	420	5	1.19	2.13	1.04	(0.33, 2.42)	674	1.59 **
<b>Total</b>	<b>1280</b>	<b>13</b>	<b>1.02</b>	<b>2.01</b>	<b>0.94 **</b>	<b>(0.50, 1.60)</b>	<b>1774</b>	<b>1.84 **</b>
<b>Winthrop Univ. Hosp</b>								
Goncalves J A	373	4	1.07	1.95	1.02	(0.27, 2.61)	568	3.37
Kokotos W J	237	1	0.42	2.15	0.36	(0.00, 2.03)	386	3.29
Schubach S	260	2	0.77	1.35	1.05	(0.12, 3.80)	450	2.75
<b>Total</b>	<b>870</b>	<b>7</b>	<b>0.80</b>	<b>1.82</b>	<b>0.82 **</b>	<b>(0.33, 1.68)</b>	<b>1404</b>	<b>3.18</b>
<b>STATEWIDE TOTAL</b>	<b>32300</b>	<b>599</b>	<b>1.85</b>				<b>54128</b>	<b>3.13</b>

1 St. Vincent's cases discharged in 2009 not included in this table.

\* 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, 2007-2009.

	Isolated CABG					Isolated CABG, or Valve or Valve/CABG		
	No of			EMR	RAMR	95% CI for RAMR	Cases	RAMR
	Cases	Deaths	OMR					
<b>Adkins M</b>	<b>120</b>	<b>7</b>	<b>5.83</b>	<b>1.47</b>	<b>7.36 *</b>	<b>(2.95,15.16)</b>	<b>167</b>	<b>9.51 *</b>
NY Hospital - Queens	118	7	5.93	1.45	7.58 *	(3.04,15.62)	158	11.10 *
NYP- Weill Cornell	2	0	0.00	2.58	0.00	(0.00,100.0)	9	0.00
<b>Aldridge J</b>	<b>302</b>	<b>6</b>	<b>1.99</b>	<b>1.70</b>	<b>2.17</b>	<b>(0.79, 4.72)</b>	<b>363</b>	<b>3.95</b>
Mercy Hospital	153	3	1.96	1.93	1.88	(0.38, 5.49)	180	3.62
Millard Fillmore Hosp	149	3	2.01	1.46	2.56	(0.51, 7.47)	183	4.36
<b>Ashraf M</b>	<b>699</b>	<b>14</b>	<b>2.00</b>	<b>1.68</b>	<b>2.21</b>	<b>(1.21, 3.71)</b>	<b>913</b>	<b>3.46</b>
Buffalo General Hosp	5	0	0.00	2.47	0.00	(0.00,55.19)	5	0.00
Mercy Hospital	1	0	0.00	0.94	0.00	(0.00,100.0)	1	0.00
Millard Fillmore Hosp	693	14	2.02	1.68	2.24	(1.22, 3.75)	907	3.49
<b>Bell-Thomson J</b>	<b>560</b>	<b>13</b>	<b>2.32</b>	<b>1.71</b>	<b>2.51</b>	<b>(1.34, 4.30)</b>	<b>796</b>	<b>4.50</b>
Erie County Med Ctr	62	0	0.00	1.92	0.00	(0.00, 5.73)	80	3.12
Mercy Hospital	498	13	2.61	1.69	2.87	(1.53, 4.91)	716	4.66
<b>Bello R A</b>	<b>181</b>	<b>5</b>	<b>2.76</b>	<b>1.98</b>	<b>2.59</b>	<b>(0.84, 6.05)</b>	<b>249</b>	<b>4.56</b>
Montefiore - Moses	58	0	0.00	2.25	0.00	(0.00, 5.22)	79	2.24
Montefiore - Weiler	123	5	4.07	1.85	4.08	(1.32, 9.53)	170	5.75
<b>Bennett E</b>	<b>216</b>	<b>0</b>	<b>0.00</b>	<b>1.38</b>	<b>0.00</b>	<b>(0.00, 2.28)</b>	<b>534</b>	<b>1.38 **</b>
Champ.Valley Phys Hosp	3	0	0.00	1.35	0.00	(0.00,100.0)	3	0.00
St. Peters Hospital	213	0	0.00	1.38	0.00	(0.00, 2.31)	531	1.39 **
<b>Brevetti G R</b>	<b>7</b>	<b>0</b>	<b>0.00</b>	<b>3.76</b>	<b>0.00</b>	<b>(0.00,25.86)</b>	<b>16</b>	<b>0.00</b>
Maimonides Medical Ctr	6	0	0.00	2.30	0.00	(0.00,49.35)	12	0.00
Univ.Hosp-Brooklyn	1	0	0.00	12.53	0.00	(0.00,54.31)	4	0.00
<b>Canavan T</b>	<b>397</b>	<b>5</b>	<b>1.26</b>	<b>1.70</b>	<b>1.38</b>	<b>(0.44, 3.21)</b>	<b>473</b>	<b>1.53</b>
Champ.Valley Phys Hosp	28	0	0.00	0.96	0.00	(0.00,25.18)	33	0.00
St. Peters Hospital	369	5	1.36	1.75	1.43	(0.46, 3.34)	440	1.58
<b>Ciuffo G B</b>	<b>213</b>	<b>7</b>	<b>3.29</b>	<b>2.37</b>	<b>2.57</b>	<b>(1.03, 5.30)</b>	<b>327</b>	<b>3.44</b>
Lenox Hill Hospital	154	3	1.95	2.35	1.54	(0.31, 4.50)	226	2.57
Mount Sinai Hospital	59	4	6.78	2.43	5.18	(1.39,13.25)	101	5.22
<b>Crooke G<sup>1</sup></b>	<b>178</b>	<b>0</b>	<b>0.00</b>	<b>1.27</b>	<b>0.00</b>	<b>(0.00, 3.00)</b>	<b>261</b>	<b>1.59</b>
Bellevue Hospital Ctr	161	0	0.00	1.27	0.00	(0.00, 3.34)	224	1.96
NYU Hospitals Center	17	0	0.00	1.36	0.00	(0.00,29.50)	37	0.00
<b>D'Alessandro D A</b>	<b>270</b>	<b>6</b>	<b>2.22</b>	<b>1.65</b>	<b>2.50</b>	<b>(0.91, 5.44)</b>	<b>424</b>	<b>2.97</b>
Montefiore - Moses	261	6	2.30	1.66	2.57	(0.94, 5.60)	412	3.04
Montefiore - Weiler	9	0	0.00	1.49	0.00	(0.00,50.70)	12	0.00
<b>Deanda A</b>	<b>94</b>	<b>5</b>	<b>5.32</b>	<b>1.44</b>	<b>6.84 *</b>	<b>(2.20,15.96)</b>	<b>141</b>	<b>8.08 *</b>
Montefiore - Moses	39	1	2.56	1.57	3.03	(0.04,16.83)	63	2.90
Montefiore - Weiler	55	4	7.27	1.35	9.99 *	(2.69,25.56)	78	14.60 *

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
<b>Depan H</b>	<b>288</b>	<b>4</b>	<b>1.39</b>	<b>1.98</b>	<b>1.30</b>	<b>(0.35, 3.33)</b>	<b>495</b>	<b>2.75</b>
Albany Medical Center	18	0	0.00	1.52	0.00	(0.00,24.92)	30	0.00
Champ.Valley Phys Hosp	4	0	0.00	1.09	0.00	(0.00,100.0)	4	0.00
Ellis Hospital	266	4	1.50	2.03	1.38	(0.37, 3.52)	460	2.91
St. Peters Hospital	.	.	.	.	.	(. , .)	1	0.00
<b>Derose J J</b>	<b>331</b>	<b>7</b>	<b>2.11</b>	<b>1.95</b>	<b>2.01</b>	<b>(0.81, 4.14)</b>	<b>551</b>	<b>4.15</b>
Montefiore - Moses	93	1	1.08	2.63	0.76	(0.01, 4.22)	107	2.86
Montefiore - Weiler	238	6	2.52	1.69	2.77	(1.01, 6.04)	444	4.44
<b>Downing S W</b>	<b>431</b>	<b>6</b>	<b>1.39</b>	<b>2.11</b>	<b>1.22</b>	<b>(0.45, 2.66)</b>	<b>477</b>	<b>1.99</b>
Erie County Med Ctr	236	3	1.27	1.93	1.22	(0.25, 3.58)	258	1.70
Mercy Hospital	195	3	1.54	2.34	1.22	(0.25, 3.57)	219	2.28
<b>Genovesi M H</b>	<b>49</b>	<b>1</b>	<b>2.04</b>	<b>1.57</b>	<b>2.41</b>	<b>(0.03,13.43)</b>	<b>64</b>	<b>7.25</b>
Maimonides Medical Ctr	46	1	2.17	1.61	2.50	(0.03,13.93)	61	7.41
Univ.Hosp-Brooklyn	3	0	0.00	0.92	0.00	(0.00,100.0)	3	0.00
<b>Goldstein D J</b>	<b>231</b>	<b>5</b>	<b>2.16</b>	<b>1.56</b>	<b>2.57</b>	<b>(0.83, 6.00)</b>	<b>390</b>	<b>2.92</b>
Montefiore - Moses	201	5	2.49	1.59	2.90	(0.94, 6.78)	346	3.17
Montefiore - Weiler	30	0	0.00	1.37	0.00	(0.00,16.50)	44	0.00
<b>Hedeshian M H</b>	<b>51</b>	<b>0</b>	<b>0.00</b>	<b>1.49</b>	<b>0.00</b>	<b>(0.00, 8.93)</b>	<b>54</b>	<b>0.00</b>
NY Methodist Hospital	49	0	0.00	1.20	0.00	(0.00,11.55)	52	0.00
NYP- Weill Cornell	2	0	0.00	8.64	0.00	(0.00,39.38)	2	0.00
<b>Isom O</b>	<b>39</b>	<b>0</b>	<b>0.00</b>	<b>0.87</b>	<b>0.00</b>	<b>(0.00,19.96)</b>	<b>128</b>	<b>3.38</b>
NY Hospital - Queens	1	0	0.00	1.08	0.00	(0.00,100.0)	1	0.00
NYP- Weill Cornell	38	0	0.00	0.87	0.00	(0.00,20.61)	127	3.39
<b>Kelley J</b>	<b>261</b>	<b>7</b>	<b>2.68</b>	<b>2.01</b>	<b>2.47</b>	<b>(0.99, 5.09)</b>	<b>390</b>	<b>4.50</b>
M I Bassett Hospital	5	0	0.00	0.98	0.00	(0.00,100.0)	6	0.00
St. Elizabeth Med Ctr	256	7	2.73	2.03	2.49	(1.00, 5.14)	384	4.54
<b>Lang S<sup>1</sup></b>	<b>229</b>	<b>7</b>	<b>3.06</b>	<b>1.21</b>	<b>4.69 *</b>	<b>(1.88, 9.66)</b>	<b>314</b>	<b>4.12</b>
NY Hospital - Queens	85	0	0.00	1.24	0.00	(0.00, 6.44)	111	0.00
NYP- Weill Cornell	.	.	.	.	.	(. , .)	4	0.00
SVCMC- St. Vincents	144	7	4.86	1.19	7.58 *	(3.04,15.62)	199	6.35
<b>Lee L Y</b>	<b>178</b>	<b>5</b>	<b>2.81</b>	<b>1.79</b>	<b>2.90</b>	<b>(0.94, 6.78)</b>	<b>286</b>	<b>3.64</b>
NY Methodist Hospital	127	4	3.15	1.60	3.66	(0.98, 9.37)	221	4.09
NYP- Weill Cornell	51	1	1.96	2.28	1.59	(0.02, 8.85)	65	1.83
<b>Lewin A</b>	<b>237</b>	<b>10</b>	<b>4.22</b>	<b>1.66</b>	<b>4.71 *</b>	<b>(2.26, 8.66)</b>	<b>248</b>	<b>7.86 *</b>
Buffalo General Hosp	236	10	4.24	1.67	4.72 *	(2.26, 8.68)	247	7.87 *
Millard Fillmore Hosp	1	0	0.00	0.52	0.00	(0.00,100.0)	1	0.00
<b>Loulmet D F</b>	<b>32</b>	<b>0</b>	<b>0.00</b>	<b>1.28</b>	<b>0.00</b>	<b>(0.00,16.65)</b>	<b>255</b>	<b>4.10</b>
Lenox Hill Hospital	25	0	0.00	1.22	0.00	(0.00,22.28)	195	4.83
NYU Hospitals Center	7	0	0.00	1.48	0.00	(0.00,65.86)	60	1.46

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
<b>Mack C A</b>	<b>45</b>	<b>3</b>	<b>6.67</b>	<b>0.92</b>	<b>13.43 *</b>	<b>(2.70,39.25)</b>	<b>51</b>	<b>11.38</b>
NY Hospital - Queens	45	3	6.67	0.92	13.43 *	(2.70,39.25)	49	14.81
NYP- Weill Cornell	.	.	.	.	.	(. , .)	2	0.00
<b>Michler R E</b>	<b>130</b>	<b>5</b>	<b>3.85</b>	<b>1.97</b>	<b>3.62</b>	<b>(1.17, 8.44)</b>	<b>297</b>	<b>4.50</b>
Montefiore - Moses	110	4	3.64	1.55	4.34	(1.17,11.12)	239	4.99
Montefiore - Weiler	20	1	5.00	4.28	2.17	(0.03,12.06)	58	2.67
<b>Mosca R S</b>	<b>1</b>	<b>0</b>	<b>0.00</b>	<b>0.38</b>	<b>0.00</b>	<b>(0.00,100.0)</b>	<b>4</b>	<b>0.00</b>
NYP- Columbia Presby.	.	.	.	.	.	(. , .)	2	0.00
NYU Hospitals Center	1	0	0.00	0.38	0.00	(0.00,100.0)	2	0.00
<b>Naka Y</b>	<b>274</b>	<b>9</b>	<b>3.28</b>	<b>1.59</b>	<b>3.82</b>	<b>(1.75, 7.26)</b>	<b>524</b>	<b>4.14</b>
NYP- Columbia Presby.	272	9	3.31	1.60	3.84	(1.75, 7.29)	522	4.15
NYP- Weill Cornell	2	0	0.00	0.92	0.00	(0.00,100.0)	2	0.00
<b>Picone A</b>	<b>169</b>	<b>5</b>	<b>2.96</b>	<b>2.24</b>	<b>2.45</b>	<b>(0.79, 5.72)</b>	<b>270</b>	<b>3.55</b>
Buffalo General Hosp	160	5	3.13	2.30	2.52	(0.81, 5.87)	254	3.84
Erie County Med Ctr	6	0	0.00	0.94	0.00	(0.00,100.0)	10	0.00
Millard Fillmore Hosp	3	0	0.00	1.33	0.00	(0.00,100.0)	6	0.00
<b>Plestis K A</b>	<b>67</b>	<b>1</b>	<b>1.49</b>	<b>1.45</b>	<b>1.91</b>	<b>(0.03,10.65)</b>	<b>207</b>	<b>2.70</b>
Lenox Hill Hospital	36	1	2.78	1.42	3.62	(0.05,20.16)	95	1.23
Mount Sinai Hospital	31	0	0.00	1.48	0.00	(0.00,14.87)	112	3.55
<b>Reddy R C</b>	<b>133</b>	<b>6</b>	<b>4.51</b>	<b>1.38</b>	<b>6.07 *</b>	<b>(2.22,13.21)</b>	<b>211</b>	<b>6.37 *</b>
Lenox Hill Hospital	25	1	4.00	1.58	4.68	(0.06,26.05)	37	6.00
Mount Sinai Hospital	108	5	4.63	1.33	6.45 *	(2.08,15.06)	174	6.43 *
<b>Reich H</b>	<b>273</b>	<b>5</b>	<b>1.83</b>	<b>1.41</b>	<b>2.40</b>	<b>(0.77, 5.60)</b>	<b>378</b>	<b>3.54</b>
Champ.Valley Phys Hosp	4	0	0.00	0.91	0.00	(0.00,100.0)	5	0.00
Ellis Hospital	269	5	1.86	1.42	2.42	(0.78, 5.66)	373	3.58
<b>Ribakove G</b>	<b>154</b>	<b>2</b>	<b>1.30</b>	<b>1.45</b>	<b>1.66</b>	<b>(0.19, 6.00)</b>	<b>364</b>	<b>3.54</b>
Bellevue Hospital Ctr	105	2	1.90	1.36	2.61	(0.29, 9.41)	223	3.76
NYU Hospitals Center	49	0	0.00	1.65	0.00	(0.00, 8.40)	141	3.27
<b>Saifi J</b>	<b>366</b>	<b>4</b>	<b>1.09</b>	<b>2.11</b>	<b>0.96</b>	<b>(0.26, 2.46)</b>	<b>622</b>	<b>2.39</b>
Champ.Valley Phys Hosp	1	0	0.00	1.09	0.00	(0.00,100.0)	2	0.00
St. Peters Hospital	365	4	1.10	2.12	0.96	(0.26, 2.46)	620	2.41
<b>Schwartz C F</b>	<b>84</b>	<b>0</b>	<b>0.00</b>	<b>1.83</b>	<b>0.00</b>	<b>(0.00, 4.41)</b>	<b>144</b>	<b>3.31</b>
Bellevue Hospital Ctr	4	0	0.00	0.66	0.00	(0.00,100.0)	5	0.00
NYU Hospitals Center	80	0	0.00	1.89	0.00	(0.00, 4.49)	139	3.36
<b>Singh C</b>	<b>239</b>	<b>1</b>	<b>0.42</b>	<b>1.42</b>	<b>0.55</b>	<b>(0.01, 3.04)</b>	<b>288</b>	<b>0.60</b>
Champ.Valley Phys Hosp	48	1	2.08	1.47	2.63	(0.03,14.61)	54	3.63
Ellis Hospital	191	0	0.00	1.41	0.00	(0.00, 2.53)	234	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
<b>Stelzer P</b>	<b>44</b>	<b>2</b>	<b>4.55</b>	<b>2.13</b>	<b>3.95</b>	<b>(0.44,14.28)</b>	<b>189</b>	<b>2.97</b>
Beth Israel Med Ctr	8	1	12.50	5.47	4.24	(0.06,23.60)	30	4.70
Mount Sinai Hospital	36	1	2.78	1.39	3.70	(0.05,20.61)	159	2.69
<b>Swistel D</b>	<b>317</b>	<b>7</b>	<b>2.21</b>	<b>2.78</b>	<b>1.47</b>	<b>(0.59, 3.04)</b>	<b>506</b>	<b>3.42</b>
Lenox Hill Hospital	2	0	0.00	0.65	0.00	(0.00,100.0)	5	0.00
St. Lukes at St. Lukes	315	7	2.22	2.79	1.48	(0.59, 3.04)	501	3.45
<b>Tortolani A</b>	<b>197</b>	<b>6</b>	<b>3.05</b>	<b>1.67</b>	<b>3.39</b>	<b>(1.24, 7.38)</b>	<b>258</b>	<b>4.44</b>
NY Methodist Hospital	157	3	1.91	1.63	2.17	(0.44, 6.34)	205	3.74
NYP- Weill Cornell	40	3	7.50	1.79	7.76	(1.56,22.69)	53	6.44
<b>Vatsia S</b>	<b>161</b>	<b>3</b>	<b>1.86</b>	<b>1.78</b>	<b>1.95</b>	<b>(0.39, 5.68)</b>	<b>263</b>	<b>3.80</b>
LIJ Medical Center	.	.	.	.	.	( . , . )	1	100.0
North Shore Univ Hosp	161	3	1.86	1.78	1.95	(0.39, 5.68)	262	3.42
<b>Zias E</b>	<b>306</b>	<b>7</b>	<b>2.29</b>	<b>1.58</b>	<b>2.69</b>	<b>(1.08, 5.53)</b>	<b>531</b>	<b>3.20</b>
Mount Sinai Hospital	284	7	2.46	1.59	2.88	(1.15, 5.93)	459	3.34
NYU Hospitals Center	22	0	0.00	1.48	0.00	(0.00,20.95)	72	2.08

<sup>1</sup> St. Vincent's cases discharged in 2009 not included in this table.

\* 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, 2007-2009

Table 7 presents, for each hospital and for each surgeon performing at least 200 cardiac operations in any hospital in 2007 – 2009 and/or performing one or more cardiac operations in each of the years 2007 – 2009, 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 surgery on 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, 2007-2009.

	<b>Isolated CABG</b>	<b>Valve or Valve/CABG</b>	<b>Other Cardiac Surgery</b>	<b>Total Cardiac Surgery</b>
<b>Albany Medical Center</b>				
Britton L	328	155	61	544
Depan H	18	12	2	32
Fuzesi L	286	59	19	364
Miller S	293	161	19	473
All Others	21	18	27	66
<b>Total</b>	<b>946</b>	<b>405</b>	<b>128</b>	<b>1479</b>
<b>Arnot Ogden Med Ctr</b>				
Nast E	190	39	14	243
Raudat C W	210	55	10	275
<b>Total</b>	<b>400</b>	<b>94</b>	<b>24</b>	<b>518</b>
<b>Bellevue Hospital Ctr</b>				
Crooke G	161	63	65	289
Ribakove G	105	118	27	250
Schwartz C F	4	1	5	10
All Others	133	67	34	234
<b>Total</b>	<b>403</b>	<b>249</b>	<b>131</b>	<b>783</b>
<b>Beth Israel Med Ctr</b>				
Geller C M	113	50	8	171
Hoffman D	208	61	12	281
Stelzer P	8	22	9	39
Tranbaugh R	360	203	42	605
All Others	3	1	0	4
<b>Total</b>	<b>692</b>	<b>337</b>	<b>71</b>	<b>1100</b>

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
<b>Buffalo General Hosp</b>				
Ashraf M	5	0	0	5
Grosner G	662	393	57	1112
Lewin A	236	11	9	256
Picone A	160	94	23	277
All Others	0	0	4	4
<b>Total</b>	<b>1063</b>	<b>498</b>	<b>93</b>	<b>1654</b>
<b>Champ.Valley Phys Hosp</b>				
Abbott A E	218	92	21	331
Bennett E	3	0	0	3
Canavan T	28	5	0	33
Depan H	4	0	0	4
Reich H	4	1	0	5
Saifi J	1	1	0	2
Singh C	48	6	2	56
All Others	0	1	0	1
<b>Total</b>	<b>306</b>	<b>106</b>	<b>23</b>	<b>435</b>
<b>Ellis Hospital</b>				
Depan H	266	194	34	494
Reich H	269	104	14	387
Singh C	191	43	4	238
<b>Total</b>	<b>726</b>	<b>341</b>	<b>52</b>	<b>1119</b>
<b>Erie County Med Ctr</b>				
Bell-Thomson J	62	18	2	82
Downing S W	236	22	18	276
Picone A	6	4	1	11
All Others	106	6	28	140
<b>Total</b>	<b>410</b>	<b>50</b>	<b>49</b>	<b>509</b>
<b>Good Sam - Suffern</b>				
Lundy E F	276	140	12	428
Salenger R	288	39	4	331
<b>Total</b>	<b>564</b>	<b>179</b>	<b>16</b>	<b>759</b>
<b>Lenox Hill Hospital</b>				
Ciuffo G B	154	72	23	249
Loulmet D F	25	170	27	222
Patel N C	568	213	35	816
Plestis K A	36	59	104	199
Reddy R C	25	12	16	53
Subramanian V	462	201	46	709
Swistel D	2	3	0	5
All Others	4	1	0	5
<b>Total</b>	<b>1276</b>	<b>731</b>	<b>251</b>	<b>2258</b>

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
<b>Long Island Jewish</b>				
Graver L	215	314	64	593
Manetta F	151	63	26	240
Palazzo R	225	122	20	367
Parnell V	0	1	6	7
Scheinerman S J	192	175	18	385
Vatsia S	0	1	4	5
All Others	0	0	3	3
<b>Total</b>	<b>783</b>	<b>676</b>	<b>141</b>	<b>1600</b>
<b>M I Bassett Hospital</b>				
Kelley J	5	1	0	6
Lancey R A	126	45	5	176
Shortt K G	86	44	6	136
<b>Total</b>	<b>217</b>	<b>90</b>	<b>11</b>	<b>318</b>
<b>Maimonides Medical Ctr</b>				
Abrol S	219	102	85	406
Brevetti G R	6	6	2	14
Genovesi M H	46	15	5	66
Jacobowitz I	391	156	28	575
Lahey S J	36	7	5	48
Saltman A E	12	4	7	23
Stephens G A	72	51	11	134
Vaynblat M	191	100	33	324
All Others	16	10	7	33
<b>Total</b>	<b>989</b>	<b>451</b>	<b>183</b>	<b>1623</b>
<b>Mercy Hospital</b>				
Aldridge J	153	27	3	183
Ashraf M	1	0	0	1
Bell-Thomson J	498	218	56	772
Downing S W	195	24	20	239
All Others	87	10	9	106
<b>Total</b>	<b>934</b>	<b>279</b>	<b>88</b>	<b>1301</b>
<b>Millard Fillmore Hosp</b>				
Aldridge J	149	34	35	218
Ashraf M	693	214	32	939
Jennings L	17	0	1	18
Lewin A	1	0	0	1
Picone A	3	3	2	8
<b>Total</b>	<b>863</b>	<b>251</b>	<b>70</b>	<b>1184</b>

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
<b>Montefiore - Moses</b>				
Bello R A	58	21	8	87
D'Alessandro D A	261	151	65	477
Deanda A	39	24	52	115
Derose J J	93	14	9	116
Goldstein D J	201	145	65	411
Michler R E	110	129	20	259
Weinstein S	0	1	15	16
All Others	8	3	0	11
<b>Total</b>	<b>770</b>	<b>488</b>	<b>234</b>	<b>1492</b>
<b>Montefiore - Weiler</b>				
Bello R A	123	47	11	181
D'Alessandro D A	9	3	1	13
Deanda A	55	23	22	100
Derose J J	238	206	43	487
Goldstein D J	30	14	3	47
Michler R E	20	38	3	61
<b>Total</b>	<b>475</b>	<b>331</b>	<b>83</b>	<b>889</b>
<b>Mount Sinai Hospital</b>				
Adams D H	8	720	76	804
Anyanwu A C	43	48	97	188
Ciuffo G B	59	42	4	105
DiLuozzo G	5	15	59	79
Filsoufi F	213	98	29	340
Griep R	0	30	100	130
Plestis K A	31	81	92	204
Reddy R C	108	66	27	201
Stelzer P	36	123	129	288
Zias E	284	175	30	489
All Others	34	16	63	113
<b>Total</b>	<b>821</b>	<b>1414</b>	<b>706</b>	<b>2941</b>
<b>NY Hospital - Queens</b>				
Adkins M	118	40	8	166
Isom O	1	0	0	1
Lang S	85	26	8	119
Mack C A	45	4	4	53
<b>Total</b>	<b>249</b>	<b>70</b>	<b>20</b>	<b>339</b>
<b>NY Methodist Hospital</b>				
Hedeshian M H	49	3	2	54
Lee L Y	127	94	41	262
Tortolani A	157	48	6	211
<b>Total</b>	<b>333</b>	<b>145</b>	<b>49</b>	<b>527</b>

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
<b>NYP- Columbia Presby.</b>				
Argenziano M	125	222	80	427
Mosca R S	0	2	29	31
Naka Y	272	250	214	736
Oz M	168	251	45	464
Quaegebeur J	0	6	86	92
Smith C	163	503	62	728
Stewart A S	198	318	358	874
Williams M R	110	166	104	380
All Others	1	0	189	190
<b>Total</b>	<b>1037</b>	<b>1718</b>	<b>1167</b>	<b>3922</b>
<b>NYP- Weill Cornell</b>				
Adkins M	2	7	2	11
Chen J M	0	3	28	31
Girardi L	345	527	595	1467
Hedeshian M H	2	0	1	3
Isom O	38	89	10	137
Krieger K	236	383	13	632
Lang S	0	4	2	6
Lee L Y	51	14	7	72
Mack C A	0	2	1	3
Naka Y	2	0	0	2
Salemi A	153	94	20	267
Tortolani A	40	13	2	55
All Others	0	0	2	2
<b>Total</b>	<b>869</b>	<b>1136</b>	<b>683</b>	<b>2688</b>
<b>NYU Hospitals Center</b>				
Colvin S	19	275	27	321
Crooke G	17	20	12	49
Culliford A	98	128	34	260
Galloway A	74	555	74	703
Grossi E	10	18	8	36
Loulmet D F	7	53	10	70
Meyer D B	0	8	9	17
Mosca R S	1	1	7	9
Ribakove G	49	92	22	163
Schwartz C F	80	59	18	157
Zias E	22	50	12	84
All Others	2	6	3	11
<b>Total</b>	<b>379</b>	<b>1265</b>	<b>236</b>	<b>1880</b>

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
<b>North Shore Univ Hosp</b>				
Arnofsky A	135	46	41	222
Esposito R	327	252	44	623
Hall M	255	160	18	433
Hartman A	114	432	106	652
Kalimi R	344	266	45	655
Pogo G	197	149	51	397
Vatsia S	161	101	36	298
<b>Total</b>	<b>1533</b>	<b>1406</b>	<b>341</b>	<b>3280</b>
<b>Rochester General Hosp</b>				
Becker E J	192	41	18	251
Cheeran D	637	339	78	1054
Kirshner R	588	567	63	1218
<b>Total</b>	<b>1417</b>	<b>947</b>	<b>159</b>	<b>2523</b>
<b>SVCMC- St. Vincents</b>				
Crooke G	0	1	1	2
Ko W	25	24	15	64
Lang S	156	62	16	234
Saltman A E	2	1	0	3
Stavropoulos C I	16	5	5	26
All Others	97	82	19	198
<b>Total</b>	<b>296</b>	<b>175</b>	<b>56</b>	<b>527</b>
<b>St. Elizabeth Med Ctr</b>				
El Amir N	193	100	34	327
Joyce F	272	156	19	447
Kelley J	256	128	40	424
<b>Total</b>	<b>721</b>	<b>384</b>	<b>93</b>	<b>1198</b>
<b>St. Francis Hospital</b>				
Bercow N	319	241	20	580
Colangelo R	620	374	37	1031
Fernandez H A	364	151	16	531
Lamendola C	352	220	22	594
Robinson N	465	414	29	908
Taylor J	402	485	45	932
All Others	33	25	3	61
<b>Total</b>	<b>2555</b>	<b>1910</b>	<b>172</b>	<b>4637</b>

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
<b>St. Josephs Hospital</b>				
Green G R	296	221	50	567
Marvasti M	245	261	46	552
Nazem A	377	174	40	591
Rosenberg J	294	195	109	598
Zhou Z	386	175	45	606
<b>Total</b>	<b>1598</b>	<b>1026</b>	<b>290</b>	<b>2914</b>
<b>St. Lukes at St. Lukes</b>				
Balaram S K	116	72	28	216
Swistel D	315	186	41	542
<b>Total</b>	<b>431</b>	<b>258</b>	<b>69</b>	<b>758</b>
<b>St. Peters Hospital</b>				
Bennett E	213	318	42	573
Canavan T	369	71	5	445
Dal Col R	307	203	29	539
Depan H	0	1	0	1
Saifi J	365	255	32	652
<b>Total</b>	<b>1254</b>	<b>848</b>	<b>108</b>	<b>2210</b>
<b>Staten Island Univ Hosp</b>				
McGinn J	667	162	24	853
Nabagiez J P	10	0	2	12
Rosell F M	288	36	26	350
All Others	98	67	11	176
<b>Total</b>	<b>1063</b>	<b>265</b>	<b>63</b>	<b>1391</b>
<b>Strong Memorial Hosp</b>				
Alfieris G	0	5	57	62
Hicks G	302	114	55	471
Knight P	532	433	157	1122
Massey H	210	65	138	413
All Others	0	0	15	15
<b>Total</b>	<b>1044</b>	<b>617</b>	<b>422</b>	<b>2083</b>
<b>United Hlth Svcs-Wilson</b>				
Wong K	291	133	7	431
Yousuf M	260	94	22	376
All Others	43	11	3	57
<b>Total</b>	<b>594</b>	<b>238</b>	<b>32</b>	<b>864</b>

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
<b>Univ. Hosp-Brooklyn</b>				
Brevetti G R	1	3	0	4
Burack J H	22	11	6	39
Genovesi M H	3	0	0	3
Ko W	107	109	25	241
Tak V M	66	47	23	136
All Others	11	9	6	26
<b>Total</b>	<b>210</b>	<b>179</b>	<b>60</b>	<b>449</b>
<b>Univ. Hosp-SUNY Upstate</b>				
Fink G W	176	98	34	308
Lutz C J	316	144	31	491
All Others	0	0	3	3
<b>Total</b>	<b>492</b>	<b>242</b>	<b>68</b>	<b>802</b>
<b>Univ. Hosp-Stony Brook</b>				
Bilfinger T	119	57	28	204
McLarty A	118	55	42	215
Rosengart T	239	278	30	547
Seifert F	328	133	22	483
All Others	10	17	3	30
<b>Total</b>	<b>814</b>	<b>540</b>	<b>125</b>	<b>1479</b>
<b>Vassar Bros. Med Ctr</b>				
Bhutani A K	106	11	1	118
Sarabu M	159	290	62	511
Shahani R	190	82	14	286
Zakow P	224	116	14	354
All Others	1	0	0	1
<b>Total</b>	<b>680</b>	<b>499</b>	<b>91</b>	<b>1270</b>
<b>Westchester Med Ctr</b>				
Fleisher A	137	31	10	178
Lafaro R	302	81	32	415
Lansman S	379	113	17	509
Malekan R	41	14	16	71
Saunders P	1	1	5	7
Spielvogel D	420	254	177	851
All Others	0	0	4	4
<b>Total</b>	<b>1280</b>	<b>494</b>	<b>261</b>	<b>2035</b>



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Table 7 continued

	<b>Isolated CABG</b>	<b>Valve or Valve/CABG</b>	<b>Other Cardiac Surgery</b>	<b>Total Cardiac Surgery</b>
<b>Winthrop Univ. Hosp</b>				
Goncalves J A	373	195	66	634
Kokotos W J	237	149	21	407
Schubach S	260	190	9	459
<b>Total</b>	<b>870</b>	<b>534</b>	<b>96</b>	<b>1500</b>
<b>Statewide Total</b>	<b>32357</b>	<b>21866</b>	<b>7015</b>	<b>61238</b>

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# Criteria Used in Reporting Significant Risk Factors (2009)

Based on Documentation in Medical Records

Patient Risk Factor	Definitions
<b>Hemodynamic State</b>	<b>Determined in the immediate pre-operative period, defined as the period prior to anesthesia taking responsibility for the patient.</b>
<ul style="list-style-type: none"><li>• Unstable</li><li>• Shock</li></ul>	<p>Patient requires pharmacologic or mechanical support to maintain blood pressure or cardiac index.</p> <p>Acute hypotension (systolic blood pressure &lt; 80 mmHg) or low cardiac index (&lt; 2.0 liters/min/m<sup>2</sup>), despite pharmacologic or mechanical support.</p> <p>Records with this risk factor were excluded from all analyses in this report.</p>
<b>Comorbidities</b>	
<ul style="list-style-type: none"><li>• Cerebrovascular Disease</li><li>• COPD</li><li>• Endocarditis</li><li>• Extensive Aortic Atherosclerosis</li><li>• Peripheral Vascular Disease</li><li>• Renal Failure, Creatinine</li><li>• Renal Failure Requiring Dialysis</li></ul>	<p>A history of stroke, with or without residual deficit, angiographic or ultrasound demonstration of at least 50% narrowing in a major cerebral or carotid artery (common or internal), or previous surgery for such disease. A history of bruits or transient ischemic attacks (TIA) is not sufficient evidence of cerebrovascular disease.</p> <p>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<sub>2</sub> &lt;60 or a PCO<sub>2</sub> &gt;50.</p> <p>Two or more positive blood cultures without other obvious source with demonstrated valvular vegetations or acute valvular dysfunction caused by infection.</p> <p>Ascending, transverse, and/or descending aortic atherosclerosis marked by either extensive calcification or luminal atheroma such that the intended surgical procedure is altered.</p> <p>Angiographic demonstration of at least 50% narrowing in a major aortoiliac or femoral/popliteal vessel, previous surgery for such disease, absent femoral or pedal pulses, or the inability to insert a catheter or intra-aortic balloon due to iliac aneurysm or obstruction of the aortoiliac or femoral arteries.</p> <p>Highest pre-operative creatinine during the hospital admission was in the indicated range.</p> <p>The patient is on chronic peritoneal or hemodialysis.</p>

Patient Risk Factor	Definitions
<b>Ventricular Function</b>	
<ul style="list-style-type: none"> <li>• Ejection Fraction</li>   <li>• Previous MI</li> </ul>	<p>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.</p> <p>One or more myocardial infarctions (MI) in the specified time period prior to surgery.</p>
<b>Previous Cardiac Procedures</b>	
<ul style="list-style-type: none"> <li>• Previous Open Heart Operations</li>   <li>• Emergency Transfer to OR Following PCI</li>   <li>• Previous PCI Before this Admission</li> </ul>	<p>Open heart surgery performed prior to the current operating room visit. Minimally invasive procedures are included.</p> <p>The patient requires immediate surgery following a Percutaneous Coronary Intervention (PCI).</p> <p>The patient has had a PCI during this admission, prior to the current cardiac surgery.</p>
<b>Vessels Diseased:</b>	
<ul style="list-style-type: none"> <li>• Left Main Disease</li> </ul>	<p>A blockage of at least 50% in the Left Main coronary artery.</p>

# MEDICAL TERMINOLOGY

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**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. 2007-2009 Risk Factors For Isolated CABG In-Hospital/30-Day Mortality

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The significant pre-procedural risk factors for in-hospital/30-day mortality following isolated CABG in the 2007-2009 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 1.435. This means that a patient with COPD is approximately 1.435 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 1 day prior to surgery; occurring 1 to 20 days prior to surgery; occurring 21 or more days prior to surgery; and no MI 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 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 three ranges: less than 30 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 30 percent is about 2.225 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 50 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 51 years old is approximately 1.055 times that of a 50 year-old patient undergoing CABG, all other risk factors being the same. All patients age 50 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<sup>2</sup>, 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. This functional form is used to improve the model's ability to predict mortality, but it means that the odds ratios for these terms do not have a straightforward interpretation.

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**Appendix 1: Multivariable Risk Factor Equation for CABG In-Hospital / 30-Day Deaths in New York State in 2007-2009**


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Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
<b>Demographic</b>				
Age: Number of years greater than 50	—	0.0533	<.0001	1.055
Female Gender	26.91	0.4422	<.0001	1.556
Body Surface Area (0.1 m <sup>2</sup> )	—	-0.7948	<.0001	—
Body Surface Area – squared (0.01 m <sup>4</sup> )	—	0.0193	<.0001	—
<b>Hemodynamic State</b>				
Unstable	0.98	1.4730	<.0001	4.362
<b>Ventricular Function</b>				
Ejection Fraction				
Ejection Fraction ≥ 40%	80.52	---Reference---		1.000
Ejection Fraction < 30%	8.11	0.7998	<.0001	2.225
Ejection Fraction 30-39%	11.37	0.5026	<.0001	1.653
Previous MI				
No Previous MI	52.96	---Reference---		1.000
Previous MI less than 1 day	2.43	0.7654	0.0006	2.150
Previous MI 1 - 20 days	22.58	0.4213	<.0001	1.524
Previous MI 21 days or more	22.03	0.3260	0.0041	1.385
<b>Comorbidities</b>				
COPD	22.52	0.3615	<.0001	1.435
Extensive Aortic Atherosclerosis	5.11	0.4038	0.0023	1.498
Peripheral Vascular Disease	12.48	0.3095	0.0027	1.363
Renal Failure				
No Renal Failure	73.45	---Reference---		1.000
Renal Failure, Creatinine 1.3 -1.5 mg/dl	14.26	0.4183	0.0004	1.519
Renal Failure, Creatinine 1.6 -2.0 mg/dl	6.61	0.8105	<.0001	2.249
Renal Failure, Creatinine > 2.0 mg/dl	3.17	1.1032	<.0001	3.014
Renal Failure, Dialysis	2.51	1.7530	<.0001	5.772
<b>Previous Cardiac Procedures</b>				
Emergency Transfer to OR Following PCI	0.64	1.1244	<.0001	3.078
Previous Open Heart Operations	3.14	0.6734	<.0001	1.961

Intercept = 1.9038

C Statistic = 0.794

## Appendix 2. 2007-2009 Risk Factors For Valve Surgery In-Hospital/30-Day Mortality

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The significant pre-procedural risk factors for in-hospital/30-day mortality following valve surgery in the 2007-2009 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 Cerebrovascular Disease is 1.474. This means that a patient with Cerebrovascular Disease is approximately 1.474 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 Cerebrovascular Disease 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 1.553 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, 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 Cerebrovascular Disease or does not have it. Age, Ejection Fraction, Previous MI and Renal Failure are interpreted in the same way as previously described.

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**Appendix 2: Multivariable Risk Factor Equation for Valve Surgery In-Hospital / 30-Day Deaths In NYS, 2007-2009.**

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Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
<b>Demographic</b>				
Age: number of years greater than 50	—	0.0475	<.0001	1.049
Female Gender	48.58	0.6074	<.0001	1.836
<b>Type of Valve Surgery</b>				
Aortic Valve Replacement	48.23	--Reference--		1.000
Mitral Valve Replacement	14.62	0.4404	0.0010	1.553
Mitral Valve Repair	17.54	-0.2074	0.2598	0.813
Multiple Valve Repair/Replacement	19.61	0.8315	<.0001	2.297
<b>Hemodynamic State</b>				
Unstable	0.81	1.1288	<.0001	3.092
<b>Ventricular Function</b>				
Ejection Fraction				
Ejection Fraction ≥ 30%	94.02	--Reference--		1.000
Ejection Fraction < 30%	5.98	0.4471	0.0040	1.564
Previous MI				
No Previous MI	87.75	--Reference--		1.000
Previous MI within 7 days	1.10	0.7324	0.0130	2.080
Previous MI 8 days or more	11.15	0.3654	0.0022	1.441
<b>Comorbidities</b>				
Cerebrovascular Disease	12.92	0.3880	0.0005	1.474
Endocarditis	5.09	0.8516	<.0001	2.343
Renal Failure				
No Renal Failure	74.53	--Reference--		1.000
Renal Failure, Creatinine 1.3 -1.5 mg/dl	12.46	0.5549	<.0001	1.742
Renal Failure, Creatinine 1.6 -2.5 mg/dl	8.43	0.8851	<.0001	2.423
Renal Failure, Creatinine > 2.5 mg/dl	1.60	1.2661	<.0001	3.547
Renal Failure, requiring dialysis	2.98	1.9271	<.0001	6.869
<b>Vessels Diseased</b>				
Left Main Disease	0.88	0.8469	0.0029	2.332
<b>Previous Open Heart Operations</b>				
	18.28	0.4482	<.0001	1.566

Intercept = -5.5133

C Statistic = 0.781

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## Appendix 3. 2007-2009 Risk Factors For Valve and CABG Surgery In-Hospital/30-Day Mortality

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The significant pre-procedural risk factors for in-hospital/30-day mortality following valve and CABG surgery in the 2007-2009 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 Endocarditis is 2.288. This means that a patient with Endocarditis is approximately 2.288 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 Endocarditis who has the same other significant risk factors. Female Gender, Unstable, 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 1.747 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, 2007-2009.**

Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
<b>Demographic</b>				
Age: Number of years greater than 70	—	0.0720	<.0001	1.075
Female Gender	37.27	0.3430	0.0015	1.409
Body Surface Area (0.1 m <sup>2</sup> )	—	-0.8682	<.0001	—
Body Surface Area – squared (0.01 m <sup>4</sup> )	—	0.0222	<.0001	—
<b>Type of Valve (with CABG)</b>				
Aortic Valve Replacement	59.56	---Reference---		1.000
Mitral Valve Replacement	10.25	0.5579	<.0001	1.747
Mitral Valve Repair	19.19	-0.1091	0.4529	0.897
Multiple Valve Repair/Replacement	11.00	1.1528	<.0001	3.167
<b>Hemodynamic State</b>				
Unstable	1.33	0.7524	0.0069	2.122
<b>Ventricular Function</b>				
Ejection Fraction				
Ejection Fraction ≥ 30%	87.76	---Reference---		1.000
Ejection Fraction < 30 %	12.24	0.5731	<.0001	1.774
Previous MI				
No MI within 14 days	87.41	---Reference---		1.000
Previous MI within 1 day	0.74	1.0687	0.0054	2.912
Previous MI 1 – 14 days	11.85	0.5135	<.0001	1.671
<b>Comorbidities</b>				
Endocarditis	1.21	0.8279	0.0056	2.288
Peripheral Vascular Disease	13.62	0.5045	<.0001	1.656
Renal Failure				
No Renal Failure	92.15	---Reference---		1.000
Renal Failure, Creatinine 2.1 – 2.5 mg/dl	2.69	0.6621	0.0023	1.939
Renal Failure, Creatinine > 2.5 mg/dl	2.09	1.2332	<.0001	3.432
Renal Failure Requiring Dialysis	3.07	1.6258	<.0001	5.082
<b>Previous Cardiac Procedures</b>				
Previous PCI before this Admission	20.40	0.3672	0.0007	1.444
Previous Open Heart Operations	8.34	0.6543	<.0001	1.924
Left Main Disease	17.44	0.2913	0.0104	1.338
Intercept = 4.1272				
C Statistic = 0.756				

## NEW YORK STATE CARDIAC SURGERY CENTERS

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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

Southside Hospital\*\*  
301 East Main Street  
Bayshore, New York 11706

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

\*\* Began performing cardiac surgery after 2009



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