ADULT CARDIAC SURGERY

in New York State

2000 – 2002

New York State Department of Health
October 2004

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INTRODUCTION

The information contained in this booklet is intended for health care providers, patients and families of patients who are considering cardiac surgery. It provides data on risk factors associated with in-hospital deaths following coronary artery bypass and/or 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 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 Department of Health and the Cardiac Advisory Committee to compile accurate and meaningful data that can and has 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 New York State.

We are pleased to be able to continue to provide expanded information in this year's report that encompasses outcomes for isolated coronary artery bypass surgery (CABG), valve surgery, and the two procedures done in combination. Isolated CABG represents the majority of adult cardiac surgeries performed, and we have reported risk-adjusted outcomes for that procedure for over 10 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.

We encourage doctors to discuss this information with their patients and colleagues as they develop treatment plans. 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 2002. 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 a 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 of cardiac surgery available to New York residents.

CORONARY ARTERY BYPASS GRAFT SURGERY (CABG)

Heart disease is, by far, the leading cause of death in New York State, 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 coronary artery bypass graft (CABG) surgery and percutaneous coronary interventions (PCI).

CABG surgery is 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, 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 blockage, patients should continue to reduce their risk factors for heart disease.

CARDIAC VALVE PROCEDURES

Heart valves control the flow of blood as it enters the heart and is pumped from the chambers of the heart to the lungs for oxygenation and back to the body. There are four valves: the tricuspid, mitral, pulmonic and aortic valves. Heart valve disease occurs when a valve cannot open all the way because of disease or injury, thus causing a decrease in blood flow to the next heart chamber. Another type of valve problem occurs when the valve does not close completely, which leads to blood leaking backwards 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, and 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 HEALTH DEPARTMENT PROGRAM

The New York State 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 New York State Cardiac Advisory Committee (CAC), 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 individual patients' pre-operative conditions.

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

- understanding the health risks of patients which 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;
- providing information to help patients make better decisions about their own care.

PATIENT POPULATION

All patients undergoing isolated coronary artery bypass graft surgery (CABG surgery with no other major heart surgery during the same admission) in New York State hospitals who were discharged in 2002 are included in the one-year results for coronary artery bypass surgery. Similarly, all patients undergoing isolated CABG and/or valve surgery who were discharged between January 1, 2000 and December 31, 2002 are included in the three-year results.

Isolated CABG surgery represented 66.46 percent of all adult cardiac surgery for the three-year period covered by this report. Valve or combined valve/CABG surgery represented 24.73 percent of all adult cardiac surgery for the same three year 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 2000 through 2002.

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 New York State Department of Health adjusts for patient risk in assessing provider outcomes.

Data Collection, Data Validation and Identifying In-Hospital Deaths

As part of the risk-adjustment process, New York State 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 45 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 analysis bases mortality on deaths occurring during the same hospital stay in which a patient underwent cardiac surgery. In the past, the data validation activities have focused on the acute care stay at the surgery center. However, changes in the health

care system have resulted in an increasing number of administrative discharges within the hospital. For example, a patient may be discharged from an acute care bed to a hospice or rehabilitation bed within the same hospital stay in order to differentiate reimbursement for differing levels of care.

In this report, 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.

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.

An 80-year-old patient with a history of a previous stroke, for example, has a very different risk profile than a 40-year-old with no previous stroke.

The statistical analyses conducted by the Department of Health consist of determining which of the risk factors collected are significantly related to in-hospital death for CABG and/or valve surgery, and determining how to weight the significant risk factors to predict the chance each patient will have of dying in the hospital, 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 if 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.

Computing the Risk-Adjusted Rate

The risk-adjusted mortality rate 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 risk-adjusted mortality rate has, to the extent possible, ironed out differences among providers in patient severity of illness, since it arrives at a mortality rate for each provider for an identical group of patients.

To get the risk-adjusted mortality rate, the observed mortality rate is first divided by the provider's expected mortality rate. 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 (2.27% in 2002) to obtain the provider's risk-adjusted rate. For the three year period 2000-2002, the ratio is then multiplied by 2.26% for isolated CABG patients or 6.94% for valve or valve/CABG patients.

Interpreting the Risk-Adjusted Mortality Rate

If the risk-adjusted mortality rate is lower than the statewide mortality rate, the provider has a better performance than the State as a whole; if the risk-adjusted mortality rate is higher than the statewide mortality rate, the provider has a worse performance than the State as a whole.

The risk-adjusted mortality rate 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 risk-adjusted mortality rate 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 risk-adjusted rate 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 have been discovered, hospitals have been required to recode these data and have been subjected to subsequent monitoring.

A final reason that risk-adjusted rates may be misleading is that overall preprocedural severity of illness may not be accurately estimated because important risk factors are missing. This is not considered to be an important factor, however, because the New York State data system contains virtually every risk factor that has ever been demonstrated to be related to patient mortality in national and international studies.

Although there are reasons that risk-adjusted mortality rates 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 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 New York State. Providing the hospitals and cardiac surgeons in New York State 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 CABG 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. It is believed that these same issues and trends will be seen with valve surgery as time goes on.

RESULTS

2002 Risk Factors for CABG Surgery

The significant pre–operative risk factors for coronary artery bypass surgery in 2002 are presented in Table 1.

Roughly speaking, the odds ratio for a risk factor represents the number of times more likely a patient with that risk factor has of dying in the hospital during or after CABG surgery than a patient without the risk factor, all other risk factors being the same. For example, the odds ratio for the risk factor shock is 5.854. This means that a patient who was in shock prior to surgery is approximately 5.854 times as likely to die in the hospital as a patient who was not in shock but who has the same other significant risk factors.

For most of the risk factors in the table, there are only two possibilities: having the risk factor or not having it (for example, a patient either is in shock or is not in shock). Exceptions are age: number of years greater than 60 and ejection fraction, which is a measure of the heart's ability to pump blood.

For age, the odds ratio roughly represents the number of times more likely a patient who is older than 60 is to die in the hospital than a patient who is one year younger. Thus, a patient undergoing CABG surgery

who is 72 years old has a chance of dying that is approximately 1.077 times the chance that a patient 71 years old undergoing CABG has of dying in the hospital.

The odds ratios for the categories for ejection fraction are relative to the omitted range (40% and higher). Thus, patients with an ejection fraction of less than 20% have odds of dying in the hospital that are 4.727 times the odds of a person with an ejection fraction of 40% or higher, all other risk factors being the same.

Table 1: Multivariable risk factor equation for CABG hospital deaths in New York State in 2002.

		Logistic Regression		
Patient Risk Factor	**Prevalence (%)**	**Coefficient**	**P-Value**	**Odds Ratio**
Demographic				
Age: Number of years greater than 60	—	0.0741	< .0001	1.077
Female Gender	28.67	0.7405	< .0001	2.097
Hemodynamic State				
Unstable	0.95	0.7669	0.0135	2.153
Shock	0.48	1.7672	< .0001	5.854
Ventricular Function				
Ejection Fraction <20%	1.93	1.5534	< .0001	4.727
Ejection Fraction 20-29%	6.87	1.0189	< .0001	2.770
Ejection Fraction 30-39%	13.29	0.5774	< .0001	1.781
Previous MI < 6 hours	0.69	1.9768	< .0001	7.220
Previous MI 6-23 hours	0.94	1.3786	< .0001	3.969
Previous MI 1-20 days	22.33	0.4979	< .0001	1.645
Comorbidities				
COPD	16.50	0.4748	< .0001	1.608
Extensively Calcified Aorta	4.84	0.7360	< .0001	2.087
Peripheral Vascular Disease	11.22	0.5614	< .0001	1.753
Renal Failure, Dialysis	1.63	1.7190	< .0001	5.579
Previous Open Heart Operations	4.93	1.1671	< .0001	3.213

Intercept = -5.8183

C Statistic = 0.823

2002 HOSPITAL OUTCOMES FOR CABG

Table 2 presents the CABG surgery results for the 36 hospitals performing this operation in New York during the year 2002. The table contains, for each hospital, the number of isolated CABG operations (CABG operations with no other major heart surgery) resulting in 2002 discharges, the number of in-hospital deaths, the observed mortality rate, the expected mortality rate based on the statistical model presented in Table 1, the risk-adjusted mortality rate, and a 95% confidence interval for the risk-adjusted mortality rate.

As indicated in Table 2, the overall mortality rate for the 16,120 CABG procedures performed at the 36 hospitals was 2.27%. Observed mortality rates ranged from 0.00% to 5.21%. The range of expected mortality rates, which measure patient severity of illness, was 0.84% to 3.18%.

The risk-adjusted mortality rates, which are used to measure performance, ranged from 0.00% to 4.86%. Three hospitals (Buffalo General, Mount Sinai and NYU Hospitals Center) had risk-adjusted mortality rates that were significantly higher than the statewide rate. Three hospitals (St. Joseph's, Staten Island – North and Vassar Brothers Hospital) had significantly lower risk-adjusted rates than the State.

2000 - 2002 HOSPITAL OUTCOMES

Table 3 presents the combined Valve Only and Valve/CABG surgery results for the 36 hospitals performing these operations in New York during the years 2000-2002. The table contains, for each hospital, the number of combined Valve Only and Valve/CABG operations resulting in 2000-2002 discharges, the number of in-hospital deaths, the observed mortality rate, the expected mortality rate based on the statistical models presented in Appendices 2-3, the risk-adjusted mortality rate, and a 95% confidence interval for the risk-adjusted mortality rate.

As indicated in Table 3, the overall mortality rate for the 19,057 combined Valve Only and Valve/CABG procedures performed at the 36 hospitals was 6.94%. Observed mortality rates ranged from 0.00% to 11.39%. The range of expected mortality rates, which measure patient severity of illness, was 2.87% to 8.86%.

The risk-adjusted mortality rates, which are used to measure performance, ranged from 0.00% to 11.43%. Two hospitals (Lenox Hill and Strong Memorial Hospital) had risk-adjusted mortality rates that were significantly higher than the statewide rate. Four hospitals (St. Francis Hospital, St. Peter's Hospital, Vassar Brother's Hospital and Weill Cornell – NY Presbyterian Hospital) had significantly lower risk-adjusted rates than the State.

Table 4 presents valve procedures performed at the 36 cardiac surgery hospitals in New York during 2000-2002. The table contains, for each hospital, the number of valve operations (as defined by eight separate groups: Aortic Valve Replacements, Aortic Valve Replacements plus CABG, Mitral Valve Replacement, Mitral Valve Replacement plus CABG, Mitral Valve Repair, Mitral Valve Repair plus CABG, Multiple Valve Surgery, Multiple Valve Surgery plus CABG) resulting in 2000-2002 discharges. In addition to the hospital volumes, the number of in-hospital deaths 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.

Definitions of key terms are as follows:

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

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 observed mortality rate by the expected mortality rate, and then multiplying by the relevant statewide mortality rate (for example 2.26% for isolated CABG patients in 2000-2002 or 6.94% for Valve or Valve/CABG patients in 2000-2002).

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 risk-adjusted mortality rate 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 the entire confidence interval range 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: Observed, Expected, and Risk-Adjusted Mortality Rates (RAMR) for isolated CABG Surgery in New York State, 2002 Discharges (Listed Alphabetically by Hospital)

Hospital	Cases	Deaths	OMR	EMR	RAMR	95% CI for RAMR
Albany Medical Center	601	15	2.50	2.00	2.83	(1.58, 4.67)
Arnot-Ogden	152	2	1.32	1.76	1.70	(0.19, 6.13)
Bellevue	78	0	0.00	0.84	0.00	(0.00,12.76)
Beth Israel	380	7	1.84	1.86	2.25	(0.90, 4.64)
Buffalo General	663	26	3.92	1.91	4.67 *	(3.05, 6.85)
Columbia Presbyterian	522	10	1.92	1.81	2.40	(1.15, 4.41)
Ellis Hospital	395	9	2.28	1.57	3.29	(1.50, 6.24)
Erie County	269	4	1.49	1.93	1.75	(0.47, 4.47)
LIJ Medical Center	290	3	1.03	2.14	1.10	(0.22, 3.20)
Lenox Hill	642	12	1.87	2.10	2.02	(1.04, 3.53)
Maimonides	704	24	3.41	3.18	2.44	(1.56, 3.62)
Mercy Hospital	113	4	3.54	2.16	3.72	(1.00, 9.53)
Millard Fillmore	456	6	1.32	1.81	1.65	(0.60, 3.60)
Montefiore - Einstein	283	2	0.71	2.08	0.77	(0.09, 2.79)
Montefiore - Moses	300	8	2.67	2.00	3.02	(1.30, 5.96)
Mount Sinai	301	11	3.65	1.71	4.86 *	(2.42, 8.70)
NY Hospital - Queens	312	3	0.96	1.71	1.28	(0.26, 3.74)
NYU Hospitals Center	307	16	5.21	2.75	4.31 *	(2.46, 6.99)
North Shore	728	17	2.34	2.51	2.11	(1.23, 3.38)
Rochester General	544	13	2.39	2.90	1.87	(1.00, 3.20)
St. Elizabeth	431	16	3.71	2.20	3.83	(2.19, 6.21)
St. Francis	1592	45	2.83	2.51	2.56	(1.87, 3.42)
St. Josephs	614	6	0.98	2.48	0.90 **	(0.33, 1.95)
St. Lukes-Roosevelt	230	7	3.04	2.38	2.90	(1.16, 5.98)
St. Peters	620	5	0.81	1.74	1.05	(0.34, 2.46)
St. Vincents	322	8	2.48	2.72	2.07	(0.89, 4.08)
Staten Island - North	497	4	0.80	2.23	0.82 **	(0.22, 2.10)
Strong Memorial	352	8	2.27	2.95	1.75	(0.75, 3.45)
United Health Services	322	7	2.17	2.75	1.79	(0.72, 3.69)
Univ Hosp-Stony Brook	538	10	1.86	1.92	2.20	(1.05, 4.05)
Univ. Hosp. - Upstate	364	8	2.20	2.78	1.80	(0.77, 3.54)
Univ. Hosp. of Brooklyn	117	2	1.71	1.44	2.69	(0.30, 9.73)
Vassar Brothers	217	0	0.00	2.27	0.00 **	(0.00, 1.69)
Weill Cornell-NYP	743	14	1.88	2.01	2.13	(1.16, 3.57)
Westchester Med. Ctr.	601	16	2.66	2.63	2.30	(1.31, 3.73)
Winthrop Univ. Hosp.	520	18	3.46	2.83	2.78	(1.64, 4.39)
Total	**16120**	**366**	**2.27**	**2.27**	**2.27**	

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

** Risk-adjusted mortality rate significantly lower than statewide rate based on 95% confidence interval.

Table 3: Valve or Valve/CABG Surgery Observed, Expected, and Risk-Adjusted Mortality Rates in New York State, 2000-2002 Discharges.

Hospital	Cases	Deaths	OMR	EMR	RAMR	95% CI for RAMR
Albany Medical Center	541	31	5.73	6.27	6.34	(4.30, 8.99)
Arnot-Ogden	62	0	0.00	3.48	0.00	(0.00,11.80)
Bellevue	70	1	1.43	2.87	3.45	(0.05,19.22)
Beth Israel	470	32	6.81	8.01	5.90	(4.03, 8.33)
Buffalo General	466	32	6.87	5.37	8.88	(6.07,12.53)
Columbia Presbyterian	1097	71	6.47	5.76	7.79	(6.08, 9.83)
Ellis Hospital	350	20	5.71	6.04	6.57	(4.01,10.14)
Erie County	95	3	3.16	5.32	4.12	(0.83,12.03)
LIJ Medical Center	452	34	7.52	7.27	7.18	(4.97,10.03)
Lenox Hill	746	73	9.79	7.11	9.54 *	(7.48,12.00)
Maimonides	613	62	10.11	8.07	8.70	(6.67,11.15)
Mercy Hospital	16	1	6.25	4.15	10.46	(0.14,58.19)
Millard Fillmore	237	20	8.44	5.63	10.40	(6.35,16.07)
Montefiore - Einstein	296	23	7.77	6.77	7.96	(5.04,11.95)
Montefiore - Moses	373	26	6.97	6.33	7.64	(4.99,11.20)
Mount Sinai	541	36	6.65	6.76	6.83	(4.78, 9.45)
NY Hospital - Queens	257	11	4.28	6.48	4.58	(2.28, 8.20)
NYU Hospitals Center	1465	100	6.83	6.27	7.55	(6.14, 9.18)
North Shore	936	81	8.65	7.88	7.61	(6.05, 9.46)
Rochester General	740	59	7.97	7.55	7.33	(5.58, 9.45)
St. Elizabeth	295	21	7.12	6.81	7.25	(4.48,11.08)
St. Francis	1929	114	5.91	7.60	5.39 **	(4.45, 6.48)
St. Josephs	800	45	5.63	7.19	5.43	(3.96, 7.26)
St. Lukes-Roosevelt	273	18	6.59	6.60	6.93	(4.11,10.96)
St. Peters	770	24	3.12	6.02	3.59 **	(2.30, 5.34)
St. Vincents	320	36	11.25	7.94	9.83	(6.88,13.60)
Staten Island - North	128	5	3.91	6.41	4.23	(1.36, 9.86)
Strong Memorial	588	67	11.39	6.92	11.43 *	(8.85,14.51)
United Health Services	255	17	6.67	6.33	7.30	(4.25,11.69)
Univ Hosp-Stony Brook	397	37	9.32	6.78	9.54	(6.71,13.15)
Univ. Hosp. - Upstate	395	35	8.86	8.07	7.62	(5.30,10.59)
Univ. Hosp. of Brooklyn	179	15	8.38	6.14	9.46	(5.29,15.60)
Vassar Brothers	205	3	1.46	6.96	1.46 **	(0.29, 4.26)
Weill Cornell-NYP	1216	58	4.77	6.40	5.17 **	(3.92, 6.68)
Westchester Med. Ctr.	642	49	7.63	7.55	7.01	(5.19, 9.27)
Winthrop Univ. Hosp.	842	62	7.36	8.86	5.76	(4.42, 7.39)
Total	**19057**	**1322**	**6.94**	**6.94**	**6.94**	

* Risk-adjusted mortality rate significantly higher than statewide rate based on 95% confidence interval.
** Risk-adjusted mortality rate significantly lower than statewide rate based on 95% confidence interval.

Table 4: Volume for Valve Procedures in New York State, 2000-2002 Discharges

Hospital	Aortic Valve Replace Surgery	Aortic Valve and CABG	Mitral Valve Replace Surgery	Mitral Replace and CABG	Mitral Valve Repair Surgery	Mitral Repair and CABG	Multiple Valve Replace Surgery	Multiple Valve and CABG	Total Valve or Valve/ CABG
Albany Medical Center	122	203	37	37	18	65	30	29	541
Arnot-Ogden	26	21	3	2	5	4	1	0	62
Bellevue	25	3	11	0	9	1	21	0	70
Beth Israel	86	101	54	57	32	39	67	34	470
Buffalo General	136	133	43	40	42	38	19	15	466
Columbia Presbyterian-NYP	315	239	107	54	140	110	102	30	1097
Ellis Hospital	76	125	26	22	29	46	13	13	350
Erie County	25	35	19	9	1	1	4	1	95
LIJ Medical Center	81	110	75	38	40	47	29	32	452
Lenox Hill	162	122	75	52	109	121	70	35	746
Maimonides	161	156	65	49	28	62	67	25	613
Mercy Hospital	6	6	1	0	0	2	1	0	16
Millard Fillmore	64	81	19	18	15	23	9	8	237
Montefiore - Einstein	56	53	69	40	17	18	35	8	296
Montefiore - Moses	95	85	57	35	17	23	53	8	373
Mount Sinai	119	90	78	37	58	49	84	26	541
NYU Hospitals Center	411	180	160	60	364	73	166	51	1465
New York Hospital - Queens	65	60	33	21	10	42	17	9	257
North Shore	272	230	134	126	31	47	65	31	936
Rochester General	224	198	85	60	46	59	48	20	740
St. Elizabeth	56	94	22	17	25	47	21	13	295
St. Francis	532	553	208	172	80	109	183	92	1929
St. Josephs	219	249	85	80	44	38	53	32	800
St. Lukes-Roosevelt	55	59	34	19	25	40	30	11	273
St. Peters	209	207	96	72	45	71	41	29	770
St. Vincents	87	63	48	43	6	21	34	18	320
Staten Island - North	21	47	25	21	7	3	2	2	128
Strong Memorial	181	136	54	35	45	59	54	24	588
United Health Services	92	91	27	20	10	3	6	6	255
Univ. Hosp. - Stony Brook	102	105	39	41	34	46	19	11	397
Univ. Hosp. - Upstate	82	108	40	36	26	43	45	15	395
Univ. Hosp. of Brooklyn	33	20	33	12	12	36	28	5	179
Vassar Brothers	41	62	31	28	4	27	4	8	205
Weill Cornell-NYP	331	263	206	102	82	51	116	65	1216
Westchester Medical Center	174	175	64	48	38	76	41	26	642
Winthrop Univ. Hosp.	201	241	76	84	19	128	64	29	842
Total	**4943**	**4704**	**2239**	**1587**	**1513**	**1668**	**1642**	**761**	**19057**
State-wide Mortality Rate (%)	**3.54**	**6.27**	**6.79**	**13.93**	**1.65**	**9.95**	**9.07**	**18.27**	**6.94**

2000 – 2002 HOSPITAL AND SURGEON OUTCOMES

Table 5 provides the number of Isolated CABG operations, number of CABG patients who died in the hospital, observed mortality rate, expected mortality rate, risk-adjusted mortality rate, the 95% confidence interval for the risk-adjusted mortality rate for isolated CABG patients in 2000-2002. In addition, the final two columns provide the number of Isolated CABG or Valve or Valve/CABG procedures and the risk-adjusted mortality rate for these patients in 2000-2002 for each of the 36 hospitals performing these operations during the time period. In addition, surgeons and hospitals with risk-adjusted mortality rates that are significantly lower or higher than the statewide mortality rate (as judged by the 95% confidence interval) are also noted.

The hospital information is presented for each surgeon who (a) performed 200 or more cardiac operations during 2000-2002, and/or (b) who performed at least one cardiac operation in each of the years 2000-2002. A cardiac operation is defined as any reportable cardiac operation and may include cases not listed in Tables 5 or 6.

The results for surgeons not meeting 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 2000-2002 are noted in Table 5 and listed under hospitals in which they performed these operations.

Also, surgeons who met criterion (a) and/or criterion (b) above and have performed isolated CABG or Valve or Valve/CABG operations in two or more New York State 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: Surgeon Isolated CABG and Valve Surgery (done in combination with or without CABG) Observed, Expected, and Risk-Adjusted Mortality Rates in NYS, 2000 - 2002

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
STATEWIDE TOTAL	**51224**	**1157**	**2.26**	**2.26**	**2.26**		**70281**	**3.53**
Albany Medical Center								
Britton L	339	8	2.36	1.58	3.37	(1.45, 6.65)	477	3.53
##Canavan T	372	6	1.61	1.52	2.39	(0.87, 5.20)	435	4.29
Canver C	259	10	3.86	2.08	4.20	(2.01, 7.72)	340	4.62
#Dal Col R	3	0	0.00	0.59	0.00	(0.00,100.0)	3	0.00
#Depan H	4	0	0.00	1.24	0.00	(0.00,100.0)	10	0.00
Devejian N	0	0	0.00	0.00	0.00	(0.00, 0.00)	8	10.58
#Kelley J	231	6	2.60	1.71	3.42	(1.25, 7.45)	327	3.62
##Miller S	446	12	2.69	2.20	2.76	(1.43, 4.82)	545	3.96
##Saifi J	4	0	0.00	1.24	0.00	(0.00,100.0)	4	0.00
#Sardella G	83	4	4.82	1.84	5.90	(1.59,15.12)	106	5.01
All Others	87	2	2.30	1.78	2.92	(0.33,10.53)	114	6.13
TOTAL	**1828**	**48**	**2.63**	**1.83**	**3.25 ***	**(2.39, 4.31)**	**2369**	**4.14**
Arnot-Ogden								
Curiale S V	196	3	1.53	1.58	2.19	(0.44, 6.40)	235	2.49
#Nast E	133	0	0.00	1.89	0.00	(0.00, 3.29)	152	0.00
Zama N	38	0	0.00	1.55	0.00	(0.00,14.09)	42	0.00
All Others	1	0	0.00	0.76	0.00	(0.00,100.0)	1	0.00
TOTAL	**368**	**3**	**0.82**	**1.69**	**1.09**	**(0.22, 3.19)**	**430**	**1.27**

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
Bellevue								
Glassman L	6	0	0.00	1.40	0.00	(0.00,98.62)	6	0.00
#Grossi E	18	0	0.00	1.06	0.00	(0.00,43.35)	27	0.00
#Ribakove G	27	0	0.00	1.14	0.00	(0.00,26.95)	63	2.50
All Others	90	0	0.00	0.88	0.00	(0.00,10.43)	115	0.00
TOTAL	**141**	**0**	**0.00**	**0.98**	**0.00**	**(0.00, 6.02)**	**211**	**1.04**
Beth Israel								
#Geller C	198	2	1.01	1.93	1.18	(0.13, 4.26)	233	3.81
Harris L	312	4	1.28	2.20	1.32	(0.35, 3.37)	380	2.51
#Hoffman D	123	0	0.00	1.90	0.00	(0.00, 3.55)	154	1.53
#Stelzer P	52	2	3.85	1.88	4.62	(0.52,16.69)	231	1.96
#Tranbaugh R	551	12	2.18	1.95	2.53	(1.30, 4.41)	701	3.78
All Others	17	1	5.88	1.18	11.27	(0.15,62.71)	24	9.31
TOTAL	**1253**	**21**	**1.68**	**1.99**	**1.90**	**(1.18, 2.91)**	**1723**	**2.99**
Buffalo General								
#Aldridge J	1	0	0.00	1.27	0.00	(0.00,100.0)	1	0.00
#Ashraf M	15	0	0.00	1.07	0.00	(0.00,51.54)	18	0.00
#Bergsland J	166	10	6.02	3.15	4.32	(2.07, 7.94)	195	5.91
Grosner G	705	9	1.28	1.94	1.49	(0.68, 2.82)	1000	2.97
##Karamanoukian H	327	15	4.59	2.52	4.12 *	(2.30, 6.79)	346	6.50 *
##Kerr P	7	0	0.00	0.95	0.00	(0.00,100.0)	9	17.12
##Lajos T	77	4	5.19	1.87	6.28	(1.69,16.08)	80	8.95
#Levinsky L	161	11	6.83	2.08	7.44 *	(3.71,13.31)	165	11.16 *
#Lewin A	445	13	2.92	1.82	3.62	(1.93, 6.19)	450	6.72 *
#Raza S	414	13	3.14	2.03	3.49	(1.86, 5.98)	497	5.31
All Others	12	0	0.00	1.07	0.00	(0.00,64.70)	35	2.80
TOTAL	**2330**	**75**	**3.22**	**2.09**	**3.47 ***	**(2.73, 4.35)**	**2796**	**5.11 ***
Columbia Presbyterian-NYP								
Edwards N	231	1	0.43	2.29	0.43	(0.01, 2.38)	343	1.85
Esrig B	4	0	0.00	5.18	0.00	(0.00,39.96)	8	5.95
Mosca R S	1	0	0.00	2.21	0.00	(0.00,100.0)	12	10.18
Naka Y	263	9	3.42	2.34	3.30	(1.50, 6.26)	381	5.75 *
Oz M	569	11	1.93	1.93	2.26	(1.13, 4.05)	912	3.99
Quaegebeur J	1	0	0.00	1.13	0.00	(0.00,100.0)	13	8.04
Rose E	58	4	6.90	1.34	11.60 *	(3.12,29.70)	114	4.14
Scott R	1	0	0.00	0.30	0.00	(0.00,100.0)	1	0.00
Smith C	451	12	2.66	1.44	4.18	(2.16, 7.31)	861	4.25
All Others	66	4	6.06	1.98	6.92	(1.86,17.72)	97	5.39
TOTAL	**1645**	**41**	**2.49**	**1.90**	**2.96**	**(2.13, 4.02)**	**2742**	**4.18**

Table 5 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Ellis Hospital								
Afifi A	403	12	2.98	1.36	4.93 *	(2.54, 8.61)	457	6.60 *
##Canavan T	2	0	0.00	2.48	0.00	(0.00,100.0)	2	0.00
#Depan H	397	16	4.03	2.31	3.94	(2.25, 6.39)	573	5.39 *
##Miller S	5	0	0.00	2.26	0.00	(0.00,73.36)	5	0.00
Reich H	375	7	1.87	1.81	2.32	(0.93, 4.79)	461	2.56
##Saifi J	104	4	3.85	2.48	3.50	(0.94, 8.96)	136	2.59
All Others	14	0	0.00	2.65	0.00	(0.00,22.33)	16	0.00
TOTAL	**1300**	**39**	**3.00**	**1.89**	**3.58 ***	**(2.55, 4.89)**	**1650**	**4.55**
Erie County								
Bell-Thomson J	313	5	1.60	1.96	1.84	(0.59, 4.29)	390	2.43
Datta S	273	1	0.37	1.75	0.47	(0.01, 2.63)	283	0.67
##Karamanoukian H	0	0	0.00	0.00	0.00	(0.00, 0.00)	1	0.00
##Kerr P	2	0	0.00	0.43	0.00	(0.00,100.0)	2	0.00
##Lajos T	6	0	0.00	3.76	0.00	(0.00,36.71)	7	7.39
All Others	50	0	0.00	1.60	0.00	(0.00,10.34)	56	0.00
TOTAL	**644**	**6**	**0.93**	**1.86**	**1.13**	**(0.41, 2.47)**	**739**	**1.87**
LIJ Medical Center								
Graver L	552	8	1.45	2.16	1.52	(0.65, 2.99)	873	3.22
Kline G	45	2	4.44	1.61	6.24	(0.70,22.55)	58	9.83
Palazzo R	389	3	0.77	1.86	0.94	(0.19, 2.73)	507	2.25
#Vatsia S	2	0	0.00	1.46	0.00	(0.00,100.0)	2	0.00
TOTAL	**988**	**13**	**1.32**	**2.01**	**1.48**	**(0.78, 2.52)**	**1440**	**3.14**
Lenox Hill								
Connolly M	693	10	1.44	2.26	1.44	(0.69, 2.65)	929	3.03
Fonger J D	98	3	3.06	2.78	2.49	(0.50, 7.27)	112	4.57
##Genovesi M	36	0	0.00	2.11	0.00	(0.00,10.93)	40	2.85
Loulmet D F	69	1	1.45	1.28	2.56	(0.03,14.23)	364	3.89
McCabe J	47	0	0.00	1.82	0.00	(0.00, 9.68)	62	1.94
Patel N	171	1	0.58	1.51	0.87	(0.01, 4.86)	182	2.30
Subramanian V	888	22	2.48	2.51	2.23	(1.40, 3.38)	1059	4.82 *
All Others	1	0	0.00	1.85	0.00	(0.00,100.0)	1	0.00
TOTAL	**2003**	**37**	**1.85**	**2.28**	**1.83**	**(1.29, 2.52)**	**2749**	**3.93**
Maimonides								
Acinapura A	127	2	1.57	1.97	1.80	(0.20, 6.50)	165	2.98
#Anderson J	36	3	8.33	3.35	5.62	(1.13,16.42)	44	6.07
#Burack J	2	0	0.00	0.73	0.00	(0.00,100.0)	3	0.00
Cunningham J N	172	9	5.23	2.39	4.94	(2.25, 9.38)	229	6.59 *

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
Maimonides *continued*								
##Genovesi M	24	4	16.67	3.99	9.44 *	(2.54,24.17)	26	13.90 *
#Jacobowitz I	992	21	2.12	2.99	1.60	(0.99, 2.45)	1270	3.16
#Ketosugbo A	5	0	0.00	0.58	0.00	(0.00,100.0)	6	0.00
Lazzaro R	9	0	0.00	2.37	0.00	(0.00,38.83)	11	0.00
##Molinaro P J	18	1	5.56	2.29	5.47	(0.07,30.44)	21	7.18
##Reddy R C	19	1	5.26	1.55	7.66	(0.10,42.62)	21	7.43
#Sabado M	122	6	4.92	4.08	2.72	(0.99, 5.92)	174	4.12
Vaynblat M	261	3	1.15	2.59	1.00	(0.20, 2.93)	312	1.51
Zisbrod Z	455	13	2.86	2.63	2.45	(1.30, 4.19)	554	5.15
All Others	98	1	1.02	3.54	0.65	(0.01, 3.62)	117	3.18
TOTAL	**2340**	**64**	**2.74**	**2.84**	**2.17**	**(1.67, 2.77)**	**2953**	**3.83**
Mercy Hospital								
All Others	113	4	3.54	2.16	3.70	(0.99, 9.46)	129	5.67
TOTAL	**113**	**4**	**3.54**	**2.16**	**3.70**	**(0.99, 9.46)**	**129**	**5.67**
Millard Fillmore								
#Aldridge J	364	8	2.20	2.26	2.20	(0.95, 4.34)	422	3.10
#Ashraf M	687	4	0.58	1.75	0.75 **	(0.20, 1.93)	806	2.06
#Bergsland J	25	1	4.00	3.22	2.81	(0.04,15.61)	28	3.76
Jennings L	256	1	0.39	1.84	0.48	(0.01, 2.67)	277	2.46
##Karamanoukian H	4	1	25.00	3.83	14.73	(0.19,81.96)	4	23.00
##Kerr P	153	6	3.92	2.52	3.51	(1.28, 7.65)	187	7.61 *
##Lajos T	1	0	0.00	0.73	0.00	(0.00,100.0)	1	0.00
#Levinsky L	26	0	0.00	1.21	0.00	(0.00,26.33)	26	0.00
#Lewin A	10	0	0.00	0.93	0.00	(0.00,89.00)	10	0.00
#Raza S	16	0	0.00	1.88	0.00	(0.00,27.50)	18	0.00
All Others	71	4	5.63	1.95	6.52	(1.75,16.69)	71	10.18
TOTAL	**1613**	**25**	**1.55**	**1.97**	**1.77**	**(1.15, 2.62)**	**1850**	**3.51**
Montefiore - Einstein								
#Camacho M	1	0	0.00	2.16	0.00	(0.00,100.0)	12	7.67
#Frymus M	357	3	0.84	2.15	0.88	(0.18, 2.59)	441	3.09
#Gold J	53	0	0.00	0.78	0.00	(0.00,19.93)	87	0.00
#Merav A	1	0	0.00	1.38	0.00	(0.00,100.0)	1	0.00
#Plestis K A	292	2	0.68	2.10	0.74	(0.08, 2.66)	416	2.57
##Tortolani A	127	7	5.51	1.94	6.41 *	(2.57,13.20)	159	7.69 *
All Others	4	1	25.00	9.88	5.72	(0.07,31.81)	15	5.04
TOTAL	**835**	**13**	**1.56**	**2.05**	**1.72**	**(0.91, 2.94)**	**1131**	**3.42**

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
Montefiore - Moses								
Attai L	217	2	0.92	1.27	1.64	(0.18, 5.93)	308	1.69
#Camacho M	220	1	0.45	1.85	0.56	(0.01, 3.09)	306	3.42
Crooke G	0	0	0.00	0.00	0.00	(0.00, 0.00)	1	0.00
#Frymus M	1	0	0.00	1.16	0.00	(0.00,100.0)	1	0.00
#Gold J	157	0	0.00	1.72	0.00	(0.00, 3.06)	214	2.47
#Merav A	232	8	3.45	1.79	4.36	(1.88, 8.59)	332	4.75
#Plestis K A	67	0	0.00	1.66	0.00	(0.00, 7.46)	91	1.19
##Tortolani A	1	0	0.00	2.72	0.00	(0.00,100.0)	2	0.00
All Others	29	4	13.79	2.63	11.85 *	(3.19,30.35)	42	17.49 *
TOTAL	**924**	**15**	**1.62**	**1.69**	**2.18**	**(1.22, 3.59)**	**1297**	**3.69**
Mount Sinai								
Galla J	191	12	6.28	2.17	6.54 *	(3.38,11.43)	284	6.47 *
Griepp R	29	0	0.00	1.74	0.00	(0.00,16.38)	79	2.85
Lansman S	256	11	4.30	2.76	3.51	(1.75, 6.28)	352	4.97
Nguyen K	1	0	0.00	14.03	0.00	(0.00,59.07)	2	0.00
Spielvogel D	352	10	2.84	2.19	2.93	(1.40, 5.39)	504	3.35
All Others	200	8	4.00	1.59	5.70 *	(2.45,11.23)	349	5.09
TOTAL	**1029**	**41**	**3.98**	**2.21**	**4.07 ***	**(2.92, 5.52)**	**1570**	**4.58 ***
NYU Hospitals Center								
Colvin S	69	0	0.00	2.50	0.00	(0.00, 4.80)	657	3.92
Culliford A	304	11	3.62	3.14	2.60	(1.30, 4.66)	507	3.63
#Esposito R	247	5	2.02	2.61	1.75	(0.56, 4.08)	378	3.51
Galloway A	177	10	5.65	2.41	5.29 *	(2.53, 9.73)	475	4.25
#Grossi E	99	6	6.06	4.06	3.38	(1.23, 7.35)	161	5.35
#Ribakove G	233	4	1.72	2.64	1.47	(0.39, 3.75)	378	3.12
All Others	80	4	5.00	2.81	4.02	(1.08,10.30)	118	6.35
TOTAL	**1209**	**40**	**3.31**	**2.85**	**2.62**	**(1.88, 3.57)**	**2674**	**3.91**
New York Hospital - Queens								
Aronis M	378	6	1.59	1.57	2.28	(0.83, 4.97)	474	2.86
#Ko W	573	5	0.87	1.71	1.15	(0.37, 2.68)	715	2.34
##Tortolani A	79	1	1.27	2.71	1.05	(0.01, 5.87)	98	0.98
All Others	1	0	0.00	0.30	0.00	(0.00,100.0)	1	0.00
TOTAL	**1031**	**12**	**1.16**	**1.74**	**1.51**	**(0.78, 2.65)**	**1288**	**2.35****
North Shore								
#Esposito R	64	3	4.69	3.47	3.05	(0.61, 8.92)	81	2.67
Hall M	733	13	1.77	2.74	1.46	(0.78, 2.50)	1041	2.68
#Hartman A	55	2	3.64	2.62	3.13	(0.35,11.32)	122	6.47

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
North Shore *continued*								
Levy M	372	5	1.34	1.92	1.58	(0.51, 3.68)	527	4.46
Pogo G	707	15	2.12	2.27	2.11	(1.18, 3.48)	978	3.90
#Vatsia S	286	3	1.05	2.44	0.97	(0.19, 2.83)	402	1.58 **
All Others	0	0	0.00	0.00	0.00	(0.00, 0.00)	2	0.00
TOTAL	**2217**	**41**	**1.85**	**2.43**	**1.72**	**(1.23, 2.33)**	**3153**	**3.37**
Rochester General								
Cheeran D	768	21	2.73	2.90	2.13	(1.32, 3.26)	1025	3.35
Kirshner R	665	14	2.11	2.77	1.72	(0.94, 2.88)	920	3.22
#Knight P	447	9	2.01	3.19	1.42	(0.65, 2.70)	650	3.17
All Others	124	4	3.23	2.09	3.49	(0.94, 8.93)	149	4.78
TOTAL	**2004**	**48**	**2.40**	**2.87**	**1.88**	**(1.39, 2.50)**	**2744**	**3.33**
St. Elizabeth								
Carr T	345	9	2.61	2.14	2.75	(1.25, 5.22)	383	4.19
Hatton P	249	12	4.82	2.68	4.06	(2.10, 7.10)	312	4.72
Joyce F	445	16	3.60	2.20	3.69	(2.11, 5.99)	599	4.85
#Kelley J	153	6	3.92	2.77	3.20	(1.17, 6.97)	186	4.51
All Others	57	1	1.75	1.64	2.41	(0.03,13.42)	64	5.57
TOTAL	**1249**	**44**	**3.52**	**2.33**	**3.42 ***	**(2.49, 4.59)**	**1544**	**4.67 ***
St. Francis								
Bercow N	818	33	4.03	2.84	3.21	(2.21, 4.50)	1039	3.57
Colangelo R	799	17	2.13	2.61	1.84	(1.07, 2.95)	1061	3.18
Damus P	533	4	0.75	1.95	0.87 **	(0.23, 2.22)	993	2.46
Durban L	75	2	2.67	3.15	1.91	(0.21, 6.90)	94	2.40
Fernandez H A	220	8	3.64	3.15	2.61	(1.12, 5.14)	250	4.05
Lamendola C	894	18	2.01	2.50	1.82	(1.08, 2.87)	1150	3.14
Robinson N	733	13	1.77	1.76	2.28	(1.21, 3.90)	1003	2.79
Taylor J	883	16	1.81	2.28	1.80	(1.03, 2.92)	1270	2.53
All Others	167	3	1.80	1.90	2.14	(0.43, 6.25)	191	3.14
TOTAL	**5122**	**114**	**2.23**	**2.39**	**2.10**	**(1.74, 2.53)**	**7051**	**2.99****
St. Josephs								
Marvasti M	570	4	0.70	2.16	0.73 **	(0.20, 1.88)	780	1.29**
#Nast E	141	6	4.26	2.38	4.04	(1.47, 8.78)	181	5.56
Nazem A	625	8	1.28	2.63	1.10 **	(0.47, 2.17)	793	1.84 **
Rosenberg J	596	16	2.68	2.57	2.36	(1.35, 3.83)	973	3.72
All Others	38	0	0.00	2.25	0.00	(0.00, 9.70)	43	0.00
TOTAL	**1970**	**34**	**1.73**	**2.45**	**1.59 ****	**(1.10, 2.22)**	**2770**	**2.63****

Table 5 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
St. Lukes-Roosevelt								
#Geller C	19	1	5.26	2.18	5.45	(0.07,30.33)	35	2.95
#Hoffman D	17	0	0.00	2.23	0.00	(0.00,21.81)	24	3.72
Safavi A	39	2	5.13	2.19	5.28	(0.59,19.08)	56	7.48
#Stelzer P	2	0	0.00	0.46	0.00	(0.00,100.0)	22	1.93
Swistel D	481	11	2.29	2.64	1.96	(0.98, 3.50)	643	3.54
#Tranbaugh R	6	0	0.00	1.20	0.00	(0.00,100.0)	8	0.00
All Others	90	1	1.11	1.89	1.33	(0.02, 7.39)	139	1.69
TOTAL	**654**	**15**	**2.29**	**2.47**	**2.10**	**(1.17, 3.46)**	**927**	**3.41**
St. Peters								
Bennett E	314	5	1.59	1.76	2.04	(0.66, 4.77)	594	2.16
##Canavan T	91	0	0.00	1.49	0.00	(0.00, 6.10)	105	1.58
#Dal Col R	530	8	1.51	1.39	2.46	(1.06, 4.84)	727	2.09
##Miller S	3	0	0.00	3.67	0.00	(0.00,75.21)	3	0.00
##Saifi J	368	7	1.90	2.03	2.11	(0.85, 4.35)	511	2.00
#Sardella G	441	8	1.81	1.74	2.35	(1.01, 4.63)	565	3.76
All Others	50	0	0.00	1.50	0.00	(0.00,11.03)	62	2.15
TOTAL	**1797**	**28**	**1.56**	**1.68**	**2.09**	**(1.39, 3.02)**	**2567**	**2.39 ****
St. Vincents								
Galdieri R	155	6	3.87	2.40	3.65	(1.33, 7.93)	183	6.84 *
Lang S	488	15	3.07	2.22	3.13	(1.75, 5.16)	615	5.23 *
#McGinn J	193	2	1.04	2.24	1.05	(0.12, 3.77)	230	2.23
##Reddy R C	94	3	3.19	2.15	3.35	(0.67, 9.79)	131	4.56
Shin YT	179	3	1.68	3.06	1.24	(0.25, 3.62)	231	2.54
Tyras D	180	4	2.22	2.20	2.28	(0.61, 5.85)	217	2.77
All Others	34	3	8.82	2.74	7.28	(1.46,21.28)	36	11.82
TOTAL	**1323**	**36**	**2.72**	**2.36**	**2.60**	**(1.82, 3.60)**	**1643**	**4.48**
Staten Island Univ- North								
#McGinn J	631	5	0.79	2.44	0.73 **	(0.24, 1.71)	717	1.50 **
##Molinaro P J	82	0	0.00	1.45	0.00	(0.00, 6.99)	106	1.40
All Others	63	0	0.00	1.08	0.00	(0.00,12.15)	81	0.00
TOTAL	**776**	**5**	**0.64**	**2.23**	**0.65 ****	**(0.21, 1.53)**	**904**	**1.38 ****
Strong Memorial								
#Alfieris G	4	0	0.00	2.26	0.00	(0.00,91.77)	5	0.00
Hicks G	367	14	3.81	2.43	3.54	(1.93, 5.94)	614	5.28 *
#Knight P	204	5	2.45	2.44	2.26	(0.73, 5.29)	338	5.14
Massey H	175	6	3.43	3.51	2.20	(0.80, 4.80)	241	3.93
Risher W	284	9	3.17	2.33	3.07	(1.40, 5.83)	424	6.27 *
TOTAL	**1034**	**34**	**3.29**	**2.59**	**2.87**	**(1.99, 4.01)**	**1622**	**5.28 ***

Table 5 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
United Health Services								
Quintos E	340	6	1.76	2.77	1.44	(0.53, 3.13)	397	2.73
Wong K	331	6	1.81	2.50	1.64	(0.60, 3.57)	427	2.55
Yousuf M	336	11	3.27	2.80	2.64	(1.32, 4.73)	438	4.43
TOTAL	**1007**	**23**	**2.28**	**2.69**	**1.92**	**(1.22, 2.88)**	**1262**	**3.26**
Univ. Hosp. - Stony Brook								
Bilfinger T	322	6	1.86	2.03	2.07	(0.76, 4.50)	373	4.13
Krukenkamp I	358	10	2.79	2.26	2.80	(1.34, 5.14)	508	4.55
McLarty A	270	9	3.33	2.01	3.75	(1.71, 7.12)	304	4.68
Saltman A E	229	10	4.37	2.06	4.78 *	(2.29, 8.79)	268	7.13 *
Seifert F	686	13	1.90	1.81	2.37	(1.26, 4.05)	808	4.26
All Others	0	0	0.00	0.00	0.00	(0.00, 0.00)	1	0.00
TOTAL	**1865**	**48**	**2.57**	**1.99**	**2.92**	**(2.15, 3.87)**	**2262**	**4.68 ***
Univ. Hosp. - Upstate								
#Alfieris G	16	2	12.50	2.25	12.53	(1.41,45.24)	53	2.93
Brandt B	256	4	1.56	2.95	1.20	(0.32, 3.06)	336	3.04
Elamir N	158	4	2.53	2.37	2.41	(0.65, 6.18)	217	3.06
Fink GW	281	9	3.20	2.41	3.00	(1.37, 5.70)	365	4.44
Myers S	69	1	1.45	1.95	1.68	(0.02, 9.32)	77	10.37 *
#Piccone V	3	0	0.00	1.75	0.00	(0.00,100.0)	3	0.00
Picone A	319	8	2.51	2.86	1.98	(0.85, 3.90)	441	3.00
All Others	18	0	0.00	2.11	0.00	(0.00,21.82)	23	4.02
TOTAL	**1120**	**28**	**2.50**	**2.62**	**2.16**	**(1.43, 3.12)**	**1515**	**3.63**
Univ. Hosp. of Brooklyn								
#Anderson J	24	1	4.17	1.85	5.08	(0.07,28.27)	34	3.31
#Burack J	57	2	3.51	1.65	4.82	(0.54,17.39)	71	4.16
##Genovesi M	55	2	3.64	1.44	5.69	(0.64,20.54)	67	9.05
#Jacobowitz I	95	4	4.21	2.13	4.47	(1.20,11.44)	125	5.73
#Ketosugbo A	54	1	1.85	1.78	2.36	(0.03,13.10)	63	5.08
##Molinaro P J	1	0	0.00	1.06	0.00	(0.00,100.0)	1	0.00
#Piccone V	8	0	0.00	2.07	0.00	(0.00,50.11)	8	0.00
##Reddy R C	61	1	1.64	1.68	2.21	(0.03,12.29)	86	6.88
#Sabado M	156	8	5.13	2.66	4.35	(1.87, 8.57)	217	5.44
All Others	80	0	0.00	1.16	0.00	(0.00, 8.93)	98	1.86
TOTAL	**591**	**19**	**3.21**	**1.94**	**3.75**	**(2.26, 5.86)**	**770**	**5.34 ***
Vassar Brothers								
Ciaburri D	358	7	1.96	1.98	2.24	(0.90, 4.61)	535	1.73 **
Zakow P	232	0	0.00	1.58	0.00 **	(0.00, 2.26)	260	0.00 **
TOTAL	**590**	**7**	**1.19**	**1.82**	**1.47**	**(0.59, 3.03)**	**795**	**1.41 ** **

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
Weill Cornell-NYP								
Altorki N	84	5	5.95	2.65	5.08	(1.64,11.86)	92	6.83
Brodman R	265	3	1.13	1.97	1.30	(0.26, 3.79)	330	1.91
Girardi L	811	9	1.11	2.12	1.18 **	(0.54, 2.24)	1168	2.14 **
Isom O	149	3	2.01	1.32	3.45	(0.69,10.08)	399	3.48
#Ko W	150	3	2.00	1.80	2.50	(0.50, 7.32)	209	2.94
Krieger K	573	8	1.40	2.02	1.56	(0.67, 3.08)	953	2.44
Lamberti JJ	2	0	0.00	1.00	0.00	(0.00,100.0)	5	0.00
##Tortolani A	168	1	0.60	2.31	0.58	(0.01, 3.24)	229	3.06
All Others	110	3	2.73	2.64	2.33	(0.47, 6.81)	143	3.51
TOTAL	**2312**	**35**	**1.51**	**2.06**	**1.66**	**(1.15, 2.31)**	**3528**	**2.61 ** **
Westchester Medical Center								
Axelrod H	397	19	4.79	3.36	3.22	(1.94, 5.03)	478	3.96
Fleisher A	356	16	4.49	2.38	4.27 *	(2.44, 6.93)	464	6.15 *
Fuzesi L	39	7	17.95	2.69	15.08 *	(6.04,31.06)	39	23.54 *
Lafaro R	173	1	0.58	1.80	0.72	(0.01, 4.03)	250	3.49
Moggio R	296	7	2.36	2.18	2.45	(0.98, 5.05)	432	3.42
Sarabu M	427	6	1.41	2.54	1.25	(0.46, 2.72)	582	1.68 **
Zias E	430	10	2.33	2.28	2.31	(1.10, 4.24)	515	4.29
All Others	1	0	0.00	0.32	0.00	(0.00,100.0)	1	0.00
TOTAL	**2119**	**66**	**3.11**	**2.50**	**2.81**	**(2.17, 3.58)**	**2761**	**4.00**
Winthrop Univ. Hosp.								
#Hartman A	330	5	1.52	3.03	1.13	(0.36, 2.64)	685	2.50
Kofsky E	547	16	2.93	2.87	2.30	(1.31, 3.74)	704	3.78
Schubach S	552	5	0.91	2.49	0.82 **	(0.26, 1.91)	776	1.75 **
Scott W	293	3	1.02	2.35	0.99	(0.20, 2.88)	367	2.87
All Others	158	6	3.80	2.91	2.95	(1.08, 6.42)	190	3.94
TOTAL	**1880**	**35**	**1.86**	**2.71**	**1.55 ** **	**(1.08, 2.16)**	**2722**	**2.72 ** **
STATEWIDE TOTAL	**51224**	**1157**	**2.26**	**2.26**	**2.26**		**70281**	**3.53**

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

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

\# Performed operations in another New York State hospital.

Performed operations in two or more other New York State hospitals.

OMR The observed mortality rate is the number of observed deaths divided by the number of patients.

EMR The expected mortality rate is the sum of the predicted probabilities of death for each patient divided by the total number of patients.

RAMR The risk-adjusted mortality rate is the best estimate, based on the statistical model, of what the provider's mortality rate would have been is the provider had a mix of patients identical to the statewide mix.It is computed as the quotient of the OMR and the EMR (OMR/EMR) multiplied by the statewide mortality rate for the time period.

Table 6: Summary Information for Surgeons Practicing at More than One Hospital, 2000-2002

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Aldridge J	**365**	**8**	**2.19**	**2.25**	**2.20**	**(0.95, 4.33)**	**423**	**3.10**
Buffalo General	1	0	0.00	1.27	0.00	(0.00,100.0)	1	0.00
Millard Fillmore	364	8	2.20	2.26	2.20	(0.95, 4.34)	422	3.10
Alfieris G	**20**	**2**	**10.00**	**2.25**	**10.02**	**(1.13,36.18)**	**58**	**2.73**
Strong Memorial	4	0	0.00	2.26	0.00	(0.00,91.77)	5	0.00
Univ. Hosp. - Upstate	16	2	12.50	2.25	12.53	(1.41,45.24)	53	2.93
Anderson J	**60**	**4**	**6.67**	**2.75**	**5.47**	**(1.47,14.02)**	**78**	**5.02**
Maimonides	36	3	8.33	3.35	5.62	(1.13,16.42)	44	6.07
Univ. Hosp. of Brooklyn	24	1	4.17	1.85	5.08	(0.07,28.27)	34	3.31
Ashraf M	**702**	**4**	**0.57**	**1.73**	**0.74 ****	**(0.20, 1.90)**	**824**	**2.02**
Buffalo General	15	0	0.00	1.07	0.00	(0.00,51.54)	18	0.00
Millard Fillmore	687	4	0.58	1.75	0.75 **	(0.20, 1.93)	806	2.06
Bergsland J	**191**	**11**	**5.76**	**3.16**	**4.12**	**(2.05, 7.37)**	**223**	**5.65**
Buffalo General	166	10	6.02	3.15	4.32	(2.07, 7.94)	195	5.91
Millard Fillmore	25	1	4.00	3.22	2.81	(0.04,15.61)	28	3.76
Burack J	**59**	**2**	**3.39**	**1.61**	**4.74**	**(0.53,17.13)**	**74**	**3.96**
Maimonides	2	0	0.00	0.73	0.00	(0.00,100.0)	3	0.00
Univ. Hosp. of Brooklyn	57	2	3.51	1.65	4.82	(0.54,17.39)	71	4.16
Camacho M	**221**	**1**	**0.45**	**1.85**	**0.55**	**(0.01, 3.08)**	**318**	**3.62**
Montefiore - Einstein	1	0	0.00	2.16	0.00	(0.00,100.0)	12	7.67
Montefiore - Moses	220	1	0.45	1.85	0.56	(0.01, 3.09)	306	3.42
Canavan T	**465**	**6**	**1.29**	**1.52**	**1.91**	**(0.70, 4.17)**	**542**	**3.73**
Albany Medical Center	372	6	1.61	1.52	2.39	(0.87, 5.20)	435	4.29
Ellis Hospital	2	0	0.00	2.48	0.00	(0.00,100.0)	2	0.00
St. Peters	91	0	0.00	1.49	0.00	(0.00, 6.10)	105	1.58
Dal Col R	**533**	**8**	**1.50**	**1.38**	**2.45**	**(1.05, 4.83)**	**730**	**2.08**
Albany Medical Center	3	0	0.00	0.59	0.00	(0.00,100.0)	3	0.00
St. Peters	530	8	1.51	1.39	2.46	(1.06, 4.84)	727	2.09
Depan H	**401**	**16**	**3.99**	**2.30**	**3.91**	**(2.24, 6.36)**	**583**	**5.29 ***
Albany Medical Center	4	0	0.00	1.24	0.00	(0.00,100.0)	10	0.00
Ellis Hospital	397	16	4.03	2.31	3.94	(2.25, 6.39)	573	5.39 *
Esposito R	**311**	**8**	**2.57**	**2.79**	**2.08**	**(0.90, 4.10)**	**459**	**3.35**
NYU Hospitals Center	247	5	2.02	2.61	1.75	(0.56, 4.08)	378	3.51
North Shore	64	3	4.69	3.47	3.05	(0.61, 8.92)	81	2.67
Frymus M	**358**	**3**	**0.84**	**2.14**	**0.88**	**(0.18, 2.58)**	**442**	**3.09**
Montefiore - Einstein	357	3	0.84	2.15	0.88	(0.18, 2.59)	441	3.09
Montefiore - Moses	1	0	0.00	1.16	0.00	(0.00,100.0)	1	0.00

Table 6 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Geller C	**217**	**3**	**1.38**	**1.95**	**1.60**	**(0.32, 4.67)**	**268**	**3.68**
Beth Israel	198	2	1.01	1.93	1.18	(0.13, 4.26)	233	3.81
St. Lukes-Roosevelt	19	1	5.26	2.18	5.45	(0.07,30.33)	35	2.95
Genovesi M	**115**	**6**	**5.22**	**2.18**	**5.40**	**(1.97,11.76)**	**133**	**8.32 ***
Lenox Hill	36	0	0.00	2.11	0.00	(0.00,10.93)	40	2.85
Maimonides	24	4	16.67	3.99	9.44 *	(2.54,24.17)	26	13.90 *
Univ. Hosp. of Brooklyn	55	2	3.64	1.44	5.69	(0.64,20.54)	67	9.05
Gold J	**210**	**0**	**0.00**	**1.49**	**0.00**	**(0.00, 2.65)**	**301**	**1.80**
Montefiore - Einstein	53	0	0.00	0.78	0.00	(0.00,19.93)	87	0.00
Montefiore - Moses	157	0	0.00	1.72	0.00	(0.00, 3.06)	214	2.47
Grossi E	**117**	**6**	**5.13**	**3.59**	**3.22**	**(1.18, 7.01)**	**188**	**5.15**
Bellevue	18	0	0.00	1.06	0.00	(0.00,43.35)	27	0.00
NYU Hospitals Center	99	6	6.06	4.06	3.38	(1.23, 7.35)	161	5.35
Hartman A	**385**	**7**	**1.82**	**2.97**	**1.38**	**(0.55, 2.85)**	**807**	**3.02**
North Shore	55	2	3.64	2.62	3.13	(0.35,11.32)	122	6.47
Winthrop Univ. Hosp.	330	5	1.52	3.03	1.13	(0.36, 2.64)	685	2.50
Hoffman D	**140**	**0**	**0.00**	**1.94**	**0.00**	**(0.00, 3.05)**	**178**	**1.90**
Beth Israel	123	0	0.00	1.90	0.00	(0.00, 3.55)	154	1.53
St. Lukes-Roosevelt	17	0	0.00	2.23	0.00	(0.00,21.81)	24	3.72
Jacobowitz I	**1087**	**25**	**2.30**	**2.91**	**1.78**	**(1.15, 2.63)**	**1395**	**3.35**
Maimonides	992	21	2.12	2.99	1.60	(0.99, 2.45)	1270	3.16
Univ. Hosp. of Brooklyn	95	4	4.21	2.13	4.47	(1.20,11.44)	125	5.73
Karamanoukian H L	**331**	**16**	**4.83**	**2.53**	**4.31 ***	**(2.46, 7.00)**	**351**	**6.72 ***
Buffalo General	327	15	4.59	2.52	4.12 *	(2.30, 6.79)	346	6.50 *
Erie County	0	0	0.00	0.00	0.00	(0.00, 0.00)	1	0.00
Millard Fillmore	4	1	25.00	3.83	14.73	(0.19,81.96)	4	23.00
Kelley J	**384**	**12**	**3.13**	**2.13**	**3.31**	**(1.71, 5.78)**	**513**	**3.97**
Albany Medical Center	231	6	2.60	1.71	3.42	(1.25, 7.45)	327	3.62
St. Elizabeth	153	6	3.92	2.77	3.20	(1.17, 6.97)	186	4.51
Kerr P	**162**	**6**	**3.70**	**2.43**	**3.45**	**(1.26, 7.50)**	**198**	**7.89 ***
Buffalo General	7	0	0.00	0.95	0.00	(0.00,100.0)	9	17.12
Erie County	2	0	0.00	0.43	0.00	(0.00,100.0)	2	0.00
Millard Fillmore	153	6	3.92	2.52	3.51	(1.28, 7.65)	187	7.61 *
Ketosugbo A	**59**	**1**	**1.69**	**1.67**	**2.29**	**(0.03,12.72)**	**69**	**4.51**
Maimonides	5	0	0.00	0.58	0.00	(0.00,100.0)	6	0.00
Univ. Hosp. of Brooklyn	54	1	1.85	1.78	2.36	(0.03,13.10)	63	5.08

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
Knight P	**651**	**14**	**2.15**	**2.96**	**1.64**	**(0.90, 2.75)**	**988**	**3.80**
Rochester General	447	9	2.01	3.19	1.42	(0.65, 2.70)	650	3.17
Strong Memorial	204	5	2.45	2.44	2.26	(0.73, 5.29)	338	5.14
Ko W	**723**	**8**	**1.11**	**1.73**	**1.44**	**(0.62, 2.84)**	**924**	**2.47**
NY Hospital-Queens	573	5	0.87	1.71	1.15	(0.37, 2.68)	715	2.34
Weill Cornell-NYP	150	3	2.00	1.80	2.50	(0.50, 7.32)	209	2.94
Lajos T	**84**	**4**	**4.76**	**1.99**	**5.40**	**(1.45,13.84)**	**88**	**8.55**
Buffalo General	77	4	5.19	1.87	6.28	(1.69,16.08)	80	8.95
Erie County	6	0	0.00	3.76	0.00	(0.00,36.71)	7	7.39
Millard Fillmore	1	0	0.00	0.73	0.00	(0.00,100.0)	1	0.00
Levinsky L	**187**	**11**	**5.88**	**1.95**	**6.80 ***	**(3.39,12.16)**	**191**	**10.30 ***
Buffalo General	161	11	6.83	2.08	7.44 *	(3.71,13.31)	165	11.16 *
Millard Fillmore	26	0	0.00	1.21	0.00	(0.00,26.33)	26	0.00
Lewin A	**455**	**13**	**2.86**	**1.80**	**3.58**	**(1.90, 6.12)**	**460**	**6.64 ***
Buffalo General	445	13	2.92	1.82	3.62	(1.93, 6.19)	450	6.72 *
Millard Fillmore	10	0	0.00	0.93	0.00	(0.00,89.00)	10	0.00
McGinn J	**824**	**7**	**0.85**	**2.39**	**0.80 ****	**(0.32, 1.65)**	**947**	**1.67 ****
St. Vincents	193	2	1.04	2.24	1.05	(0.12, 3.77)	230	2.23
Staten Island Univ- North	631	5	0.79	2.44	0.73 **	(0.24, 1.71)	717	1.50 **
Merav A	**233**	**8**	**3.43**	**1.79**	**4.34**	**(1.87, 8.56)**	**333**	**4.75**
Montefiore - Einstein	1	0	0.00	1.38	0.00	(0.00,100.0)	1	0.00
Montefiore - Moses	232	8	3.45	1.79	4.36	(1.88, 8.59)	332	4.75
Miller S	**454**	**12**	**2.64**	**2.21**	**2.70**	**(1.39, 4.72)**	**553**	**3.91**
Albany Medical Center	446	12	2.69	2.20	2.76	(1.43, 4.82)	545	3.96
Ellis Hospital	5	0	0.00	2.26	0.00	(0.00,73.36)	5	0.00
St. Peters	3	0	0.00	3.67	0.00	(0.00,75.21)	3	0.00
Molinaro P J	**101**	**1**	**0.99**	**1.59**	**1.40**	**(0.02, 7.81)**	**128**	**2.34**
Maimonides	18	1	5.56	2.29	5.47	(0.07,30.44)	21	7.18
Staten Island Univ- North	82	0	0.00	1.45	0.00	(0.00, 6.99)	106	1.40
Univ. Hosp. of Brooklyn	1	0	0.00	1.06	0.00	(0.00,100.0)	1	0.00
Nast E	**274**	**6**	**2.19**	**2.15**	**2.31**	**(0.84, 5.02)**	**333**	**3.48**
Arnot-Ogden	133	0	0.00	1.89	0.00	(0.00, 3.29)	152	0.00
St. Josephs	141	6	4.26	2.38	4.04	(1.47, 8.78)	181	5.56
Piccone V	**11**	**0**	**0.00**	**1.98**	**0.00**	**(0.00,38.03)**	**11**	**0.00**
Univ. Hosp. - Upstate	3	0	0.00	1.75	0.00	(0.00,100.0)	3	0.00
Univ. Hosp. of Brooklyn	8	0	0.00	2.07	0.00	(0.00,50.11)	8	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
Plestis K A	**359**	**2**	**0.56**	**2.02**	**0.62 ****	**(0.07,2.25)**	**507**	**2.32**
Montefiore - Einstein	292	2	0.68	2.10	0.74	(0.08, 2.66)	416	2.57
Montefiore - Moses	67	0	0.00	1.66	0.00	(0.00, 7.46)	91	1.19
Raza S	**430**	**13**	**3.02**	**2.02**	**3.37**	**(1.79,5.77)**	**515**	**5.16**
Buffalo General	414	13	3.14	2.03	3.49	(1.86, 5.98)	497	5.31
Millard Fillmore	16	0	0.00	1.88	0.00	(0.00,27.50)	18	0.00
Reddy R C	**174**	**5**	**2.87**	**1.92**	**3.38**	**(1.09,7.89)**	**238**	**5.52**
Maimonides	19	1	5.26	1.55	7.66	(0.10,42.62)	21	7.43
St. Vincents	94	3	3.19	2.15	3.35	(0.67, 9.79)	131	4.56
Univ. Hosp. of Brooklyn	61	1	1.64	1.68	2.21	(0.03,12.29)	86	6.88
Ribakove G	**260**	**4**	**1.54**	**2.49**	**1.40**	**(0.38,3.58)**	**441**	**3.08**
Bellevue	27	0	0.00	1.14	0.00	(0.00,26.95)	63	2.50
NYU Hospitals Center	233	4	1.72	2.64	1.47	(0.39, 3.75)	378	3.12
Sabado M	**278**	**14**	**5.04**	**3.29**	**3.46**	**(1.89,5.81)**	**391**	**4.69**
Maimonides	122	6	4.92	4.08	2.72	(0.99, 5.92)	174	4.12
Univ. Hosp. of Brooklyn	156	8	5.13	2.66	4.35	(1.87, 8.57)	217	5.44
Saifi J	**476**	**11**	**2.31**	**2.12**	**2.46**	**(1.22,4.40)**	**651**	**2.12 ****
Albany Medical Center	4	0	0.00	1.24	0.00	(0.00,100.0)	4	0.00
Ellis Hospital	104	4	3.85	2.48	3.50	(0.94, 8.96)	136	2.59
St. Peters	368	7	1.90	2.03	2.11	(0.85, 4.35)	511	2.00
Sardella G	**524**	**12**	**2.29**	**1.76**	**2.94**	**(1.52,5.14)**	**671**	**3.99**
Albany Medical Center	83	4	4.82	1.84	5.90	(1.59,15.12)	106	5.01
St. Peters	441	8	1.81	1.74	2.35	(1.01, 4.63)	565	3.76
Stelzer P	**54**	**2**	**3.70**	**1.83**	**4.58**	**(0.51,16.54)**	**253**	**1.95**
Beth Israel	52	2	3.85	1.88	4.62	(0.52,16.69)	231	1.96
St. Lukes-Roosevelt	2	0	0.00	0.46	0.00	(0.00,100.0)	22	1.93
Tortolani A	**375**	**9**	**2.40**	**2.27**	**2.39**	**(1.09,4.53)**	**488**	**3.89**
Montefiore - Einstein	127	7	5.51	1.94	6.41 *	(2.57,13.20)	159	7.69 *
Montefiore - Moses	1	0	0.00	2.72	0.00	(0.00,100.0)	2	0.00
NY Hospital - Queens	79	1	1.27	2.71	1.05	(0.01, 5.87)	98	0.98
Weill Cornell-NYP	168	1	0.60	2.31	0.58	(0.01, 3.24)	229	3.06
Tranbaugh R	**557**	**12**	**2.15**	**1.94**	**2.51**	**(1.30,4.38)**	**709**	**3.75**
Beth Israel	551	12	2.18	1.95	2.53	(1.30, 4.41)	701	3.78
St. Lukes-Roosevelt	6	0	0.00	1.20	0.00	(0.00,100.0)	8	0.00
Vatsia S	**288**	**3**	**1.04**	**2.44**	**0.97**	**(0.19,2.82)**	**404**	**1.58 ****
LIJ Medical Center	2	0	0.00	1.46	0.00	(0.00,100.0)	2	0.00
North Shore	286	3	1.05	2.44	0.97	(0.19, 2.83)	402	1.58 **

SURGEON AND HOSPITAL VOLUMES FOR TOTAL ADULT CARDIAC SURGERY, 2000-2002

Table 7 presents, for each hospital and for each surgeon performing at least 200 cardiac operations in any hospital in 2000 – 2002 and/or performing one or more cardiac operations in each of the years 2000 – 2002, the total number of isolated CABG surgeries, 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.

Isolated CABG volumes include patients who undergo bypass of one or more of the coronary arteries with no other major heart surgery during 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 includes cardiac procedures not represented by isolated CABG or Valve or Valve/CABG operations and includes, but is not limited to: congenital procedures, heart transplants, aneurysm repairs, ventricular reconstruction, and ventricular assist device insertions. Total cardiac surgery is the sum of the previous three columns and includes any procedure to the heart or great vessels.

Table 7: Surgeon and Hospital Volume for Isolated CABG, Valve or Valve/CABG, Other Cardiac Surgery, and Total Adult Cardiac Surgery, 2000-2002

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Albany Medical Center				
Britton L	339	138	50	527
Canavan T	372	63	7	442
Canver C	259	81	95	435
Dal Col R	3	0	0	3
Depan H	4	6	0	10
Devejian N	0	8	31	39
Kelley J	231	96	70	397
Miller S	446	99	22	567
Saifi J	4	0	1	5
Sardella G	83	23	3	109
All Others	87	27	17	131
TOTAL	**1828**	**541**	**296**	**2665**
Arnot-Ogden				
Curiale S V	196	39	12	247
Nast E	133	19	6	158
Zama N	38	4	0	42
All Others	1	0	1	2
TOTAL	**368**	**62**	**19**	**449**
Bellevue				
Glassman L	6	0	1	7
Grossi E	18	9	4	31

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Bellevue *continued*				
Ribakove G	27	36	16	79
All Others	90	25	27	142
TOTAL	**141**	**70**	**48**	**259**
Beth Israel				
Geller C	198	35	18	251
Harris L	312	68	13	393
Hoffman D	123	31	6	160
Stelzer P	52	179	146	377
Tranbaugh R	551	150	48	749
All Others	17	7	0	24
TOTAL	**1253**	**470**	**231**	**1954**
Buffalo General				
Aldridge J	1	0	0	1
Ashraf M	15	3	0	18
Bergsland J	166	29	7	202
Grosner G	705	295	49	1049
Karamanoukian H L	327	19	21	367
Kerr P	7	2	6	15
Lajos T	77	3	8	88
Levinsky L	161	4	5	170
Lewin A	445	5	4	454
Raza S	414	83	64	561
All Others	12	23	7	42
TOTAL	**2330**	**466**	**171**	**2967**
Columbia Presbyterian-NYP				
Edwards N	231	112	94	437
Esrig B	4	4	34	42
Mosca R S	1	11	30	42
Naka Y	263	118	195	576
Oz M	569	343	142	1054
Quaegebeur J	1	12	89	102
Rose E	58	56	14	128
Scott R	1	0	21	22
Smith C	451	410	140	1001
All Others	66	31	144	241
TOTAL	**1645**	**1097**	**903**	**3645**
Ellis Hospital				
Afifi A	403	54	6	463
Canavan T	2	0	0	2
Depan H	397	176	67	640

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Ellis Hospital *continued*				
Miller S	5	0	0	5
Reich H	375	86	16	477
Saifi J	104	32	7	143
All Others	14	2	1	17
TOTAL	**1300**	**350**	**97**	**1747**
Erie County				
Bell-Thomson J	313	77	25	415
Datta S	273	10	18	301
Karamanoukian H L	0	1	1	2
Kerr P	2	0	0	2
Lajos T	6	1	2	9
All Others	50	6	11	67
TOTAL	**644**	**95**	**57**	**796**
LIJ Medical Center				
Graver L	552	321	86	959
Kline G	45	13	17	75
Palazzo R	389	118	18	525
Vatsia S	2	0	0	2
All Others	0	0	4	4
TOTAL	**988**	**452**	**125**	**1565**
Lenox Hill				
Connolly M	693	236	57	986
Fonger J D	98	14	5	117
Genovesi M	36	4	2	42
Loulmet D F	69	295	61	425
McCabe J	47	15	12	74
Patel N	171	11	1	183
Subramanian V	888	171	30	1089
All Others	1	0	0	1
TOTAL	**2003**	**746**	**168**	**2917**
Maimonides				
Acinapura A	127	38	14	179
Anderson J	36	8	5	49
Burack J	2	1	1	4
Cunningham J N	172	57	17	246
Genovesi M	24	2	3	29
Jacobowitz I	992	278	50	1320
Ketosugbo A	5	1	2	8
Lazzaro R	9	2	7	18
Molinaro P J	18	3	1	22

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Maimonides *continued*				
Reddy R C	19	2	0	21
Sabado M	122	52	18	192
Vaynblat M	261	51	6	318
Zisbrod Z	455	99	21	575
All Others	98	19	19	136
TOTAL	**2340**	**613**	**164**	**3117**
Mercy Hospital				
All Others	113	16	14	143
TOTAL	**113**	**16**	**14**	**143**
Millard Fillmore				
Aldridge J	364	58	29	451
Ashraf M	687	119	23	829
Bergsland J	25	3	2	30
Jennings L	256	21	4	281
Karamanoukian H L	4	0	1	5
Kerr P	153	34	11	198
Lajos T	1	0	0	1
Levinsky L	26	0	1	27
Lewin A	10	0	0	10
Raza S	16	2	0	18
All Others	71	0	3	74
TOTAL	**1613**	**237**	**74**	**1924**
Montefiore - Einstein				
Camacho M	1	11	0	12
Frymus M	357	84	30	471
Gold J	53	34	6	93
Merav A	1	0	0	1
Plestis K A	292	124	112	528
Tortolani A	127	32	9	168
All Others	4	11	1	16
TOTAL	**835**	**296**	**158**	**1289**
Montefiore - Moses				
Attai L	217	91	7	315
Camacho M	220	86	18	324
Crooke G	0	1	5	6
Frymus M	1	0	1	2
Gold J	157	57	17	231
Merav A	232	100	16	348
Plestis K A	67	24	26	117

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Montefiore - Moses *continued*				
Tortolani A	1	1	0	2
All Others	29	13	23	65
TOTAL	**924**	**373**	**113**	**1410**
Mount Sinai				
Galla J	191	93	97	381
Griepp R	29	50	147	226
Lansman S	256	96	106	458
Nguyen K	1	1	23	25
Spielvogel D	352	152	162	666
All Others	200	149	69	418
TOTAL	**1029**	**541**	**604**	**2174**
NYU Hospitals Center				
Colvin S	69	588	114	771
Culliford A	304	203	90	597
Esposito R	247	131	24	402
Galloway A	177	298	71	546
Grossi E	99	62	42	203
Ribakove G	233	145	49	427
All Others	80	38	25	143
TOTAL	**1209**	**1465**	**415**	**3089**
New York Hospital - Queens				
Aronis M	378	96	12	486
Ko W	573	142	62	777
Tortolani A	79	19	3	101
All Others	1	0	0	1
TOTAL	**1031**	**257**	**77**	**1365**
North Shore				
Esposito R	64	17	3	84
Hall M	733	308	39	1080
Hartman A	55	67	7	129
Levy M	372	155	41	568
Pogo G	707	271	49	1027
Vatsia S	286	116	39	441
All Others	0	2	10	12
TOTAL	**2217**	**936**	**188**	**3341**
Rochester General				
Cheeran D	768	257	53	1078
Kirshner R	665	255	51	971
Knight P	447	203	37	687
All Others	124	25	10	159
TOTAL	**2004**	**740**	**151**	**2895**

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
St. Elizabeth				
Carr T	345	38	8	391
Hatton P	249	63	14	326
Joyce F	445	154	29	628
Kelley J	153	33	9	195
All Others	57	7	1	65
TOTAL	**1249**	**295**	**61**	**1605**
St. Francis				
Bercow N	818	221	41	1080
Colangelo R	799	262	13	1074
Damus P	533	460	82	1075
Durban L	75	19	10	104
Fernandez H A	220	30	3	253
Lamendola C	894	256	34	1184
Robinson N	733	270	50	1053
Taylor J	883	387	44	1314
All Others	167	24	2	193
TOTAL	**5122**	**1929**	**279**	**7330**
St. Josephs				
Marvasti M	570	210	42	822
Nast E	141	40	5	186
Nazem A	625	168	20	813
Rosenberg J	596	377	120	1093
All Others	38	5	4	47
TOTAL	**1970**	**800**	**191**	**2961**
St. Lukes-Roosevelt				
Geller C	19	16	9	44
Hoffman D	17	7	3	27
Safavi A	39	17	6	62
Stelzer P	2	20	32	54
Swistel D	481	162	39	682
Tranbaugh R	6	2	0	8
All Others	90	49	16	155
TOTAL	**654**	**273**	**105**	**1032**
St. Peters				
Bennett E	314	280	64	658
Canavan T	91	14	1	106
Dal Col R	530	197	25	752
Miller S	3	0	0	3

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
St. Peters *continued*				
Saifi J	368	143	18	529
Sardella G	441	124	15	580
All Others	50	12	10	72
TOTAL	**1797**	**770**	**133**	**2700**
St. Vincents				
Galdieri R	155	28	10	193
Lang S	488	127	47	662
McGinn J	193	37	9	239
Reddy R C	94	37	14	145
Shin YT	179	52	16	247
Tyras D	180	37	4	221
All Others	34	2	2	38
TOTAL	**1323**	**320**	**102**	**1745**
Staten Island Univ- North				
McGinn J	631	86	9	726
Molinaro P J	82	24	2	108
All Others	63	18	8	89
TOTAL	**776**	**128**	**19**	**923**
Strong Memorial				
Alfieris G	4	1	34	39
Hicks G	367	247	59	673
Knight P	204	134	47	385
Massey H	175	66	65	306
Risher W	284	140	102	526
All Others	0	0	2	2
TOTAL	**1034**	**588**	**309**	**1931**
United Health Services				
Quintos E	340	57	13	410
Wong K	331	96	21	448
Yousuf M	336	102	18	456
TOTAL	**1007**	**255**	**52**	**1314**
Univ. Hosp. - Stony Brook				
Bilfinger T	322	51	18	391
Krukenkamp I	358	150	58	566
McLarty A	270	34	29	333
Saltman A E	229	39	42	310
Seifert F	686	122	29	837
All Others	0	1	0	1
TOTAL	**1865**	**397**	**176**	**2438**

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Univ. Hosp. - Upstate				
Alfieris G	16	37	36	89
Brandt B	256	80	30	366
Elamir N	158	59	22	239
Fink GW	281	84	33	398
Myers S	69	8	10	87
Piccone V	3	0	0	3
Picone A	319	122	27	468
All Others	18	5	12	35
TOTAL	**1120**	**395**	**170**	**1685**
Univ. Hosp. of Brooklyn				
Anderson J	24	10	10	44
Burack J	57	14	8	79
Genovesi M	55	12	2	69
Jacobowitz I	95	30	6	131
Ketosugbo A	54	9	1	64
Molinaro P J	1	0	0	1
Piccone V	8	0	2	10
Reddy R C	61	25	7	93
Sabado M	156	61	20	237
All Others	80	18	2	100
TOTAL	**591**	**179**	**58**	**828**
Vassar Brothers				
Ciaburri D	358	177	24	559
Zakow P	232	28	7	267
All Others	0	0	2	2
TOTAL	**590**	**205**	**33**	**828**
Weill Cornell-NYP				
Altorki N	84	8	3	95
Brodman R	265	65	12	342
Girardi L	811	357	477	1645
Isom O	149	250	45	444
Ko W	150	59	8	217
Krieger K	573	380	41	994
Lamberti JJ	2	3	20	25
Tortolani A	168	61	7	236
All Others	110	33	9	152
TOTAL	**2312**	**1216**	**622**	**4150**

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Westchester Medical Center				
Axelrod H	397	81	13	491
Fleisher A	356	108	46	510
Fuzesi L	39	0	12	51
Lafaro R	173	77	78	328
Moggio R	296	136	34	466
Sarabu M	427	155	58	640
Zias E	430	85	51	566
All Others	1	0	0	1
TOTAL	**2119**	**642**	**292**	**3053**
Winthrop Univ. Hosp.				
Hartman A	330	355	49	734
Kofsky E	547	157	17	721
Schubach S	552	224	26	802
Scott W	293	74	14	381
All Others	158	32	13	203
TOTAL	**1880**	**842**	**119**	**2841**
STATE TOTAL	**51224**	**19057**	**6794**	**77075**

Criteria Used in Reporting Significant Risk Factors (2002)

Based on Documentation in Medical Record

Patient Risk Factor	Definitions
Hemodynamic State	**Determined just prior to surgery.**
• Unstable	Patient requires pharmacologic or mechanical support to maintain blood pressure or cardiac output.
• Shock	Acute hypotension (systolic blood pressure < 80 mmHg) or low cardiac index (< 2.0 liters/min/m^2), despite pharmacologic or mechanical support.
Comorbidities	
• Chronic Obstructive Pulmonary Disease (COPD)	Patients who require chronic (longer than three months), bronchodilator therapy to avoid disability from obstructive airway disease; or have a forced expiratory volume in one second of less than 75% of the predicted value or less than 1.25 liters; or have a room air pO_2 <60 or a pCO_2 >50
• Extensively Calcified Aorta	More than the usual amount (for age) of calcification or plaque formation in the ascending aorta, or plaque, palpable at surgery, in the ascending aorta.
• Peripheral Vascular Disease	Patient has either Aortoiliac Disease or Femoral/Popliteal Disease as defined below
- Aortoiliac Disease	Angiographic demonstration of at least 50% narrowing in a major aortoiliac vessel, previous surgery for such disease, absent femoral pulses, or the inability to insert a catheter or intra-aortic balloon due to iliac aneurysm or obstruction of the aortoiliac arteries.
- Femoral/Popliteal Disease	Angiographic demonstration of at least 50% narrowing in a major femoral/popliteal vessel, previous surgery for such disease, absent pedal pulses, or inability to insert a catheter or intra-aortic balloon due to obstruction in the femoral arteries.
• Renal Failure Requiring Dialysis	The patient is on chronic peritoneal or hemodialysis.
Ventricular Function	
• Ejection Fraction	Value of the ejection fraction taken closest to the procedure. When a calculated measure is unavailable the ejection fraction should be estimated visually from the ventriculogram or by echocardiography. Intraoperative direct observation of the heart is not an adequate basis for a visual estimate of the ejection fraction
• Previous MI, less than 6 hours	One or more myocardial infarctions (MI) less than 6 hours before surgery
• Previous MI, 6-23 hours	One or more myocardial infarctions (MI) between 6 and 23 hours before surgery
• Previous MI, 1 to 20 days	One or more myocardial infarctions (MI) between 1 and 20 days before surgery
Previous Open Heart Operations	Open heart surgery previous to the hospitalization. For the purpose of this reporting system, minimally invasive procedures are considered open heart surgery.

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

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 required before coronary bypass surgery.

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 to remove plaque. In particular, stents are used for most patients, and devices such as rotoblaters and ultrasound are sometimes used.

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

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) - is 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, 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.

double, triple, quadruple bypass - the average number of bypass grafts created during coronary artery bypass graft surgery 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 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, blood and oxygen 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 valve- 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 - partial destruction of the heart muscle due to interrupted blood supply, also called a heart attack or coronary thrombosis.

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 2000-2002 Risk Factors For Isolated CABG In-Hospital Mortality

The significant pre-procedural risk factors for in-hospital mortality following isolated CABG in the 2000-2002 time period are presented in the table below.

Roughly speaking, the odds ratio for a risk factor represents the number of times more likely a patient with that risk factor is of dying in the hospital during or after CABG 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 2.081. This means that a patient with COPD is approximately 2.081 times as likely to die in the hospital during or after undergoing CABG as a patient without COPD who has the same other significant risk factors.

For all risk factors in the table except age, ejection fraction, previous MI, sum of binary risk factors squared, and vessels diseased, there are only two possibilities – having the risk factor or 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 renal failure.

Previous MI is subdivided into 6 groups: occurring less than 24 hours and having stent thrombosis, occurring less than 6 hours without stent thrombosis; occurring 6-23 hours without stent thrombosis; occurring 1 to 20 days with or without stent thrombosis; occurring 21 days or more prior to the procedure with or without stent thrombosis; and no MI prior to the procedure. The last range, which does not appear in the table below, is referred to as the reference category. The odds ratios for the Previous MI ranges listed below are relative to patients who have not had a previous MI.

Ejection fraction, which is the percentage of blood in the heart's left ventricle that is expelled when it contracts (with more denoting a healthier heart), is subdivided into four ranges (<20%, 20-29%, 30-39% and 40% or more). The last range, which does not appear in the Appendix 1 table, 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% or more. Thus, a patient with an ejection fraction of between 20% and 29% is about 2.550 times as likely to die in the hospital as a patient with an ejection fraction of 40% or higher, all other significant risk factors being the same.

With regard to age, the odds ratio roughly represents the number of times more likely a patient who is over age 60 is to die in the hospital than another patient who is one year younger all other significant risk factors being the same. Thus, a patient undergoing CABG surgery who is 63 years old has a chance of dying in the hospital that is approximately 1.062 times the chance that a 62 year-old patient undergoing CABG surgery has of dying in the hospital, all other risk factors being the same. All patients age 60 or under have roughly the same odds of dying in the hospital if their risk factors are identical.

The sum of binary risk factors squared term is merely the square of the number of risk factors in Appendix 1 that a patient has (not counting age or body surface area, since everybody has them), and is used to improve the ability of the model to predict mortality.

Left Main diseased should be compared with patients who do not have a diseased left main. Therefore, a patient with left main disease is 1.609 times as likely to die in the hospital as a patient without left main disease. Patients with three vessels diseased should be compared to patients with no more than two vessels diseased.

Appendix 1: Multivariable risk factor equation for isolated CABG hospital deaths in NYS, 2000-2002.

		Logistic Regression		
Patient Risk Factor	**Prevalence (%)**	**Coefficient**	**P-Value**	**Odds Ratio**
Demographic				
Age: Number of years greater than 60	—	0.0604	< .0001	1.062
Female Gender	28.53	0.8076	< .0001	2.242
Hemodynamic State				
Unstable	1.00	1.1885	< .0001	3.282
Shock	0.43	2.0515	< .0001	7.780
Ventricular Function				
Ejection Fraction				
<20%	1.81	1.5670	< .0001	4.792
20-29%	6.75	0.9361	< .0001	2.550
30-39%	13.37	0.6726	< .0001	1.959
Pre-Procedural MI				
MI < 24 hours with Stent Thrombosis	0.09	2.7769	< .0001	16.070
MI < 6 hours w/o Stent Thrombosis	0.61	1.7613	< .0001	5.820
MI 6-23 hours w/o Stent Thrombosis	0.83	1.2349	< .0001	3.438
Previous MI 1-20 days with or w/o Stent Thrombosis	22.39	0.7396	< .0001	2.095
Previous MI ≥ 21 days with or w/o Stent Thrombosis	28.60	0.3779	0.0002	1.459
Vessels Diseased				
Left Main	26.33	0.4759	< .0001	1.609
Three Vessels	55.24	0.4235	< .0001	1.527
Comorbidities				
Cerebrovascular Disease	18.88	0.5422	< .0001	1.720
COPD	16.75	0.7329	< .0001	2.081
Extensively Calcified Ascending Aorta	5.01	0.6852	< .0001	1.984
Peripheral Vascular Disease	10.88	0.6426	< .0001	1.901
Renal Failure, Creatinine > 2.5 mg/dl	1.96	1.1191	< .0001	3.062
Renal Failure Requiring Dialysis	1.56	1.7919	< .0001	6.001
Previous Open Heart Operations	5.06	1.4193	< .0001	4.134
Sum of Binary Risk Factors Squared	—	-0.0290	0.0014	0.971

Intercept = -6.1507

C Statistic = 0.803

Appendix 2 2000-2002 Risk Factors For Valve Surgery In-Hospital Mortality

The significant pre-procedural risk factors for in-hospital mortality following valve surgery in the 2000-2002 time period are presented in the table below.

Roughly speaking, the odds ratio for a risk factor represents the number of times more likely a patient with that risk factor is of dying in the hospital during or after valve surgery than a patient without the risk factor, all other risk factors being the same. For example, the odds ratio for the risk factor COPD is 1.815. This means that a patient with COPD is approximately 1.815 times as likely to die in the hospital during or after undergoing valve surgery as a patient without COPD who has the same other significant risk factors.

The odds ratio for type of valve surgery represents the number of times more likely a patient with a specific valve surgery has of dying in the hospital during or after that particular surgery 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 1.928 times as likely to die in the hospital during or after surgery as a patient with aortic valve replacement surgery, all other significant risk factors being the same.

For all risk factors in the table except age there are only two possibilities – having the risk factor or 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 for both categories are relative to patients with no renal failure.

With regard to age, the odds ratio roughly represents the number of times more likely a patient who is over age 70 is to die in the hospital than another patient who is one year younger all other significant risk factors being the same. Thus, a patient undergoing valve surgery who is 73 years old has a chance of dying in the hospital that is approximately 1.098 times the chance that a 72 year-old patient undergoing valve surgery has of dying in the hospital, all other risk factors being the same. All patients age 70 or under have roughly the same odds of dying in the hospital if their risk factors are identical.

Appendix 2: Multivariable risk factor equation for valve surgery hospital deaths in NYS, 2000-2002.

Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
Demographic				
Age: Number of years greater than 70	—	0.0935	< .0001	1.098
Female Gender	50.81	0.2799	0.0053	1.323
Type of Valve Surgery				
Aortic Valve Replacement	47.82		Valve Reference Group	
Mitral Valve Replacement	21.66	0.6566	< .0001	1.928
Mitral Valve Repair	14.64	-0.3512	0.1136	0.704
Multiple Valve Repair/Replacement	15.88	0.9325	< .0001	2.541
Ventricular Function				
Previous MI 7 days or less	1.17	0.9252	0.0018	2.522
Previous MI 8 to 14 days	0.59	0.8672	0.0252	2.380
Previous MI 15 days or more	11.48	0.2935	0.0239	1.341
Hemodynamic State				
Unstable	1.26	1.2844	< .0001	3.613
Shock	0.41	1.9402	< .0001	6.960
Comorbidities				
Cerebrovascular Disease	12.92	0.5041	< .0001	1.655
COPD	17.86	0.5962	< .0001	1.815
Hepatic Failure	0.31	2.0271	< .0001	7.592
Renal Failure, Creatinine > 2.5 mg/dl	2.22	0.7306	0.0005	2.076
Renal Failure Requiring Dialysis	2.53	1.7229	< .0001	5.600
Previous Open Heart Operations	18.64	0.7221	< .0001	2.059

Intercept = -4.5885

C Statistic = 0.786

Appendix 3 2000-2002 Risk Factors For Valve and CABG In-Hospital Mortality

The significant pre-procedural risk factors for in-hospital mortality following valve and CABG surgery in the 2000-2002 time period are presented in the table below.

Roughly speaking, the odds ratio for a risk factor represents the number of times more likely a patient with that risk factor is of dying in the hospital during or after valve and CABG 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 1.590. This means that a patient with Peripheral Vascular Disease is approximately 1.590 times as likely to die in the hospital during or after undergoing valve and CABG surgery as a patient without Peripheral Vascular Disease who has the same other significant risk factors.

The odds ratio for type of valve with CABG surgery represents the number of times more likely a patient with a specific valve with CABG surgery has of dying in the hospital during or after that particular surgery than a patient who has had aortic valve 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 1.942 times as likely to die in the hospital during or after surgery as a patient with aortic valve replacement and CABG surgery, all other significant risk factors being the same.

For all risk factors in the table except age, ejection fraction, and previous MI, there are only two possibilities – having the risk factor or not having it. For example, a patient either has Peripheral Vascular Disease or does not have it. Since renal failure is expressed in terms of renal failure with dialysis and without dialysis, the odds ratios for both categories are relative to patients with no renal failure.

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 two ranges (<20% and 20% or more). The last range, which does not appear in the Appendix 3 table, is referred to as the reference category. This means that the odds ratios that appear for the other ejection fraction category in the table is relative to patients with an ejection fraction of 20% or more. Thus, a patient with an ejection fraction of <20% is about 2.565 times as likely to die in the hospital as a patient with an ejection fraction of 20% or higher, all other significant risk factors being the same.

Previous MI is subdivided into five groups (occurring less than 24 hours prior to the procedure, 1-7 days prior to the procedure, 8-14 days prior to the procedure, 15 or more days prior to the procedure, and no MI prior to the procedure). The last range, which does not appear in the table below, is referred to as the reference category. The odds ratios for the Previous MI ranges listed below are relative to patients who have not had a previous MI prior to the procedure.

With regard to age, the odds ratio roughly represents the number of times more likely a patient who is over age 70 is to die in the hospital than another patient who is one year younger all other significant risk factors being the same. Thus, a patient undergoing valve and CABG surgery who is 73 years old has a chance of dying in the hospital that is approximately 1.064 times the chance that a 72 year-old patient undergoing valve and CABG surgery has of dying in the hospital, all other risk factors being the same. All patients age 70 or under have roughly the same odds of dying in the hospital if their risk factors are identical.

Appendix 3: Multivariable risk factor equation for valve and CABG surgery hospital deaths in NYS, 2000-2002.

Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
Demographic				
Age: Number of years greater than 70	—	0.0622	< .0001	1.064
Female Gender	39.77	0.5857	< .0001	1.796
Type of Valve (with CABG)				
Aortic Valve Replacement	53.94	Valve Reference Group		
Mitral Valve Replacement	18.20	0.6637	< .0001	1.942
Mitral Valve Repair	19.13	0.3366	0.0023	1.400
Multiple Valve Repair/Replacement	8.73	1.0872	< .0001	2.966
Ventricular Function				
Ejection Fraction <20%	3.73	0.9419	< .0001	2.565
Previous MI less than 24 hours	1.01	1.3001	< .0001	3.670
Previous MI 1 to 7 days	8.29	0.7413	< .0001	2.099
Previous MI 8 to 14 days	5.15	0.5758	0.0002	1.779
Previous MI 15 days or more	26.95	0.3230	0.0004	1.381
Hemodynamic State				
Unstable	2.26	0.3681	0.0588	1.445
Shock	1.11	1.2987	< .0001	3.665
Comorbidities				
Peripheral Vascular Disease	12.25	0.4640	< .0001	1.590
Malignant Ventricular Arrhythmia	1.87	0.7866	0.0002	2.196
Renal Failure, Creatinine > 2.5 mg/dl	3.43	0.8654	< .0001	2.376
Renal Failure Requiring Dialysis	2.53	1.4213	< .0001	4.142
Previous Open Heart Operations	10.14	0.7055	< .0001	2.025

Intercept = -3.8373

C Statistic = 0.746

NEW YORK STATE CARDIAC SURGERY CENTERS

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

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

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

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

Buffalo General Hospital
100 High Street
Buffalo, New York 14203

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

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

Mercy Hospital
565 Abbot 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

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

St. Vincent's Hospital & Medical
Center of NY
153 West 11th Street
New York, New York 10011

Staten Island
University-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
SUNY Health Science Center at
Stony Brook
Stony Brook, New York 11794-8410

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

University Hospital Upstate
Medical Center
750 East Adams Street
Syracuse, New York 13210

Vassar Brother's Hospital
45 Reade Place
Poughkeepsie, NY 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

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Albany, New York 12220

State of New York
George E. Pataki, Governor

Department of Health
Antonia C. Novello, M.D., M.P.H., Dr.P.H., Commissioner

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