

**ADULT
CARDIAC
SURGERY**

**in
New York State**

2001 – 2003

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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 2003. 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 2003 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, 2001 and December 31, 2003 are included in the three-year results.

Isolated CABG surgery represented 64.55 percent of all adult cardiac surgery for the three-year period covered by this report. Valve or combined valve/CABG surgery represented 26.37 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 2001 through 2003.

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. Please note that in 2003, patients who were still alive 30 days after discharge to hospice care are not considered mortalities. All other 2003 hospice discharges are counted as mortalities.

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 (1.61% in 2003) to obtain the provider's risk-adjusted rate. For the three year period 2001-2003, the ratio is multiplied by 2.04% for isolated CABG patients or 6.43% for valve or valve/CABG patients.

Interpreting the Risk-Adjusted Mortality Rate

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

RESULTS

2003 Risk Factors for CABG Surgery

The significant pre-operative risk factors for coronary artery bypass surgery in 2003 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 is 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 21.717. This means that a patient who was in shock prior to surgery is approximately 21.717 times as likely to die in the hospital as a patient who was

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.

hemodynamically stable 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 55, ejection fraction (which is a measure of the heart's ability to pump blood), previous MI, and renal failure.

For age, the odds ratio roughly represents the number of times more likely a patient who is older than 55 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 1.067 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 (30% and higher). Thus, patients with an ejection fraction of less than 20% have odds of dying in the hospital that are 2.506 times the odds of a person with an ejection fraction of 30% or higher, all other risk factors being the same.

Previous MI is subdivided into three groups: occurring less than or equal to 7 days prior to surgery, occurring 8 to 14 days prior to surgery and no MI within 14 days prior to surgery. The last range which does not appear in the table that follows is referred to as the reference category. The odds ratios for the Previous MI ranges are relative to patients who have not had a previous MI within 14 days prior to the procedure.

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.

Table 1: Multivariable risk factor equation for CABG hospital deaths in New York State in 2003.

Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
Demographic				
Age: Number of years greater than 55	—	0.0646	< .0001	1.067
Hemodynamic State				
Unstable	1.40	1.0779	0.0007	2.939
Shock	0.36	3.0781	< .0001	21.717
Ventricular Function				
Ejection Fraction < 20 %	2.08	0.9187	0.0024	2.506
Ejection Fraction 20-29 %	7.08	0.6756	0.0005	1.965
Previous MI ≤ 7 days	19.39	0.6632	<.0001	1.941
Previous MI 8 - 14 days	4.72	0.6424	0.0064	1.901
Comorbidities				
Cerebrovascular Disease	18.93	0.6793	< .0001	1.972
Peripheral Vascular Disease	10.58	0.6945	< .0001	2.003
Renal Failure, Creatinine > 2.5 mg/dl	2.12	1.1316	< .0001	3.101
Renal Failure, Dialysis	1.75	1.4246	< .0001	4.156
Previous Open Heart Operations	4.33	1.2058	< .0001	3.339

Intercept = -6.0110

C Statistic = 0.806

2003 HOSPITAL OUTCOMES FOR CABG SURGERY

Table 2 presents the CABG surgery results for the 37 hospitals performing this operation in New York during the year 2003. The table contains, for each hospital, the number of isolated CABG operations (CABG operations with no other major heart surgery) resulting in 2003 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 14,692 CABG procedures performed at the 37 hospitals was 1.61%. Observed mortality rates ranged from 0.00% to 6.25%. The range of expected

mortality rates, which measure patient severity of illness, was 0.98% to 2.26%.

The risk-adjusted mortality rates, which are used to measure performance, ranged from 0.00% to 4.46%. One hospital (University Hospital of Brooklyn) had risk-adjusted mortality rates that were significantly higher than the statewide rate. No hospitals had significantly lower risk-adjusted rates than the State.

2001 - 2003 HOSPITAL OUTCOMES

Table 3 presents the combined Valve Only and Valve/CABG surgery results for the 37 hospitals performing these operations in New York during the years 2001-2003. The table contains, for each hospital, the number of combined Valve Only and Valve/CABG operations resulting in 2001-2003 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 19,525 combined Valve Only and Valve/CABG procedures performed at the 37 hospitals was 6.43%. Observed mortality rates ranged from 0.00% to 10.62%. The range of expected mortality rates, which measure patient severity of illness, was 2.06% to 8.46%.

The risk-adjusted mortality rates, which are used to measure performance, ranged from 0.00% to 11.65%. Three hospitals (Lenox Hill Hospital, Maimonides Medical Center and Strong Memorial Hospital) had risk-adjusted mortality rates that were significantly higher than the statewide rate. Four hospitals (St. Francis Hospital, St. Joseph's Hospital, St. Peter's Hospital and Vassar Brother's Medical Center) had significantly lower risk-adjusted rates than the State.

Table 4 presents valve procedures performed at the 37 cardiac surgery hospitals in New York during 2001-2003. The table contains, for each hospital, the number of valve operations (as defined by eight separate groups: Aortic

Valve Replacements, Aortic Valve Repair or Replacements plus CABG, Mitral Valve Replacement, Mitral Valve Replacement plus CABG, Mitral Valve Repair, Mitral Valve Repair plus CABG, Multiple Valve Surgery, Multiple Valve Surgery plus CABG) resulting in 2001-2003 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.

Note on Hospitals Not Performing Cardiac Surgery During Entire 2001-2003 Period

Several hospitals began performing cardiac surgery during the 2001 - 2003 time period on which this report is based. These hospitals and the month of the first cardiac surgery are listed below. Staten Island University Hospital - March 2001; Mercy Hospital - January 2003; and Mary Imogene Bassett Hospital - March 2003.

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 2.04% for isolated CABG patients in 2001-2003 or 6.43% for Valve or Valve/CABG patients in 2001-2003).

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, 2003 Discharges (Listed Alphabetically by Hospital)

Hospital	Cases	Deaths	OMR	EMR	RAMR	95% CI for RAMR
Albany Medical Center	548	5	0.91	1.43	1.03	(0.33, 2.40)
Arnot-Ogden	126	1	0.79	1.55	0.82	(0.01, 4.58)
Bellevue	97	2	2.06	0.98	3.40	(0.38,12.28)
Beth Israel	344	6	1.74	1.29	2.18	(0.80, 4.75)
Buffalo General	554	9	1.62	1.43	1.83	(0.84, 3.48)
Columbia Presbyterian	413	3	0.73	1.32	0.89	(0.18, 2.60)
Ellis Hospital	379	4	1.06	1.23	1.38	(0.37, 3.54)
Erie County	244	2	0.82	1.51	0.88	(0.10, 3.17)
LIJ Medical Center	283	4	1.41	1.48	1.54	(0.41, 3.94)
Lenox Hill	474	8	1.69	1.63	1.67	(0.72, 3.28)
Maimonides	535	11	2.06	2.09	1.59	(0.79, 2.84)
Mary Imogene Bassett Hosp.	79	1	1.27	1.34	1.52	(0.02, 8.45)
Mercy Hospital	218	6	2.75	1.46	3.05	(1.11, 6.64)
Millard Fillmore	369	5	1.36	1.24	1.76	(0.57, 4.12)
Montefiore - Einstein	206	6	2.91	1.24	3.79	(1.38, 8.25)
Montefiore - Moses	301	6	1.99	1.43	2.25	(0.82, 4.90)
Mount Sinai	256	2	0.78	1.20	1.05	(0.12, 3.79)
NY Hospital - Queens	265	3	1.13	1.46	1.25	(0.25, 3.67)
NYU Hospitals Center	215	2	0.93	1.73	0.87	(0.10, 3.13)
North Shore	787	19	2.41	1.82	2.14	(1.29, 3.35)
Rochester General	646	9	1.39	1.94	1.16	(0.53, 2.20)
St. Elizabeth	385	6	1.56	1.64	1.54	(0.56, 3.34)
St. Francis	1424	28	1.97	1.60	1.99	(1.32, 2.87)
St. Josephs	574	7	1.22	1.75	1.12	(0.45, 2.31)
St. Lukes-Roosevelt	210	4	1.90	1.57	1.96	(0.53, 5.02)
St. Peters	535	3	0.56	1.42	0.64	(0.13, 1.86)
St. Vincents	255	6	2.35	1.46	2.60	(0.95, 5.65)
Staten Island - North	561	6	1.07	1.75	0.99	(0.36, 2.15)
Strong Memorial	393	7	1.78	1.54	1.86	(0.75, 3.84)
United Health Services	306	6	1.96	1.61	1.96	(0.72, 4.27)
Univ Hosp-Stony Brook	509	13	2.55	2.15	1.91	(1.02, 3.27)
Univ. Hosp. - Upstate	340	7	2.06	2.21	1.51	(0.60, 3.10)
Univ. Hosp. of Brooklyn	96	6	6.25	2.26	4.46 *	(1.63, 9.72)
Vassar Brothers	197	0	0.00	1.83	0.00	(0.00, 1.64)
Weill Cornell-NYP	619	8	1.29	1.41	1.48	(0.64, 2.91)
Westchester Med. Ctr.	585	13	2.22	1.80	1.99	(1.06, 3.40)
Winthrop Univ. Hosp.	364	3	0.82	1.59	0.84	(0.17, 2.44)
Total	14692	237	1.61	1.61	1.61	

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

Table 3: Observed, Expected, and Risk-Adjusted Mortality Rates for Valve or Valve/CABG Surgery in New York State, 2001-2003 Discharges.

Hospital	Cases	Deaths	OMR	EMR	RAMR	95% CI for RAMR
Albany Medical Center	520	25	4.81	5.81	5.32	(3.44, 7.86)
Arnot-Ogden	88	1	1.14	4.14	1.77	(0.02, 9.83)
Bellevue	107	4	3.74	2.06	11.65	(3.13,29.83)
Beth Israel	479	29	6.05	7.00	5.56	(3.72, 7.99)
Buffalo General	469	29	6.18	5.28	7.53	(5.04,10.81)
Columbia Presbyterian-NYP	1175	67	5.70	5.09	7.20	(5.58, 9.14)
Ellis Hospital	388	18	4.64	5.23	5.70	(3.38, 9.01)
Erie County	160	5	3.13	4.93	4.07	(1.31, 9.51)
LIJ Medical Center	505	40	7.92	7.35	6.93	(4.95, 9.44)
Lenox Hill	842	83	9.86	6.46	9.82 *	(7.82,12.17)
Maimonides	612	65	10.62	8.18	8.35 *	(6.44,10.64)
Mary Imogene Bassett Hosp.	19	0	0.00	4.69	0.00	(0.00,26.48)
Mercy Hospital	41	4	9.76	5.75	10.91	(2.93,27.92)
Millard Fillmore	183	8	4.37	5.05	5.56	(2.40,10.97)
Montefiore - Einstein	304	25	8.22	5.84	9.07	(5.86,13.38)
Montefiore - Moses	340	23	6.76	5.68	7.67	(4.86,11.50)
Mount Sinai	583	36	6.17	6.05	6.56	(4.59, 9.08)
NYU Hospitals Center	1517	98	6.46	5.28	7.87	(6.39, 9.59)
New York Hospital - Queens	200	8	4.00	5.82	4.42	(1.90, 8.70)
North Shore	1102	91	8.26	8.05	6.60	(5.31, 8.10)
Rochester General	744	49	6.59	7.06	6.00	(4.44, 7.94)
St. Elizabeth	359	30	8.36	6.96	7.72	(5.21,11.02)
St. Francis	1907	100	5.24	7.04	4.79 **	3.90, 5.83)
St. Josephs	760	33	4.34	7.13	3.92 **	(2.70, 5.50)
St. Lukes-Roosevelt	295	18	6.10	5.93	6.62	(3.92,10.47)
St. Peters	735	24	3.27	6.01	3.49 **	(2.24, 5.20)
St. Vincents	286	27	9.44	7.49	8.11	(5.34,11.80)
Staten Island - North	228	12	5.26	5.68	5.96	(3.08,10.42)
Strong Memorial	592	53	8.95	6.33	9.10 *	(6.81,11.90)
United Health Services	240	13	5.42	5.58	6.25	(3.32,10.68)
Univ. Hosp. - Stony Brook	380	35	9.21	6.70	8.84	(6.16,12.30)
Univ. Hosp. - Upstate	426	35	8.22	7.88	6.70	(4.67, 9.32)
Univ. Hosp. of Brooklyn	150	12	8.00	5.18	9.94	(5.13,17.37)
Vassar Brothers	275	6	2.18	6.04	2.33 **	(0.85, 5.06)
Weill Cornell-NYP	1221	54	4.42	5.74	4.96	(3.72, 6.47)
Westchester Medical Center	599	44	7.35	6.97	6.78	(4.93, 9.11)
Winthrop Univ. Hosp.	694	52	7.49	8.46	5.70	(4.26, 7.47)
Total	19525	1256	6.43	6.43	6.43	

* 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, 2001-2003 Discharges

Hospital	Aortic Valve Replace Surgery	Aortic Valve and CABG	Mitral Valve Replace Surgery	Mitral Replace and CABG	Mitral Valve Repair Surgery	Mitral Repair and CABG	Multiple Valve Surgery	Multiple Valve and CABG	Total Valve or Valve/CABG
Albany Medical Center	113	185	43	32	22	62	33	30	520
Arnot-Ogden	31	29	6	4	7	9	1	1	88
Bellevue	39	3	21	1	12	2	28	1	107
Beth Israel	81	87	61	56	34	51	72	37	479
Buffalo General	131	131	40	38	41	59	19	10	469
Columbia Presbyterian-NYP	340	230	115	65	176	109	107	33	1175
Ellis Hospital	91	133	32	26	43	42	12	9	388
Erie County	47	45	31	18	2	4	9	4	160
Lenox Hill	175	127	77	53	141	121	100	48	842
LIJ Medical Center	92	119	80	52	38	57	37	30	505
Maimonides	146	141	61	43	35	84	68	34	612
Mary Imogene Bassett Hosp	3	11	2	1	0	0	1	1	19
Mercy Hospital	10	12	5	1	1	8	3	1	41
Millard Fillmore	48	75	14	15	11	13	4	3	183
Montefiore - Einstein	65	58	55	40	18	23	33	12	304
Montefiore - Moses	85	76	51	41	18	15	45	9	340
Mount Sinai	98	88	61	24	89	71	126	26	583
NYU Hospitals Center	459	183	152	43	415	75	156	34	1517
New York Hospital - Queens	52	47	33	15	11	21	14	7	200
North Shore	311	238	156	120	56	79	93	49	1102
Rochester General	227	217	73	51	39	73	43	21	744
St. Elizabeth	69	107	27	20	26	57	28	25	359
St. Francis	524	541	189	144	90	139	184	96	1907
St. Josephs	206	241	69	73	46	36	55	34	760
St. Lukes-Roosevelt	48	62	37	20	40	46	27	15	295
St. Peters	180	213	75	67	43	79	43	35	735
St. Vincents	66	53	41	33	7	30	42	14	286
Staten Island - North	40	83	39	36	14	4	8	4	228
Strong Memorial	185	116	62	35	47	57	62	28	592
United Health Services	79	89	21	18	13	7	7	6	240
Univ. Hosp. - Stony Brook	89	100	40	35	29	49	27	11	380
Univ. Hosp. - Upstate	84	108	46	32	28	59	49	20	426
Univ. Hosp. of Brooklyn	25	14	23	15	13	32	22	6	150
Vassar Brothers	59	75	32	27	14	50	12	6	275
Weill Cornell-NYP	341	256	182	97	94	57	130	64	1221
Westchester Medical Center	177	156	49	58	32	69	38	20	599
Winthrop Univ. Hosp.	162	202	66	63	21	104	53	23	694
Total	4978	4651	2167	1512	1766	1853	1791	807	19525
State-wide Mortality Rate (%)	3.11	5.76	5.63	13.69	1.64	8.69	9.27	18.34	6.43

2001 – 2003 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 and the 95% confidence interval for the risk-adjusted mortality rate for isolated CABG patients in 2001-2003. 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 2001-2003 for each of the 37 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 2001-2003, and/or (b) who performed at least

one cardiac operation in each of the years 2001-2003. 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 2001-2003 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: Observed, Expected, and Risk-Adjusted Mortality Rates by Surgeon for Isolated CABG and Valve Surgery (done in combination with or without CABG), in NYS, 2001 - 2003

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
STATEWIDE TOTAL	47795	973	2.04	2.04	2.04		67320	3.31
Albany Medical Center								
Britton L	360	6	1.67	1.55	2.19	(0.80, 4.76)	508	3.22
##Canavan T	214	2	0.93	1.45	1.31	(0.15, 4.74)	247	2.84
Canver C	232	6	2.59	2.20	2.39	(0.87, 5.20)	310	2.80
#Depan H	4	0	0.00	1.35	0.00	(0.00,100.0)	8	0.00
Devejian N	0	0	0.0	0.00	0.00	(0.00, 0.00)	12	15.31
#Kelley J	105	1	0.95	1.93	1.01	(0.01, 5.59)	146	1.50
##Miller S	434	9	2.07	1.91	2.21	(1.01, 4.20)	543	2.69
Perez T	105	3	2.86	1.66	3.50	(0.70,10.22)	136	6.53
##Saifi J	1	0	0.00	1.03	0.00	(0.00,100.0)	1	0.00
#Sardella G	264	7	2.65	1.74	3.11	(1.24, 6.40)	328	3.79
Total	1719	34	1.98	1.77	2.27	(1.57, 3.17)	2239	3.22
Arnot-Ogden								
Curiale S V	179	2	1.12	1.43	1.59	(0.18, 5.76)	218	2.44
#Nast E	208	1	0.48	2.03	0.48	(0.01, 2.68)	255	0.52 **
All Others	15	0	0.00	0.82	0.00	(0.00,60.60)	17	0.00
Total	402	3	0.75	1.72	0.88	(0.18, 2.58)	490	1.26**

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								
#Grossi E	18	0	0.00	0.84	0.00	(0.00,49.25)	27	0.00
#Ribakove G	39	0	0.00	1.41	0.00	(0.00,13.61)	102	6.54
#Zervos M	101	1	0.99	0.89	2.27	(0.03,12.63)	119	2.76
All Others	62	1	1.61	1.05	3.13	(0.04,17.44)	79	3.43
Total	220	2	0.91	1.02	1.81	(0.20, 6.54)	327	4.46
Beth Israel								
#Geller C	197	2	1.02	1.59	1.30	(0.15, 4.70)	233	3.74
Harris L	284	5	1.76	1.79	2.00	(0.65, 4.67)	338	2.92
#Hoffman D	130	0	0.00	1.75	0.00	(0.00, 3.29)	152	1.88
Stelzer P	55	2	3.64	1.38	5.36	(0.60,19.34)	283	2.54
#Tranbaugh R	531	14	2.64	1.60	3.36	(1.84, 5.64)	670	4.13
Total	1197	23	1.92	1.65	2.37	(1.50, 3.56)	1676	3.23
Buffalo General								
#Aldridge J	1	0	0.00	1.16	0.00	(0.00,100.0)	1	0.00
#Ashraf M	20	0	0.00	1.02	0.00	(0.00,36.54)	23	0.00
##Brodman R	72	0	0.00	1.64	0.00	(0.00, 6.33)	108	4.28
Grosner G	742	7	0.94	1.84	1.04	(0.42, 2.15)	1076	2.62
##Karamanoukian H	304	15	4.93	1.92	5.24 *	(2.93, 8.64)	322	8.23 *
#Lajos T	.	.	.	.	.	(. , .)	1	0.00
#Lewin A	397	13	3.27	1.83	3.65	(1.94, 6.24)	402	6.21 *
##Raza S	351	10	2.85	1.92	3.02	(1.44, 5.55)	409	4.57
All Others	117	8	6.84	2.36	5.90 *	(2.54,11.63)	131	7.59
Total	2004	53	2.64	1.88	2.87 *	(2.15, 3.75)	2473	4.35 *
Columbia Presbyterian-NYP								
Argenziano M	95	3	3.16	1.74	3.69	(0.74,10.78)	141	4.02
#Derose J J	1	0	0.00	0.65	0.00	(0.00,100.0)	1	0.00
Edwards N	149	1	0.67	2.18	0.63	(0.01, 3.49)	244	2.86
Esrig B	3	0	0.00	4.47	0.00	(0.00,55.70)	5	0.00
Mosca R S	2	0	0.00	1.19	0.00	(0.00,100.0)	12	0.00
Naka Y	246	8	3.25	2.23	2.96	(1.28, 5.84)	366	5.14
Oz M	485	5	1.03	1.63	1.29	(0.42, 3.01)	906	2.94
Quaegebeur J	1	0	0.00	1.03	0.00	(0.00,100.0)	12	19.63
Rose E	32	2	6.25	0.96	13.23	(1.49,47.78)	73	3.87
Smith C	387	10	2.58	1.24	4.23	(2.02, 7.78)	802	4.20
Ting W	12	1	8.33	1.64	10.35	(0.14,57.59)	25	7.07
All Others	8	1	12.50	0.69	36.84	(0.48,100.0)	9	30.25
Total	1421	31	2.18	1.68	2.65	(1.80, 3.76)	2596	3.88

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	490	12	2.45	1.21	4.13 *	(2.13, 7.22)	573	6.25 *
##Canavan T	2	0	0.00	2.30	0.00	(0.00,100.0)	2	0.00
#Depan H	356	8	2.25	2.02	2.27	(0.98, 4.47)	570	3.06
##Miller S	5	0	0.00	2.45	0.00	(0.00,61.02)	5	0.00
Reich H	377	4	1.06	1.64	1.32	(0.35, 3.38)	465	1.59
##Saifi J	2	0	0.00	1.06	0.00	(0.00,100.0)	3	0.00
All Others	14	0	0.00	2.22	0.00	(0.00,24.05)	16	0.00
Total	1246	24	1.93	1.59	2.47	(1.58, 3.68)	1634	3.47
Erie County								
Bell-Thomson J	448	6	1.34	1.86	1.46	(0.53, 3.18)	579	1.77
#Datta S	270	1	0.37	1.82	0.41	(0.01, 2.31)	287	1.16
##Karamanoukian H	0	0	0.0	0.00	0.00	(0.00, 0.00)	1	0.00
#Lajos T	7	0	0.00	3.69	0.00	(0.00,28.87)	8	8.21
##Raza S	17	1	5.88	3.41	3.51	(0.05,19.51)	22	9.42
All Others	22	0	0.00	1.41	0.00	(0.00,24.05)	27	0.00
Total	764	8	1.05	1.89	1.13	(0.49, 2.23)	924	1.93**
LIJ Medical Center								
Graver L	464	5	1.08	2.17	1.01	(0.33, 2.36)	805	3.24
Palazzo R	380	5	1.32	1.80	1.49	(0.48, 3.47)	523	2.66
#Vatsia S	2	0	0.00	1.50	0.00	(0.00,100.0)	2	0.00
All Others	51	1	1.96	1.84	2.17	(0.03,12.08)	72	3.30
Total	897	11	1.23	1.99	1.25	(0.63, 2.24)	1402	3.07
Lenox Hill								
Connolly M	381	7	1.84	1.94	1.93	(0.77, 3.97)	530	3.93
Fonger J D	83	3	3.61	2.51	2.93	(0.59, 8.56)	104	5.90
##Genovesi M	1	0	0.00	0.29	0.00	(0.00,100.0)	1	0.00
Loulmet D F	60	1	1.67	1.01	3.35	(0.04,18.64)	296	5.27
McCabe J	44	0	0.00	1.32	0.00	(0.00,12.88)	56	5.27
Patel N	221	1	0.45	1.42	0.65	(0.01, 3.62)	244	2.45
##Reddy R C	40	0	0.00	1.77	0.00	(0.00,10.54)	71	2.75
#Safavi A	5	0	0.00	0.63	0.00	(0.00,100.0)	6	0.00
Subramanian V	869	22	2.53	2.35	2.19	(1.37, 3.32)	1094	4.61 *
All Others	98	3	3.06	1.80	3.47	(0.70,10.14)	242	3.64
Total	1802	37	2.05	2.04	2.05	(1.44, 2.83)	2644	4.36 *
Maimonides								
Abrol S	144	1	0.69	3.34	0.42	(0.01, 2.36)	184	2.12
Acinapura A	69	2	2.90	1.66	3.55	(0.40,12.80)	85	5.44
#Anderson J	37	3	8.11	2.68	6.17	(1.24,18.02)	44	6.99

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
<i>Maimonides continued</i>								
#Brevetti GR	4	0	0.00	3.47	0.00	(0.00,53.84)	5	0.00
#Burack J	1	0	0.00	0.25	0.00	(0.00,100.0)	2	0.00
Cunningham J N	215	8	3.72	1.88	4.04	(1.74, 7.96)	277	5.60
##Genovesi M	53	6	11.32	3.32	6.94 *	(2.53,15.11)	60	8.55 *
#Jacobowitz I	782	21	2.69	2.82	1.94	(1.20, 2.96)	1066	3.60
LaPunzina C S	3	0	0.00	0.41	0.00	(0.00,100.0)	3	0.00
##Reddy R C	5	0	0.00	1.53	0.00	(0.00,97.54)	5	0.00
#Sabado M	96	3	3.13	3.35	1.90	(0.38, 5.55)	141	2.97
Vaynblat M	265	3	1.13	2.69	0.86	(0.17, 2.50)	324	2.70
Zisbrod Z	326	10	3.07	2.50	2.49	(1.19, 4.59)	413	4.83
All Others	8	0	0.00	1.93	0.00	(0.00,48.28)	11	10.37
Total	2008	57	2.84	2.67	2.16	(1.64, 2.80)	2620	3.89
Mary Imogene Bassett Hosp.								
All Physicians	79	1	1.27	1.58	1.63	(0.02, 9.06)	98	1.55
Total	79	1	1.27	1.58	1.63	(0.02, 9.06)	98	1.55
Mercy Hospital								
##Raza S	24	1	4.17	1.50	5.65	(0.07,31.43)	27	7.63
All Others	307	9	2.93	1.91	3.13	(1.43, 5.94)	345	5.29
Total	331	10	3.02	1.88	3.28	(1.57, 6.03)	372	5.41
Millard Fillmore								
#Aldridge J	358	7	1.96	1.83	2.17	(0.87, 4.48)	407	3.21
#Ashraf M	689	6	0.87	1.53	1.16	(0.42, 2.52)	805	1.97
##Brodman R	1	0	0.00	0.25	0.00	(0.00,100.0)	1	0.00
#Datta S	6	0	0.00	1.19	0.00	(0.00,100.0)	6	0.00
Jennings L	219	1	0.46	1.70	0.55	(0.01, 3.04)	230	1.61
##Karamanoukian H	1	0	0.00	10.54	0.00	(0.00,70.86)	1	0.00
#Lewin A	9	0	0.00	0.84	0.00	(0.00,98.30)	9	0.00
##Raza S	3	0	0.00	0.45	0.00	(0.00,100.0)	3	0.00
All Others	56	2	3.57	2.16	3.36	(0.38,12.14)	63	5.60
Total	1342	16	1.19	1.66	1.46	(0.83, 2.37)	1525	2.52
Montefiore - Einstein								
##Camacho M	1	0	0.00	2.61	0.00	(0.00,100.0)	13	9.63
#Frymus M	376	6	1.60	1.80	1.81	(0.66, 3.93)	472	4.92
#Garcia J P	9	1	11.11	5.36	4.22	(0.06,23.47)	20	7.85
#Gold J	55	0	0.00	0.88	0.00	(0.00,15.41)	90	1.54
#Plestis K A	286	3	1.05	1.83	1.17	(0.24, 3.42)	436	2.73
##Tortolani A	1	0	0.00	2.45	0.00	(0.00,100.0)	1	0.00
Total	728	10	1.37	1.78	1.57	(0.75, 2.88)	1032	3.77

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	209	2	0.96	1.54	1.27	(0.14, 4.58)	289	2.30
##Camacho M	136	0	0.00	1.53	0.00	(0.00, 3.58)	194	2.09
Crooke G	.	.	.	.	.	(. , .)	2	0.00
#Frymus M	2	0	0.00	1.47	0.00	(0.00,100.0)	2	0.00
#Garcia J P	88	6	6.82	1.68	8.24 *	(3.01,17.95)	114	12.05 *
#Gold J	129	0	0.00	1.65	0.00	(0.00, 3.50)	174	2.23
Merav A	232	11	4.74	1.80	5.37 *	(2.68, 9.61)	332	5.27
#Plestis K A	88	1	1.14	1.66	1.39	(0.02, 7.76)	115	3.00
All Others	3	0	0.00	1.21	0.00	(0.00,100.0)	5	25.89
Total	887	20	2.25	1.65	2.79	(1.70, 4.31)	1227	4.20
Mount Sinai								
Adams DH	96	1	1.04	1.05	2.01	(0.03,11.20)	305	3.28
Galla J	97	6	6.19	1.54	8.16 *	(2.98,17.76)	158	7.58 *
Griep R	15	0	0.00	1.94	0.00	(0.00,25.69)	41	2.62
Lansman S	206	4	1.94	1.73	2.28	(0.61, 5.84)	292	4.21
Nguyen K	1	0	0.00	18.06	0.00	(0.00,41.34)	2	0.00
Spielvogel D	300	6	2.00	1.94	2.10	(0.77, 4.58)	433	3.14
All Others	190	7	3.68	1.77	4.23	(1.70, 8.72)	257	4.07
Total	905	24	2.65	1.74	3.11	(1.99, 4.62)	1488	3.89
NYU Hospitals Center								
Colvin S	49	0	0.00	2.26	0.00	(0.00, 6.74)	729	3.86
Culliford A	269	8	2.97	2.52	2.40	(1.03, 4.73)	488	4.07
#Esposito R	145	3	2.07	2.08	2.03	(0.41, 5.92)	230	3.98
Galloway A	153	6	3.92	2.12	3.77	(1.38, 8.21)	480	3.92
#Grossi E	80	6	7.50	3.35	4.56	(1.66, 9.92)	133	6.82 *
#Ribakove G	172	3	1.74	2.24	1.59	(0.32, 4.64)	303	3.00
#Zervos M	3	0	0.00	2.11	0.00	(0.00,100.0)	3	0.00
All Others	36	2	5.56	4.91	2.31	(0.26, 8.32)	58	7.60
Total	907	28	3.09	2.48	2.53	(1.68, 3.66)	2424	4.07 *
New York Hospital - Queens								
Aronis M	295	4	1.36	1.43	1.93	(0.52, 4.94)	363	3.25
#Ko W	537	7	1.30	1.80	1.47	(0.59, 3.04)	641	2.40
##Tortolani A	123	1	0.81	2.30	0.72	(0.01, 4.00)	151	0.71
All Others	1	0	0.00	0.25	0.00	(0.00,100.0)	1	0.00
Total	956	12	1.26	1.75	1.46	(0.75, 2.55)	1156	2.33

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								
##Camacho M	70	6	8.57	2.37	7.37 *	(2.69, 16.04)	105	9.99 *
#Esposito R	275	5	1.82	2.53	1.46	(0.47, 3.41)	380	2.07
Hall M	582	13	2.23	2.58	1.77	(0.94, 3.02)	837	2.75
#Hartman A	180	2	1.11	2.27	1.00	(0.11, 3.60)	390	3.30
Levy M	212	1	0.47	1.58	0.61	(0.01, 3.38)	304	4.36
Pogo G	585	11	1.88	1.95	1.97	(0.98, 3.52)	872	3.62
#Vatsia S	333	7	2.10	1.99	2.15	(0.86, 4.42)	450	2.56
All Others	.	.	.	.	.	(. , .)	1	0.00
Total	2237	45	2.01	2.19	1.87	(1.36, 2.50)	3339	3.27
Rochester General								
Cheeran D	774	12	1.55	2.61	1.21	(0.62, 2.11)	1056	2.30
Green G R	233	7	3.00	2.28	2.69	(1.08, 5.54)	281	3.65
Kirshner R	672	12	1.79	2.67	1.36	(0.70, 2.37)	984	2.73
#Knight P	196	5	2.55	2.94	1.77	(0.57, 4.12)	298	3.84
Total	1875	36	1.92	2.63	1.49	(1.04, 2.06)	2619	2.77
St. Elizabeth								
Carr T	188	4	2.13	1.72	2.52	(0.68, 6.46)	208	3.17
#Elamir N	41	0	0.00	1.93	0.00	(0.00, 9.43)	58	3.67
Joyce F	408	13	3.19	1.81	3.59	(1.91, 6.14)	581	5.17 *
#Kelley J	270	8	2.96	2.36	2.55	(1.10, 5.03)	353	3.82
Singh C	170	3	1.76	1.67	2.15	(0.43, 6.29)	201	3.57
All Others	114	4	3.51	2.29	3.12	(0.84, 7.98)	149	3.85
Total	1191	32	2.69	1.95	2.81	(1.92, 3.96)	1550	4.26
St. Francis								
Bercow N	697	27	3.87	2.35	3.36 *	(2.21, 4.89)	907	3.49
Colangelo R	751	17	2.26	2.33	1.97	(1.15, 3.16)	1002	2.93
Damus P	501	5	1.00	1.73	1.17	(0.38, 2.74)	934	2.40
Davison M J	243	6	2.47	1.92	2.61	(0.95, 5.69)	276	3.83
Durban L	39	0	0.00	2.38	0.00	(0.00, 8.04)	53	1.74
Fernandez H A	326	11	3.37	2.65	2.59	(1.29, 4.64)	377	3.87
Lamendola C	731	15	2.05	2.22	1.88	(1.05, 3.10)	960	2.93
Robinson N	691	14	2.03	1.62	2.55	(1.39, 4.27)	945	3.35
Taylor J	760	15	1.97	2.00	2.01	(1.12, 3.31)	1192	2.56
Total	4739	110	2.32	2.10	2.25	(1.85, 2.71)	6646	2.98

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. Josephs								
Marvasti M	491	3	0.61	2.15	0.58 **	(0.12, 1.69)	709	0.97 **
#Nast E	16	0	0.00	1.83	0.00	(0.00,25.52)	19	0.00
Nazem A	588	10	1.70	2.35	1.48	(0.71, 2.72)	744	2.04 **
Rosenberg J	566	13	2.30	2.06	2.27	(1.21, 3.87)	918	3.15
Zhou Z	167	2	1.20	2.39	1.02	(0.11, 3.68)	197	1.43
All Others	1	0	0.00	3.43	0.00	(0.00,100.0)	2	0.00
Total	1829	28	1.53	2.21	1.41	(0.94, 2.04)	2589	2.14 **
St. Lukes-Roosevelt								
#Derose J J	162	3	1.85	1.85	2.04	(0.41, 5.96)	250	3.21
#Geller C	1	0	0.00	0.25	0.00	(0.00,100.0)	1	0.00
#Hoffman D	17	0	0.00	1.95	0.00	(0.00,22.55)	24	4.16
#Safavi A	31	3	9.68	1.86	10.57 *	(2.12,30.88)	44	12.56 *
Swistel D	436	7	1.61	2.34	1.39	(0.56, 2.87)	621	2.70
#Tranbaugh R	2	0	0.00	0.87	0.00	(0.00,100.0)	4	0.00
Total	649	13	2.00	2.18	1.87	(1.00, 3.20)	944	3.25
St. Peters								
Bennett E	291	1	0.34	1.71	0.41	(0.01, 2.27)	531	1.16 **
##Canavan T	233	0	0.00	1.46	0.00	(0.00, 2.19)	267	0.59 **
Dal Col R	486	7	1.44	1.24	2.36	(0.95, 4.87)	686	1.86
##Miller S	3	0	0.00	3.43	0.00	(0.00,72.54)	3	0.00
##Saifi J	457	7	1.53	2.02	1.54	(0.62, 3.18)	649	2.12
#Sardella G	238	3	1.26	1.75	1.47	(0.29, 4.29)	307	3.96
Total	1708	18	1.05	1.64	1.31	(0.78, 2.07)	2443	1.93 **
St. Vincents								
Lang S	436	11	2.52	1.93	2.66	(1.33, 4.77)	556	4.74
#McGinn J	31	0	0.00	1.69	0.00	(0.00,14.26)	35	0.00
##Reddy R C	94	3	3.19	1.91	3.40	(0.68, 9.94)	132	4.18
Shin YT	296	6	2.03	2.46	1.68	(0.61, 3.65)	393	2.53
All Others	125	5	4.00	2.33	3.49	(1.13, 8.15)	152	6.87
Total	982	25	2.55	2.13	2.43	(1.57, 3.59)	1268	4.07
Staten Island - North								
#McGinn J	1029	10	0.97	2.37	0.84 **	(0.40, 1.54)	1167	1.79 **
Molinaro P J	168	0	0.00	1.34	0.00	(0.00, 3.32)	219	2.11
All Others	140	1	0.71	1.11	1.30	(0.02, 7.26)	179	2.08
Total	1337	11	0.82	2.11	0.79 **	(0.40, 1.42)	1565	1.85 **

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
Strong Memorial								
#Alfieris G	4	0	0.00	2.03	0.00	(0.00,92.13)	5	0.00
Hicks G	303	8	2.64	2.42	2.22	(0.96, 4.37)	508	3.89
#Knight P	393	9	2.29	2.14	2.18	(0.99, 4.13)	626	4.31
Massey H	249	6	2.41	2.71	1.81	(0.66, 3.94)	339	3.67
Risher W	108	5	4.63	1.80	5.23	(1.68,12.19)	171	7.09 *
Total	1057	28	2.65	2.32	2.32	(1.54, 3.36)	1649	4.33 *
United Health Services								
Quintos E	307	9	2.93	2.33	2.56	(1.17, 4.86)	358	3.14
Wong K	330	4	1.21	2.17	1.14	(0.31, 2.91)	418	2.66
Yousuf M	316	6	1.90	2.46	1.57	(0.57, 3.42)	417	3.18
Total	953	19	1.99	2.32	1.75	(1.05, 2.73)	1193	2.98
Univ. Hosp. - Stony Brook								
Bilfinger T	262	7	2.67	2.01	2.70	(1.08, 5.57)	314	3.49
Krukenkamp I	386	10	2.59	2.24	2.35	(1.13, 4.32)	545	4.77
McLarty A	194	7	3.61	1.97	3.73	(1.49, 7.68)	216	4.81
Seifert F	709	13	1.83	1.82	2.05	(1.09, 3.51)	833	4.01
All Others	122	5	4.10	1.97	4.24	(1.37, 9.90)	145	6.05
Total	1673	42	2.51	1.97	2.59	(1.86, 3.50)	2053	4.36 *
Univ. Hosp. - Upstate								
#Alfieris G	4	2	50.00	1.77	57.36 *	(6.44,100.0)	22	6.04
Brandt B	154	3	1.95	3.16	1.26	(0.25, 3.67)	211	3.45
#Elamir N	151	2	1.32	2.23	1.21	(0.14, 4.36)	215	2.69
Fink GW	341	8	2.35	2.06	2.32	(1.00, 4.56)	458	3.46
Picone A	286	7	2.45	2.40	2.07	(0.83, 4.27)	412	3.17
All Others	132	3	2.27	2.92	1.58	(0.32, 4.63)	176	3.48
Total	1068	25	2.34	2.44	1.95	(1.26, 2.88)	1494	3.33
Univ. Hosp. of Brooklyn								
#Anderson J	24	1	4.17	1.65	5.16	(0.07,28.69)	33	2.70
#Brevetti GR	64	2	3.13	2.09	3.05	(0.34,11.01)	89	6.21
#Burack J	68	5	7.35	2.22	6.74 *	(2.17,15.72)	84	10.21 *
##Genovesi M	63	2	3.17	1.25	5.17	(0.58,18.68)	77	10.24
#Jacobowitz I	42	2	4.76	2.30	4.21	(0.47,15.21)	61	4.97
##Reddy R C	21	0	0.00	1.26	0.00	(0.00,28.14)	31	3.49
#Sabado M	86	4	4.65	2.42	3.92	(1.05,10.03)	112	3.90
All Others	98	2	2.04	1.27	3.28	(0.37,11.85)	129	6.45
Total	466	18	3.86	1.84	4.27 *	(2.53, 6.75)	616	6.08 *

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
Vassar Brothers								
Ciaburri D	285	4	1.40	2.41	1.18	(0.32, 3.03)	504	1.56 **
Zakow P	352	0	0.00	1.66	0.00 **	(0.00, 1.28)	408	0.00 **
Total	637	4	0.63	2.00	0.64 **	(0.17, 1.64)	912	1.13 **
Weill Cornell-NYP								
Altorki N	38	1	2.63	2.18	2.45	(0.03,13.66)	41	3.69
##Brodman R	177	2	1.13	1.98	1.16	(0.13, 4.19)	222	1.61
Girardi L	712	7	0.98	1.64	1.22	(0.49, 2.51)	1076	1.96 **
Isom O	93	1	1.08	1.01	2.16	(0.03,12.01)	287	2.56
#Ko W	119	2	1.68	1.94	1.76	(0.20, 6.36)	175	3.73
Krieger K	499	8	1.60	1.67	1.96	(0.84, 3.86)	880	2.70
Lee L Y	157	2	1.27	2.22	1.17	(0.13, 4.21)	210	1.68
Mack CA	53	3	5.66	2.33	4.94	(0.99,14.45)	64	8.66
##Tortolani A	285	2	0.70	1.97	0.73	(0.08, 2.62)	396	2.75
All Others	4	0	0.00	1.24	0.00	(0.00,100.0)	7	0.00
Total	2137	28	1.31	1.78	1.50	(1.00, 2.17)	3358	2.51 **
Westchester Medical Center								
Axelrod H	371	15	4.04	3.06	2.69	(1.50, 4.44)	438	3.79
Fleisher A	300	13	4.33	2.22	3.97 *	(2.11, 6.79)	386	6.47 *
Fuzesi L	42	7	16.67	2.02	16.79 *	(6.73,34.60)	47	21.31 *
Lafaro R	158	2	1.27	1.66	1.56	(0.17, 5.62)	233	3.70
Moggio R	261	5	1.92	1.96	1.99	(0.64, 4.63)	388	3.13
Sarabu M	435	7	1.61	2.47	1.33	(0.53, 2.74)	592	1.84 **
Zias E	350	10	2.86	2.21	2.63	(1.26, 4.83)	432	4.45
All Others	1	0	0.00	0.25	0.00	(0.00,100.0)	1	0.00
Total	1918	59	3.08	2.35	2.66	(2.03, 3.44)	2517	3.93
Winthrop Univ. Hosp.								
Blucher M L	170	6	3.53	2.11	3.40	(1.24, 7.40)	202	5.55
#Hartman A	196	3	1.53	2.98	1.05	(0.21, 3.06)	420	2.29
Kofsky E	460	14	3.04	2.26	2.74	(1.50, 4.60)	602	4.32
Schubach S	448	4	0.89	2.09	0.87	(0.23, 2.23)	668	2.04
Scott W	171	1	0.58	1.94	0.61	(0.01, 3.42)	221	1.80
All Others	79	0	0.00	2.80	0.00	(0.00, 3.37)	105	0.83
Total	1524	28	1.84	2.28	1.64	(1.09, 2.37)	2218	2.84
Statewide Total	47795	973	2.04	2.04	2.04		67320	3.31

Table 6: Summary Information for Surgeons Practicing at More than One Hospital, 2001-2003

	Isolated CABG					Isolated CABG, or Valve or Valve/CABG		
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Aldridge J	359	7	1.95	1.83	2.17	(0.87, 4.47)	408	3.21
Buffalo General	1	0	0.00	1.16	0.00	(0.00,100.0)	1	0.00
Millard Fillmore	358	7	1.96	1.83	2.17	(0.87, 4.48)	407	3.21
Alfieris G	8	2	25.00	1.90	26.78 *	(3.01,96.69)	27	5.43
Strong Memorial	4	0	0.00	2.03	0.00	(0.00,92.13)	5	0.00
Univ. Hosp. - Upstate	4	2	50.00	1.77	57.36 *	(6.44,100.0)	22	6.04
Anderson J	61	4	6.56	2.27	5.88	(1.58,15.05)	77	5.01
Maimonides	37	3	8.11	2.68	6.17	(1.24,18.02)	44	6.99
Univ. Hosp. of Brooklyn	24	1	4.17	1.65	5.16	(0.07,28.69)	33	2.70
Ashraf M	709	6	0.85	1.52	1.13	(0.41, 2.47)	828	1.93
Buffalo General	20	0	0.00	1.02	0.00	(0.00,36.54)	23	0.00
Millard Fillmore	689	6	0.87	1.53	1.16	(0.42, 2.52)	805	1.97
Brevetti GR	68	2	2.94	2.17	2.76	(0.31, 9.98)	94	5.78
Maimonides	4	0	0.00	3.47	0.00	(0.00,53.84)	5	0.00
Univ. Hosp. of Brooklyn	64	2	3.13	2.09	3.05	(0.34,11.01)	89	6.21
Brodman R	250	2	0.80	1.88	0.87	(0.10, 3.13)	331	2.50
Buffalo General	72	0	0.00	1.64	0.00	(0.00, 6.33)	108	4.28
Millard Fillmore	1	0	0.00	0.25	0.00	(0.00,100.0)	1	0.00
Weill Cornell-NYP	177	2	1.13	1.98	1.16	(0.13, 4.19)	222	1.61
Burack J	69	5	7.25	2.19	6.73 *	(2.17,15.70)	86	9.84 *
Maimonides	1	0	0.00	0.25	0.00	(0.00,100.0)	2	0.00
Univ. Hosp. of Brooklyn	68	5	7.35	2.22	6.74 *	(2.17,15.72)	84	10.21 *
Camacho M	207	6	2.90	1.82	3.24	(1.18, 7.05)	312	5.84 *
Montefiore - Einstein	1	0	0.00	2.61	0.00	(0.00,100.0)	13	9.63
Montefiore - Moses	136	0	0.00	1.53	0.00	(0.00, 3.58)	194	2.09
North Shore	70	6	8.57	2.37	7.37 *	(2.69,16.04)	105	9.99 *
Canavan T	449	2	0.45	1.46	0.62	(0.07, 2.24)	516	1.60
Albany Medical Center	214	2	0.93	1.45	1.31	(0.15, 4.74)	247	2.84
Ellis Hospital	2	0	0.00	2.30	0.00	(0.00,100.0)	2	0.00
St. Peters	233	0	0.00	1.46	0.00	(0.00, 2.19)	267	0.59 **
Datta S	276	1	0.36	1.81	0.41	(0.01, 2.27)	293	1.15
Erie County	270	1	0.37	1.82	0.41	(0.01, 2.31)	287	1.16
Millard Fillmore	6	0	0.00	1.19	0.00	(0.00,100.0)	6	0.00
Depan H	360	8	2.22	2.01	2.25	(0.97, 4.43)	578	3.01
Albany Medical Center	4	0	0.00	1.35	0.00	(0.00,100.0)	8	0.00
Ellis Hospital	356	8	2.25	2.02	2.27	(0.98, 4.47)	570	3.06

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
Derose J J	163	3	1.84	1.84	2.03	(0.41, 5.94)	251	3.21
Columbia Presbyterian-NYP	1	0	0.00	0.65	0.00	(0.00,100.0)	1	0.00
St. Lukes-Roosevelt	162	3	1.85	1.85	2.04	(0.41, 5.96)	250	3.21
Elamir N	192	2	1.04	2.17	0.98	(0.11, 3.53)	273	2.88
St. Elizabeth	41	0	0.00	1.93	0.00	(0.00, 9.43)	58	3.67
Univ. Hosp. - Upstate	151	2	1.32	2.23	1.21	(0.14, 4.36)	215	2.69
Esposito R	420	8	1.90	2.38	1.63	(0.70, 3.22)	610	2.68
NYU Hospitals Center	145	3	2.07	2.08	2.03	(0.41, 5.92)	230	3.98
North Shore	275	5	1.82	2.53	1.46	(0.47, 3.41)	380	2.07
Frymus M	378	6	1.59	1.80	1.80	(0.66, 3.92)	474	4.91
Montefiore - Einstein	376	6	1.60	1.80	1.81	(0.66, 3.93)	472	4.92
Montefiore - Moses	2	0	0.00	1.47	0.00	(0.00,100.0)	2	0.00
Garcia J P	97	7	7.22	2.02	7.26 *	(2.91,14.95)	134	10.98 *
Montefiore - Einstein	9	1	11.11	5.36	4.22	(0.06,23.47)	20	7.85
Montefiore - Moses	88	6	6.82	1.68	8.24 *	(3.01,17.95)	114	12.05 *
Geller C	198	2	1.01	1.58	1.30	(0.15, 4.70)	234	3.74
Beth Israel	197	2	1.02	1.59	1.30	(0.15, 4.70)	233	3.74
St. Lukes-Roosevelt	1	0	0.00	0.25	0.00	(0.00,100.0)	1	0.00
Genovesi M	117	8	6.84	2.18	6.39 *	(2.75,12.59)	138	9.18 *
Lenox Hill	1	0	0.00	0.29	0.00	(0.00,100.0)	1	0.00
Maimonides	53	6	11.32	3.32	6.94 *	(2.53,15.11)	60	8.55 *
Univ. Hosp. of Brooklyn	63	2	3.17	1.25	5.17	(0.58,18.68)	77	10.24
Gold J	184	0	0.00	1.42	0.00	(0.00, 2.85)	264	2.00
Montefiore - Einstein	55	0	0.00	0.88	0.00	(0.00,15.41)	90	1.54
Montefiore - Moses	129	0	0.00	1.65	0.00	(0.00, 3.50)	174	2.23
Grossi E	98	6	6.12	2.89	4.31	(1.58, 9.39)	160	6.50
Bellevue	18	0	0.00	0.84	0.00	(0.00,49.25)	27	0.00
NYU Hospitals Center	80	6	7.50	3.35	4.56	(1.66, 9.92)	133	6.82 *
Hartman A	376	5	1.33	2.64	1.03	(0.33, 2.40)	810	2.68
North Shore	180	2	1.11	2.27	1.00	(0.11, 3.60)	390	3.30
Winthrop Univ. Hosp.	196	3	1.53	2.98	1.05	(0.21, 3.06)	420	2.29
Hoffman D	147	0	0.00	1.77	0.00	(0.00, 2.87)	176	2.30
Beth Israel	130	0	0.00	1.75	0.00	(0.00, 3.29)	152	1.88
St. Lukes-Roosevelt	17	0	0.00	1.95	0.00	(0.00,22.55)	24	4.16
Jacobowitz I	824	23	2.79	2.79	2.03	(1.29, 3.05)	1127	3.65
Maimonides	782	21	2.69	2.82	1.94	(1.20, 2.96)	1066	3.60
Univ. Hosp. of Brooklyn	42	2	4.76	2.30	4.21	(0.47,15.21)	61	4.97

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
Karamanoukian H L	305	15	4.92	1.95	5.15 *	(2.88, 8.49)	324	8.08 *
Buffalo General	304	15	4.93	1.92	5.24 *	(2.93, 8.64)	322	8.23 *
Erie County	.	.	.	.	.	(. , .)	1	0.00
Millard Fillmore	1	0	0.00	10.54	0.00	(0.00,70.86)	1	0.00
Kelley J	375	9	2.40	2.24	2.18	(1.00, 4.14)	499	3.23
Albany Medical Center	105	1	0.95	1.93	1.01	(0.01, 5.59)	146	1.50
St. Elizabeth	270	8	2.96	2.36	2.55	(1.10, 5.03)	353	3.82
Knight P	589	14	2.38	2.41	2.01	(1.10, 3.37)	924	4.16
Rochester General	196	5	2.55	2.94	1.77	(0.57, 4.12)	298	3.84
Strong Memorial	393	9	2.29	2.14	2.18	(0.99, 4.13)	626	4.31
Ko W	656	9	1.37	1.83	1.53	(0.70, 2.90)	816	2.72
New York Hospital - Queens	537	7	1.30	1.80	1.47	(0.59, 3.04)	641	2.40
Weill Cornell-NYP	119	2	1.68	1.94	1.76	(0.20, 6.36)	175	3.73
Lajos T	7	0	0.00	3.69	0.00	(0.00,28.87)	9	8.06
Buffalo General	.	.	.	.	.	(. , .)	1	0.00
Erie County	7	0	0.00	3.69	0.00	(0.00,28.87)	8	8.21
Lewin A	406	13	3.20	1.81	3.61	(1.92, 6.17)	411	6.14 *
Buffalo General	397	13	3.27	1.83	3.65	(1.94, 6.24)	402	6.21 *
Millard Fillmore	9	0	0.00	0.84	0.00	(0.00,98.30)	9	0.00
McGinn J	1060	10	0.94	2.35	0.82 **	(0.39, 1.50)	1202	1.76 **
St. Vincents	31	0	0.00	1.69	0.00	(0.00,14.26)	35	0.00
Staten Island - North	1029	10	0.97	2.37	0.84 **	(0.40, 1.54)	1167	1.79 **
Miller S	442	9	2.04	1.92	2.16	(0.98, 4.09)	551	2.65
Albany Medical Center	434	9	2.07	1.91	2.21	(1.01, 4.20)	543	2.69
Ellis Hospital	5	0	0.00	2.45	0.00	(0.00,61.02)	5	0.00
St. Peters	3	0	0.00	3.43	0.00	(0.00,72.54)	3	0.00
Nast E	224	1	0.45	2.02	0.45	(0.01, 2.50)	274	0.50 **
Arnot-Ogden	208	1	0.48	2.03	0.48	(0.01, 2.68)	255	0.52 **
St. Josephs	16	0	0.00	1.83	0.00	(0.00,25.52)	19	0.00
Plestis K A	374	4	1.07	1.79	1.22	(0.33, 3.12)	551	2.78
Montefiore - Einstein	286	3	1.05	1.83	1.17	(0.24, 3.42)	436	2.73
Montefiore - Moses	88	1	1.14	1.66	1.39	(0.02, 7.76)	115	3.00
Raza S	395	12	3.04	1.95	3.17	(1.64, 5.54)	461	4.96
Buffalo General	351	10	2.85	1.92	3.02	(1.44, 5.55)	409	4.57
Erie County	17	1	5.88	3.41	3.51	(0.05,19.51)	22	9.42
Mercy Hospital	24	1	4.17	1.50	5.65	(0.07,31.43)	27	7.63
Millard Fillmore	3	0	0.00	0.45	0.00	(0.00,100.0)	3	0.00

Table 6 continued

	Isolated CABG					Isolated CABG, or Valve or Valve/CABG		
	No of		OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
	Cases	Deaths						
Reddy R C	160	3	1.88	1.78	2.15	(0.43, 6.27)	239	3.53
Lenox Hill	40	0	0.00	1.77	0.00	(0.00,10.54)	71	2.75
Maimonides	5	0	0.00	1.53	0.00	(0.00,97.54)	5	0.00
St. Vincents	94	3	3.19	1.91	3.40	(0.68, 9.94)	132	4.18
Univ. Hosp. of Brooklyn	21	0	0.00	1.26	0.00	(0.00,28.14)	31	3.49
Ribakove G	211	3	1.42	2.08	1.39	(0.28, 4.06)	405	3.47
Bellevue	39	0	0.00	1.41	0.00	(0.00,13.61)	102	6.54
NYU Hospitals Center	172	3	1.74	2.24	1.59	(0.32, 4.64)	303	3.00
Sabado M	182	7	3.85	2.91	2.69	(1.08, 5.55)	253	3.22
Maimonides	96	3	3.13	3.35	1.90	(0.38, 5.55)	141	2.97
Univ. Hosp. of Brooklyn	86	4	4.65	2.42	3.92	(1.05,10.03)	112	3.90
Safavi A	36	3	8.33	1.69	10.02	(2.01,29.29)	50	12.23 *
Lenox Hill	5	0	0.00	0.63	0.00	(0.00,100.0)	6	0.00
St. Lukes-Roosevelt	31	3	9.68	1.86	10.57 *	(2.12,30.88)	44	12.56 *
Saifi J	460	7	1.52	2.02	1.54	(0.62, 3.17)	653	2.11
Albany Medical Center	1	0	0.00	1.03	0.00	(0.00,100.0)	1	0.00
Ellis Hospital	2	0	0.00	1.06	0.00	(0.00,100.0)	3	0.00
St. Peters	457	7	1.53	2.02	1.54	(0.62, 3.18)	649	2.12
Sardella G	502	10	1.99	1.74	2.33	(1.11, 4.28)	635	3.87
Albany Medical Center	264	7	2.65	1.74	3.11	(1.24, 6.40)	328	3.79
St. Peters	238	3	1.26	1.75	1.47	(0.29, 4.29)	307	3.96
Tortolani A	409	3	0.73	2.07	0.72	(0.14, 2.11)	548	2.18
Montefiore - Einstein	1	0	0.00	2.45	0.00	(0.00,100.0)	1	0.00
New York Hospital - Queens	123	1	0.81	2.30	0.72	(0.01, 4.00)	151	0.71
Weill Cornell-NYP	285	2	0.70	1.97	0.73	(0.08, 2.62)	396	2.75
Tranbaugh R	533	14	2.63	1.59	3.35	(1.83, 5.63)	674	4.09
Beth Israel	531	14	2.64	1.60	3.36	(1.84, 5.64)	670	4.13
St. Lukes-Roosevelt	2	0	0.00	0.87	0.00	(0.00,100.0)	4	0.00
Vatsia S	335	7	2.09	1.99	2.14	(0.86, 4.40)	452	2.56
LIJ Medical Center	2	0	0.00	1.50	0.00	(0.00,100.0)	2	0.00
North Shore	333	7	2.10	1.99	2.15	(0.86, 4.42)	450	2.56
Zervos M	104	1	0.96	0.92	2.12	(0.03,11.80)	122	2.62
Bellevue	101	1	0.99	0.89	2.27	(0.03,12.63)	119	2.76
NYU Hospitals Center	3	0	0.00	2.11	0.00	(0.00,100.0)	3	0.00

SURGEON AND HOSPITAL VOLUMES FOR TOTAL ADULT CARDIAC SURGERY, 2001-2003

Table 7 presents, for each hospital and for each surgeon performing at least 200 cardiac operations in any hospital in 2001 – 2003 and/or performing one or more cardiac operations in each of the years 2001 – 2003, 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, 2001-2003

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Albany Medical Center				
Britton L	360	148	46	554
Canavan T	214	33	2	249
Canver C	232	78	95	405
Depan H	4	4	0	8
Devejian N	0	12	36	48
Kelley J	105	41	40	186
Miller S	434	109	19	562
Perez T	105	31	17	153
Saifi J	1	0	1	2
Sardella G	264	64	9	337
Total	1719	520	265	2504
Arnot-Ogden				
Curiale S V	179	39	5	223
Nast E	208	47	9	264
All Others	15	2	0	17
Total	402	88	14	504
Bellevue				
Grossi E	18	9	4	31
Ribakove G	39	63	20	122
Zervos M	101	18	26	145
All Others	62	17	9	88
Total	220	107	59	386

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Beth Israel				
Geller C	197	36	15	248
Harris L	284	54	6	344
Hoffman D	130	22	7	159
Stelzer P	55	228	168	451
Tranbaugh R	531	139	34	704
Total	1197	479	230	1906
Buffalo General				
Aldridge J	1	0	0	1
Ashraf M	20	3	0	23
Brodman R	72	36	4	112
Grosner G	742	334	43	1119
Karamanoukian H L	304	18	23	345
Lajos T	0	1	2	3
Lewin A	397	5	5	407
Raza S	351	58	50	459
All Others	117	14	6	137
Total	2004	469	133	2606
Childrens - Buffalo				
All Others	0	0	1	1
Total	0	0	1	1
Columbia Presbyterian-NYP				
Argenziano M	95	46	96	237
Derosé J J	1	0	2	3
Edwards N	149	95	80	324
Esrig B	3	2	22	27
Mosca R S	2	10	42	54
Naka Y	246	120	187	553
Oz M	485	421	119	1025
Quaegebeur J	1	11	88	100
Rose E	32	41	14	87
Smith C	387	415	137	939
Ting W	12	13	8	33
All Others	8	1	111	120
Total	1421	1175	906	3502
Ellis Hospital				
Afifi A	490	83	10	583
Canavan T	2	0	0	2
Depan H	356	214	65	635
Miller S	5	0	0	5
Reich H	377	88	11	476
Saifi J	2	1	0	3
All Others	14	2	1	17
Total	1246	388	87	1721

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Erie County				
Bell-Thomson J	448	131	41	620
Datta S	270	17	25	312
Karamanoukian H L	0	1	1	2
Lajos T	7	1	3	11
Raza S	17	5	1	23
All Others	22	5	4	31
Total	764	160	75	999
LIJ Medical Center				
Graver L	464	341	77	882
Palazzo R	380	143	16	539
Vatsia S	2	0	1	3
All Others	51	21	32	104
Total	897	505	126	1528
Lenox Hill				
Connolly M	381	149	29	559
Fonger J D	83	21	6	110
Genovesi M	1	0	0	1
Loulmet D F	60	236	46	342
McCabe J	44	12	10	66
Patel N U	221	23	3	247
Reddy R C	40	31	16	87
Safavi A	5	1	0	6
Subramanian V	869	225	46	1140
All Others	98	144	35	277
Total	1802	842	191	2835
Maimonides				
Abrol S	144	40	34	218
Acinapura A	69	16	5	90
Anderson J	37	7	5	49
Brevetti GR	4	1	1	6
Burack J	1	1	1	3
Cunningham J N	215	62	19	296
Genovesi M	53	7	4	64
Jacobowitz I	782	284	65	1131
LaPunzina C S	3	0	0	3
Reddy R C	5	0	0	5
Sabado M	96	45	14	155
Vaynblat M	265	59	10	334
Zisbrod Z	326	87	15	428
All Others	8	3	8	19
Total	2008	612	181	2801

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Mary Imogene Bassett Hosp.				
All Others	79	19	4	102
Total	79	19	4	102
Mercy Hospital				
Raza S	24	3	6	33
All Others	307	38	28	373
Total	331	41	34	406
Millard Fillmore				
Aldridge J	358	49	29	436
Ashraf M	689	116	21	826
Brodman R	1	0	0	1
Datta S	6	0	0	6
Jennings L	219	11	2	232
Karamanoukian H L	1	0	1	2
Lewin A	9	0	0	9
Raza S	3	0	0	3
All Others	56	7	4	67
Total	1342	183	57	1582
Montefiore - Einstein				
Camacho M	1	12	0	13
Frymus M	376	96	28	500
Garcia J P	9	11	1	21
Gold J	55	35	6	96
Plestis K A	286	150	135	571
Tortolani A	1	0	0	1
Total	728	304	170	1202
Montefiore - Moses				
Attai L	209	80	6	295
Camacho M	136	58	13	207
Crooke G	0	2	5	7
Frymus M	2	0	1	3
Garcia J P	88	26	43	157
Gold J	129	45	19	193
Merav A	232	100	13	345
Plestis K A	88	27	24	139
All Others	3	2	1	6
Total	887	340	125	1352
Mount Sinai				
Adams DH	96	209	60	365
Galla J	97	61	66	224
Griep R	15	26	147	188

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Mount Sinai <i>continued</i>				
Lansman S	206	86	97	389
Nguyen K	1	1	25	27
Spielvogel D	300	133	187	620
All Others	190	67	39	296
Total	905	583	621	2109
NYU Hospitals Center				
Colvin S	49	680	87	816
Culliford A	269	219	69	557
Esposito R	145	85	8	238
Galloway A	153	327	65	545
Grossi E	80	53	26	159
Ribakove G	172	131	45	348
Zervos M	3	0	1	4
All Others	36	22	15	73
Total	907	1517	316	2740
New York Hospital - Queens				
Aronis M	295	68	12	375
Ko W	537	104	48	689
Tortolani A	123	28	4	155
All Others	1	0	0	1
Total	956	200	64	1220
North Shore				
Camacho M	70	35	5	110
Esposito R	275	105	16	396
Hall M	582	255	31	868
Hartman A	180	210	39	429
Levy M	212	92	23	327
Pogo G	585	287	45	917
Vatsia S	333	117	39	489
All Others	0	1	8	9
Total	2237	1102	206	3545
Rochester General				
Cheeran D	774	282	69	1125
Green G R	233	48	18	299
Kirshner R	672	312	67	1051
Knight P	196	102	16	314
Total	1875	744	170	2789

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
St. Elizabeth				
Carr T	188	20	3	211
Elamir N	41	17	1	59
Joyce F	408	173	27	608
Kelley J	270	83	23	376
Singh C	170	31	3	204
All Others	114	35	9	158
Total	1191	359	66	1616
St. Francis				
Bercow N	697	210	45	952
Colangelo R	751	251	16	1018
Damus P	501	433	60	994
Davison M J	243	33	2	278
Durban L	39	14	6	59
Fernandez H A	326	51	5	382
Lamendola C	731	229	20	980
Robinson N	691	254	38	983
Taylor J	760	432	37	1229
Total	4739	1907	229	6875
St. Josephs				
Marvasti M	491	218	46	755
Nast E	16	3	3	22
Nazem A	588	156	25	769
Rosenberg J	566	352	121	1039
Zhou Z	167	30	5	202
All Others	1	1	3	5
Total	1829	760	203	2792
St. Lukes-Roosevelt				
Derose J J	162	88	19	269
Geller C	1	0	0	1
Hoffman D	17	7	3	27
Safavi A	31	13	5	49
Swistel D	436	185	35	656
Tranbaugh R	2	2	0	4
All Others	0	0	1	1
Total	649	295	63	1007
St. Peters				
Bennett E	291	240	55	586
Canavan T	233	34	2	269
Dal Col R	486	200	26	712
Miller S	3	0	0	3

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
St. Peters <i>continued</i>				
Saifi J	457	192	22	671
Sardella G	238	69	7	314
All Others	0	0	10	10
Total	1708	735	122	2565
St. Vincents				
Lang S	436	120	36	592
McGinn J	31	4	0	35
Reddy R C	94	38	14	146
Shin YT	296	97	31	424
All Others	125	27	7	159
Total	982	286	88	1356
Staten Island Univ- North				
McGinn J	1029	138	16	1183
Molinaro P J	168	51	3	222
All Others	140	39	15	194
Total	1337	228	34	1599
Strong Memorial				
Alfieris G	4	1	39	44
Hicks G	303	205	63	571
Knight P	393	233	104	730
Massey H	249	90	102	441
Risher W	108	63	53	224
All Others	0	0	1	1
Total	1057	592	362	2011
United Health Services				
Quintos E	307	51	13	371
Wong K	330	88	20	438
Yousuf M	316	101	21	438
Total	953	240	54	1247
Univ. Hosp. - Stony Brook				
Bilfinger T	262	52	19	333
Krukenkamp I	386	159	52	597
McLarty A	194	22	29	245
Seifert F	709	124	35	868
All Others	122	23	33	178
Total	1673	380	168	2221
Univ. Hosp. - Upstate				
Alfieris G	4	18	34	56
Brandt B	154	57	16	227

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Univ. Hosp. - Upstate <i>continued</i>				
Elamir N	151	64	26	241
Fink GW	341	117	39	497
Picone A	286	126	20	432
All Others	132	44	21	197
Total	1068	426	156	1650
Univ. Hosp. of Brooklyn				
Anderson J	24	9	7	40
Brevetti GR	64	25	4	93
Burack J	68	16	5	89
Genovesi M	63	14	2	79
Jacobowitz I	42	19	3	64
Reddy R C	21	10	4	35
Sabado M	86	26	8	120
All Others	98	31	5	134
Total	466	150	38	654
Vassar Brothers				
Ciaburri D	285	219	19	523
Zakow P	352	56	11	419
All Others	0	0	2	2
Total	637	275	32	944
Weill Cornell-NYP				
Altorki N	38	3	2	43
Brodman R	177	45	11	233
Girardi L	712	364	512	1588
Isom O	93	194	37	324
Ko W	119	56	8	183
Krieger K	499	381	35	915
Lee L Y	157	53	11	221
Mack CA	53	11	5	69
Tortolani A	285	111	15	411
All Others	4	3	20	27
Total	2137	1221	656	4014
Westchester Medical Center				
Axelrod H	371	67	21	459
Fleisher A	300	86	51	437
Fuzesi L	42	5	25	72
Lafaro R	158	75	73	306
Moggio R	261	127	35	423
Sarabu M	435	157	69	661

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Westchester Medical Center <i>continued</i>				
Zias E	350	82	59	491
All Others	1	0	2	3
Total	1918	599	335	2852
Winthrop Univ. Hosp.				
Blucher M L	170	32	10	212
Hartman A	196	224	26	446
Kofsky E	460	142	9	611
Schubach S	448	220	20	688
Scott W	171	50	7	228
All Others	79	26	8	113
Total	1524	694	80	2298
STATE TOTAL	47795	19525	6721	74041

Criteria Used in Reporting Significant Risk Factors (2003)

Based on Documentation in Medical Records

Patient Risk Factor	Definitions
<p>Hemodynamic State</p> <ul style="list-style-type: none"> • Unstable • Shock 	<p>Determined just prior to surgery.</p> <p>Patient requires pharmacologic or mechanical support to maintain blood pressure or cardiac output.</p> <p>Acute hypotension (systolic blood pressure < 80 mmHg) or low cardiac index (< 2.0 liters/min/m²), despite pharmacologic or mechanical support.</p>
<p>Comorbidities</p> <ul style="list-style-type: none"> • Cerebrovascular Disease <ul style="list-style-type: none"> - Stroke - Carotid/Cerebrovascular Disease • Peripheral Vascular Disease <ul style="list-style-type: none"> - Aortoiliac Disease - Femoral/Popliteal Disease • Renal Failure, Creatinine > 2.5 mg/dl • Renal Failure Requiring Dialysis 	<p>Patient has either Stroke or Carotid/Cerebrovascular Disease as defined below</p> <p>A history of stroke, with or without residual deficit.</p> <p>Angiographic or ultrasound demonstration of at least 50% narrowing in a major cerebral or carotid artery (common or internal), history of a non-embolic stroke, or previous surgery for such disease. A history of bruits or transient ischemic attacks (TIA) is not sufficient evidence of carotid/cerebrovascular disease.</p> <p>Patient has either Aortoiliac Disease or Femoral/Popliteal Disease as defined below</p> <p>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.</p> <p>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.</p> <p>Pre-operative creatinine > 2.5 mg/dl.</p> <p>The patient is on chronic peritoneal or hemodialysis.</p>
<p>Ventricular Function</p> <ul style="list-style-type: none"> • Ejection Fraction • Previous MI, less than or equal to 7 days • Previous MI, 8-14 days 	<p>Value of the ejection fraction taken closest to the procedure. When a calculated measure is unavailable the ejection fraction should be estimated visually from the ventriculogram or by echocardiography. Intraoperative direct observation of the heart is not an adequate basis for a visual estimate of the ejection fraction. If no ejection fraction is reported, the ejection fraction is considered “normal” for purposes of analysis and is classified with the reference category.</p> <p>One or more myocardial infarctions (MI) less than or equal to 7 days before surgery.</p> <p>One or more myocardial infarctions (MI) 8 to 14 days before surgery.</p>
<p>Previous Open Heart Operations</p>	<p>Open heart surgery previous to the hospitalization. For the purpose of this reporting system, minimally invasive procedures are considered open heart surgery.</p>

MEDICAL TERMINOLOGY

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 rotoblators 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.

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 2001-2003 Risk Factors For Isolated CABG In-Hospital Mortality

The significant pre-procedural risk factors for in-hospital mortality following isolated CABG in the 2001-2003 time period are presented in the table that follows.

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 1.869. This means that a patient with COPD is approximately 1.869 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, renal failure and sum of binary risk factors squared, 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 4 groups: occurring less than 6 hours prior to surgery; occurring 6-23 hours prior to surgery; occurring 1-14 days prior to surgery; and no MI within 14 days prior to the procedure. The last range, which does not appear in the table that follows, 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 within 14 days prior to the procedure.

Ejection fraction, which is the percentage of blood in the heart's left ventricle that is expelled when it contracts (with more denoting a healthier heart), is subdivided into four ranges (<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 2.825 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 1.070 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 (except age) and is used to improve the ability of the model to predict mortality.

Appendix 1: Multivariable risk factor equation for isolated CABG hospital deaths in NYS, 2001-2003.

Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
Demographic				
Age: Number of years greater than 60	—	0.0677	< .0001	1.070
Female Gender	28.38	0.7606	< .0001	2.140
Hemodynamic State				
Unstable	1.09	1.2323	< .0001	3.429
Shock	0.45	2.3884	< .0001	10.896
Ventricular Function				
Ejection Fraction <20 %	1.93	1.4980	< .0001	4.473
Ejection Fraction 20-29 %	6.88	1.0385	< .0001	2.825
Ejection Fraction 30-39 %	13.05	0.6792	< .0001	1.972
Previous MI < 6 hours	0.69	1.8487	< .0001	6.351
Previous MI 6 - 23 hours	0.93	1.0763	< .0001	2.934
Previous MI 1 - 14 days	21.66	0.7587	< .0001	2.136
Comorbidities				
Cerebrovascular Disease	19.01	0.6484	< .0001	1.912
COPD	17.23	0.6255	< .0001	1.869
Extensively Calcified Ascending Aorta	4.95	0.6515	< .0001	1.918
Peripheral Vascular Disease	10.70	0.7735	< .0001	2.167
Renal Failure, Creatinine > 2.5 mg/dl	2.05	1.1525	< .0001	3.166
Renal Failure Requiring Dialysis	1.63	1.8778	< .0001	6.539
Previous Open Heart Operations	4.72	1.4542	< .0001	4.281
Sum of Binary Risk Factors Squared	—	-0.0463	0.0002	0.955
Intercept = -5.9703				
C Statistic = 0.806				

Appendix 2 2001-2003 Risk Factors For Valve Surgery In-Hospital Mortality

The significant pre-procedural risk factors for in-hospital mortality following valve surgery in the 2001-2003 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 1.753. This means that a patient with COPD is approximately 1.753 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 1.739 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 other risk factors in the table except age and renal failure 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.

Age is represented by a linear term in order to improve the fit of the statistical model. The odds ratio represents the number of times more likely a patient is to die in the hospital than a patient who is one year younger, all other significant risk factors being the same. Thus the odds of dying for a patient who is 55 are 1.047 times the odds of dying for a patient who is 54, all other risk factors being the same.

Appendix 2: Multivariable risk factor equation for valve surgery hospital deaths in NYS, 2001-2003.

Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
Demographic				
Age	—	0.0460	< .0001	1.047
Female Gender	50.34	0.3709	0.0003	1.449
Type of Valve Surgery				
Aortic Valve Replacement	46.51	Valve Reference Group		1.000
Mitral Valve Replacement	20.25	0.5532	< .0001	1.739
Mitral Valve Repair	16.50	-0.1055	0.6151	0.900
Multiple Valve Repair/Replacement	16.74	1.0414	< .0001	2.833
Hemodynamic State				
Unstable	1.28	1.3234	< .0001	3.756
Shock	0.41	1.6780	< .0001	5.355
Ventricular Function				
Previous MI \leq 14 days	1.80	0.6974	0.0038	2.009
Comorbidities				
COPD	18.45	0.5612	< .0001	1.753
Endocarditis	5.80	0.9740	< .0001	2.649
Hepatic Failure	0.23	1.6055	0.0015	4.980
Peripheral Vascular Disease	4.89	0.6457	< .0001	1.907
Renal Failure, Creatinine > 2.5 mg/dl	2.50	0.8123	< .0001	2.253
Renal Failure Requiring Dialysis	2.63	1.4843	< .0001	4.412
Previous Open Heart Operations	18.32	0.6783	< .0001	1.970
Intercept = -7.4753				
C Statistic = 0.794				

Appendix 3 2001-2003 Risk Factors For Valve and CABG Surgery In-Hospital Mortality

The significant pre-procedural risk factors for in-hospital mortality following valve and CABG surgery in the 2001-2003 time period are presented in the table that follows.

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 Cerebrovascular Disease is 1.374. This means that a patient with Cerebrovascular Disease is approximately 1.374 times as likely to die in the hospital during or after undergoing valve and CABG surgery as a patient without Cerebrovascular 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 repair or replacement and CABG surgery, all other risk

factors being the same. For example, a patient who has a mitral valve replacement and CABG surgery is 2.348 times as likely to die in the hospital during or after surgery as a patient with aortic valve repair or replacement and CABG surgery, all other significant risk factors being the same.

For all other risk factors in the table except age, ejection fraction, renal failure, and previous MI, there are only two possibilities – having the risk factor or not having it. For example, a patient either has Cerebrovascular Disease or does not have it. The risk factors age, ejection fraction and renal failure are interpreted in the same manner as in Appendix 1

Previous MI is subdivided into four groups (occurring less than 6 hours prior to the procedure, 6-23 hours prior to the procedure, 1-7 days prior to the procedure, and no MI within 7 days 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 an MI within 7 days prior to the procedure.

Appendix 3: Multivariable risk factor equation for valve and CABG surgery hospital deaths in NYS, 2001-2003.

Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
Demographic				
Age: Number of years greater than 60	—	0.0555	< .0001	1.057
Female Gender	39.02	0.4835	< .0001	1.622
Type of Valve (with CABG)				
Aortic Valve Replacement	52.71	Valve Reference Group		1.000
Mitral Valve Replacement	17.14	0.8534	< .0001	2.348
Mitral Valve Repair	21.00	0.4340	0.0001	1.543
Multiple Valve Repair/Replacement	9.15	1.2161	< .0001	3.374
Ventricular Function				
Ejection Fraction < 20%	4.03	0.7582	< .0001	2.134
Ejection Fraction 20-29%	11.57	0.4687	< .0001	1.598
Ejection Fraction 30-39%	16.53	0.2203	0.0366	1.246
Previous MI < 6 hours	0.42	0.9569	0.0288	2.603
Previous MI 6 - 23 hours	0.66	0.7884	0.0251	2.200
Previous MI 1 - 7 days	8.70	0.4311	0.0004	1.539
Hemodynamic State				
Unstable	2.35	0.6163	0.0011	1.852
Shock	1.00	1.4771	< .0001	4.380
Comorbidities				
Cerebrovascular Disease	22.58	0.3179	0.0003	1.374
Diabetes	29.04	0.2950	0.0005	1.343
Endocarditis	1.29	0.7549	0.0040	2.127
Extensively Calcified Ascending Aorta	9.15	0.4322	0.0003	1.541
Renal Failure, Creatinine > 2.5 mg/dl	3.40	0.8383	< .0001	2.313
Renal Failure Requiring Dialysis	2.57	1.2194	< .0001	3.385
Previous Open Heart Operations	9.52	0.6810	<.0001	1.976
Intercept = -4.4283				
C Statistic = 0.750				

NEW YORK STATE CARDIAC SURGERY CENTERS

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

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

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

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

Buffalo General Hospital
100 High Street
Buffalo, New York 14203

Champlain Valley Physicians Hospital
Medical Center*
75 Beekman Street
Plattsburgh, NY 12901

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

Ellis Hospital
1101 Nott Street
Schenectady, New York 12308

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

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

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

Maimonides Medical Center
4802 Tenth Avenue
Brooklyn, New York 11219

Mary Imogene Bassett Healthcare
Atwell Road
Cooperstown, NY 13326

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

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

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

Rochester General Hospital
1425 Portland Avenue
Rochester, New York 14621

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

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

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

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

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

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

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

Strong Memorial Hospital
601 Elmwood Avenue
Rochester, New York 14642

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

University Hospital at Stony Brook
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 Medical Center
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

*Opened Cardiac Surgery Program
in 2004

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