

**ADULT
CARDIAC
SURGERY**

**in
New York State**

1998-2000

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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 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 2000. 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).

Coronary artery bypass graft 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 usually are 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 2000 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, 1998 and December 31, 2000 are included in the three-year results.

Isolated CABG surgery represented 68.79 percent of all adult cardiac surgery for the three-year period covered by this report. Valve or combined valve/CABG surgery represented 22.65 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 1998 through 2000.

RISK ADJUSTMENT FOR ASSESSING PROVIDER PERFORMANCE

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

Data Collection, Data Validation and Identifying In-Hospital Deaths

As part of the risk-adjustment process, New York State hospitals where cardiac surgery is performed provide information to the Department of Health for each patient undergoing that procedure. Cardiac surgery departments collect data concerning

patients' demographic and clinical characteristics. Approximately 45 of these characteristics (called risk factors) are collected for each patient. Along with information about the procedure, physician and the patient's status at discharge, these data are entered into a computer, and sent to the Department of Health for analysis.

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

The analysis bases mortality on deaths occurring during the same hospital stay in which a patient underwent cardiac surgery. In the past, the data validation activities have focused on the acute care stay at the surgery center. However, changes in the health

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

In this report, an in-hospital death is defined as a patient who died subsequent to CABG or valve surgery during the same admission, or was discharged to hospice care.

Assessing Patient Risk

Each person who develops heart disease has a unique health history. A cardiac profile system has been developed to evaluate the risk of treatment for each individual patient based on his or her history, weighing the important health factors for that person based on the experiences of thousands of patients who have undergone the same procedures in recent years. All important risk factors for each patient are combined to create a risk profile.

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

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

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

Predicting Patient Mortality Rates for Providers

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

The mortality rate for each hospital and surgeon is also predicted using the relevant statistical models. This is accomplished by summing the predicted probabilities of death for each of the provider's patients and dividing by the number of patients. The resulting rate is an estimate of what the provider's mortality rate would have been if the provider's performance were identical to the State performance. The percentage is called the predicted or expected mortality rate.

Computing the Risk-Adjusted Rate

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

To get the risk-adjusted mortality rate, the observed mortality rate is first divided by the provider's expected mortality rate. If the resulting ratio is larger than one, the provider has a higher mortality rate than expected on the basis of its patient mix; if it is smaller than one, the provider has a lower mortality rate than expected from its patient mix. For isolated CABG patients the ratio is then multiplied by the overall statewide mortality rate (2.32% in 2000) to obtain the provider's risk-adjusted rate. For the three year period 1998-2000, the ratio is then multiplied by 2.24% for isolated CABG patients or 7.13% for valve or valve/CABG patients.

Interpreting the Risk-Adjusted Mortality Rate

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

The risk-adjusted mortality rate is used in this report as a measure of quality of care provided by hospitals and surgeons. However, there are reasons that a provider's risk-adjusted mortality rate may not be indicative of its true quality.

For example, extreme outcome rates may occur due to chance alone. This is particularly true for low-volume providers, for whom very high or very low mortality rates are more likely to occur than for high-volume providers. To prevent misinterpretation of differences caused by chance variation, confidence intervals are reported in the results. The interpretations of those terms are provided later when the data are presented.

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

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

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

RESULTS

2000 Risk Factors for CABG Surgery

The significant pre-operative risk factors for coronary artery bypass surgery in 2000 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 COPD is 2.123. This means that a patient who had COPD prior to surgery is approximately 2.123 times as likely to die in the hospital as a patient who did not have

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.

COPD 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 has had COPD or has not had COPD). Exceptions are age: number of years greater than 60 and, ejection fraction, which is a measure of the heart's ability to pump blood.

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

who is 72 years old has a chance of dying that is approximately 1.056 times the chance that a patient 71 years old undergoing CABG has of dying in the hospital.

The odds ratios for the categories for ejection fraction are relative to the omitted range (40% and higher). Thus, patients with an ejection fraction of less than 20% have odds of dying in the hospital that are 3.517 times the odds of a person with an ejection fraction of 40% or higher, all other risk factors being the same.

Table 1: Multivariable risk factor equation for CABG hospital deaths in New York State in 2000.

Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
Demographic				
Age: Number of years greater than 60 ...		0.0543	< .0001	1.056
Female Gender	28.50	0.5400	< .0001	1.716
Hemodynamic State				
Unstable	1.09	1.3197	< .0001	3.742
Shock	0.34	1.9747	< .0001	7.205
Cardiopulmonary Resuscitation	0.15	2.2258	< .0001	9.261
Ventricular Function				
Ejection Fraction <20 %	1.71	1.2576	< .0001	3.517
Ejection Fraction 20-29 %	6.69	0.6998	< .0001	2.013
Ejection Fraction 30-39 %	13.59	0.4529	0.0007	1.573
Comorbidities				
Cerebrovascular Disease	18.57	0.3914	0.0006	1.479
COPD	16.46	0.7528	< .0001	2.123
Hepatic Failure	0.09	2.2024	0.0042	9.046
Malignant Ventricular Arrhythmia	1.65	0.6166	0.0209	1.853
Peripheral Vascular Disease	11.10	0.3994	0.0018	1.491
Renal Failure, Creatinine >2.5 mg/dl	1.84	1.1034	< .0001	3.014
Renal Failure Requiring Dialysis	1.54	1.3728	< .0001	3.946
Previous Open Heart Operations	5.37	1.2302	< .0001	3.422
Intercept = -5.3226				
C Statistic = 0.788				

2000 HOSPITAL OUTCOMES FOR CABG

Table 2 and Figure 1 present the CABG surgery results for the 34 hospitals performing this operation in New York during the year 2000. The table contains, for each hospital, the number of isolated CABG operations (CABG operations with no other major heart surgery) resulting in 2000 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 18,121 CABG procedures performed at the 34 hospitals was 2.32%. Observed mortality rates ranged from 0.00% to 5.00%. The range of expected

mortality rates, which measure patient severity of illness, was 1.00% to 3.14%.

The risk-adjusted mortality rates, which are used to measure performance, ranged from 0.00% to 5.13%. Three hospitals (Albany Medical Center, Ellis Hospital, and Mount Sinai Hospital) had risk-adjusted mortality rates that were significantly higher than the statewide rate. Two hospitals (Lenox Hill Hospital and Winthrop University Hospital) had significantly lower risk-adjusted rates than the State.

1998 - 2000 HOSPITAL OUTCOMES

Table 3 and Figure 2 present the combined Valve only and Valve/CABG surgery results for the 34 hospitals performing these operations in New York during the years 1998-2000. The table contains, for each hospital, the number of combined Valve Only and Valve/CABG operations resulting in 1998-2000 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 18,125 combined Valve Only and Valve/CABG procedures performed at the 34 hospitals was 7.13%. Observed mortality rates ranged from 2.44% to 12.52%. The range of expected mortality rates, which measure patient severity of illness, was 3.49% to 9.36%.

The risk-adjusted mortality rates, which are used to measure performance, ranged from 2.70% to 12.05%. Four hospitals (Buffalo General Hospital, Millard Fillmore Hospital, Strong Memorial Hospital and University Hospital of Brooklyn) had risk-adjusted mortality rates that were significantly higher than the statewide rate. Three hospitals (St. Francis Hospital, St. Joseph's Hospital, and Weill Cornell – NY Presbyterian Hospital) had significantly lower risk-adjusted rates than the State.

Table 4 presents valve procedures performed at the 34 cardiac surgery hospitals in New York during 1998-2000. The table contains, for each hospital, the number of valve operations (as defined by eight separate groups: Aortic Valve Replacements, Aortic Valve Replacements plus CABG, Mitral Valve Replacement, Mitral Valve Replacement plus CABG, Mitral Valve Repair, Mitral Valve Repair plus CABG, Multiple Valve Surgery, Multiple Valve Surgery plus CABG) resulting in 1998-2000 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 column nine of Table 4.

Definitions of key terms are as follows:

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

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

The **risk-adjusted mortality rate (RAMR)** is the best estimate, based on the statistical model, of what the provider's mortality rate would have been if the provider had a mix of patients identical to the statewide mix. It is

obtained by first dividing the observed mortality rate by the expected mortality rate, and then multiplying by the relevant statewide mortality rate (for example 2.24% for isolated CABG patients in 1998-2000 or 7.13% for Valve or Valve/CABG patients in 1998-2000).

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.

Confidence intervals are depicted in Figures 1 and 2. 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 CABG Surgery in New York State, 2000 Discharges (Listed Alphabetically by Hospital)

Hospital	Cases	Deaths	OMR	EMR	RAMR	95% CI for RAMR
Albany Medical Center	657	19	2.89	1.65	4.08 *	(2.46, 6.37)
Arnot-Ogden	92	1	1.09	1.79	1.41	(0.02, 7.85)
Bellevue	18	0	0.00	1.00	0.00	(0.00,47.24)
Beth Israel	400	4	1.00	2.21	1.05	(0.28, 2.69)
Buffalo General	880	31	3.52	2.42	3.38	(2.29, 4.79)
Columbia Presbyterian	637	13	2.04	2.12	2.24	(1.19, 3.82)
Ellis Hospital	433	19	4.39	1.99	5.13 *	(3.09, 8.01)
Erie County	124	0	0.00	1.84	0.00	(0.00, 3.73)
LIJ Medical Center	374	6	1.60	1.89	1.97	(0.72, 4.29)
Lenox Hill	675	8	1.19	2.40	1.15 **	(0.49, 2.26)
Maimonides	867	18	2.08	2.77	1.74	(1.03, 2.75)
Millard Fillmore	640	14	2.19	2.28	2.23	(1.22, 3.74)
Montefiore - Einstein	313	9	2.88	2.19	3.06	(1.40, 5.80)
Montefiore - Moses	338	1	0.30	1.57	0.44	(0.01, 2.43)
Mount Sinai	380	19	5.00	2.32	5.01 *	(3.02, 7.83)
NY Hospital - Queens	340	3	0.88	1.62	1.26	(0.25, 3.69)
NYU Hospitals Center	517	14	2.71	2.61	2.41	(1.32, 4.05)
North Shore	767	15	1.96	2.39	1.90	(1.07, 3.14)
Rochester General	775	21	2.71	3.14	2.00	(1.24, 3.06)
St. Elizabeth	443	18	4.06	2.66	3.55	(2.10, 5.62)
St. Francis	1807	32	1.77	2.34	1.76	(1.20, 2.49)
St. Josephs	715	13	1.82	2.69	1.57	(0.83, 2.68)
St. Lukes-Roosevelt	215	6	2.79	2.36	2.74	(1.00, 5.97)
St. Peters	624	13	2.08	1.54	3.15	(1.67, 5.38)
St. Vincents	596	17	2.85	2.15	3.08	(1.79, 4.93)
Strong Memorial	370	13	3.51	2.36	3.46	(1.84, 5.92)
United Health Services	360	10	2.78	3.05	2.12	(1.01, 3.89)
Univ Hosp-Stony Brook	701	19	2.71	2.20	2.86	(1.72, 4.46)
Univ. Hosp. - Upstate	392	10	2.55	2.90	2.04	(0.98, 3.76)
Univ. Hosp. of Brooklyn	221	7	3.17	1.96	3.75	(1.50, 7.74)
Vassar Brothers	150	3	2.00	1.34	3.46	(0.70,10.11)
Weill Cornell-NYP	794	15	1.89	2.34	1.87	(1.05, 3.09)
Westchester Med. Ctr.	786	20	2.54	2.03	2.91	(1.78, 4.49)
Winthrop Univ. Hosp.	720	10	1.39	2.93	1.10 **	(0.53, 2.02)
Total	18121	421	2.32	2.32	2.32	

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

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

Table 3: Valve or Valve/CABG Surgery Observed, Expected, and Risk-Adjusted Mortality Rates in New York State, 1998-2000 Discharges.

Hospital	Cases	Deaths	OMR	EMR	RAMR	95% CI for RAMR
Albany Medical Center	596	40	6.71	5.92	8.09	(5.78, 11.01)
Arnot-Ogden	40	2	5.00	3.49	10.23	(1.15, 36.92)
Bellevue	100	8	8.00	5.83	9.79	(4.21, 19.29)
Beth Israel	449	32	7.13	8.28	6.14	(4.20, 8.67)
Buffalo General	509	47	9.23	6.24	10.56 *	(7.76, 14.04)
Columbia Presbyterian	957	62	6.48	6.33	7.30	(5.59, 9.35)
Ellis Hospital	378	18	4.76	6.07	5.60	(3.31, 8.84)
Erie County	48	4	8.33	6.39	9.30	(2.50, 23.80)
LIJ Medical Center	365	23	6.30	6.11	7.36	(4.66, 11.04)
Lenox Hill	519	48	9.25	7.20	9.17	(6.76, 12.15)
Maimonides	609	48	7.88	7.02	8.01	(5.91, 10.62)
Millard Fillmore	310	30	9.68	5.73	12.05 *	(8.13, 17.20)
Montefiore - Einstein	281	19	6.76	6.89	7.00	(4.22, 10.94)
Montefiore - Moses	396	24	6.06	6.84	6.32	(4.05, 9.40)
Mount Sinai	611	44	7.20	6.99	7.35	(5.34, 9.86)
NY Hospital - Queens	273	12	4.40	6.55	4.78	(2.47, 8.36)
NYU Hospitals Center	1234	91	7.37	7.57	6.95	(5.60, 8.53)
North Shore	955	61	6.39	7.05	6.46	(4.94, 8.30)
Rochester General	695	62	8.92	8.04	7.91	(6.07, 10.14)
St. Elizabeth	265	11	4.15	5.99	4.95	(2.47, 8.85)
St. Francis	1954	125	6.40	7.79	5.86 **	(4.88, 6.98)
St. Josephs	804	39	4.85	6.97	4.96 **	(3.53, 6.79)
St. Lukes-Roosevelt	262	14	5.34	7.34	5.19	(2.84, 8.72)
St. Peters	635	24	3.78	5.25	5.14	(3.29, 7.64)
St. Vincents	362	36	9.94	7.20	9.85	(6.90, 13.64)
Strong Memorial	519	65	12.52	7.95	11.24 *	(8.67, 14.32)
United Health Services	262	23	8.78	7.05	8.89	(5.63, 13.33)
Univ Hosp-Stony Brook	396	34	8.59	6.64	9.22	(6.39, 12.89)
Univ. Hosp. - Upstate	407	32	7.86	7.87	7.13	(4.87, 10.06)
Univ. Hosp. of Brooklyn	209	24	11.48	6.80	12.05 *	(7.72, 17.93)
Vassar Brothers	41	1	2.44	6.45	2.70	(0.04, 15.02)
Weill Cornell-NYP	1161	62	5.34	6.98	5.46 **	(4.18, 7.00)
Westchester Med. Ctr.	705	67	9.50	7.92	8.56	(6.63, 10.87)
Winthrop Univ. Hosp.	818	61	7.46	9.36	5.68	(4.35, 7.30)
Total	18125	1293	7.13	7.13	7.13	

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

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

Figure 1: Risk-Adjusted Mortality Rates for CABG in New York State, 2000 Discharges (Listed Alphabetically by Hospital)

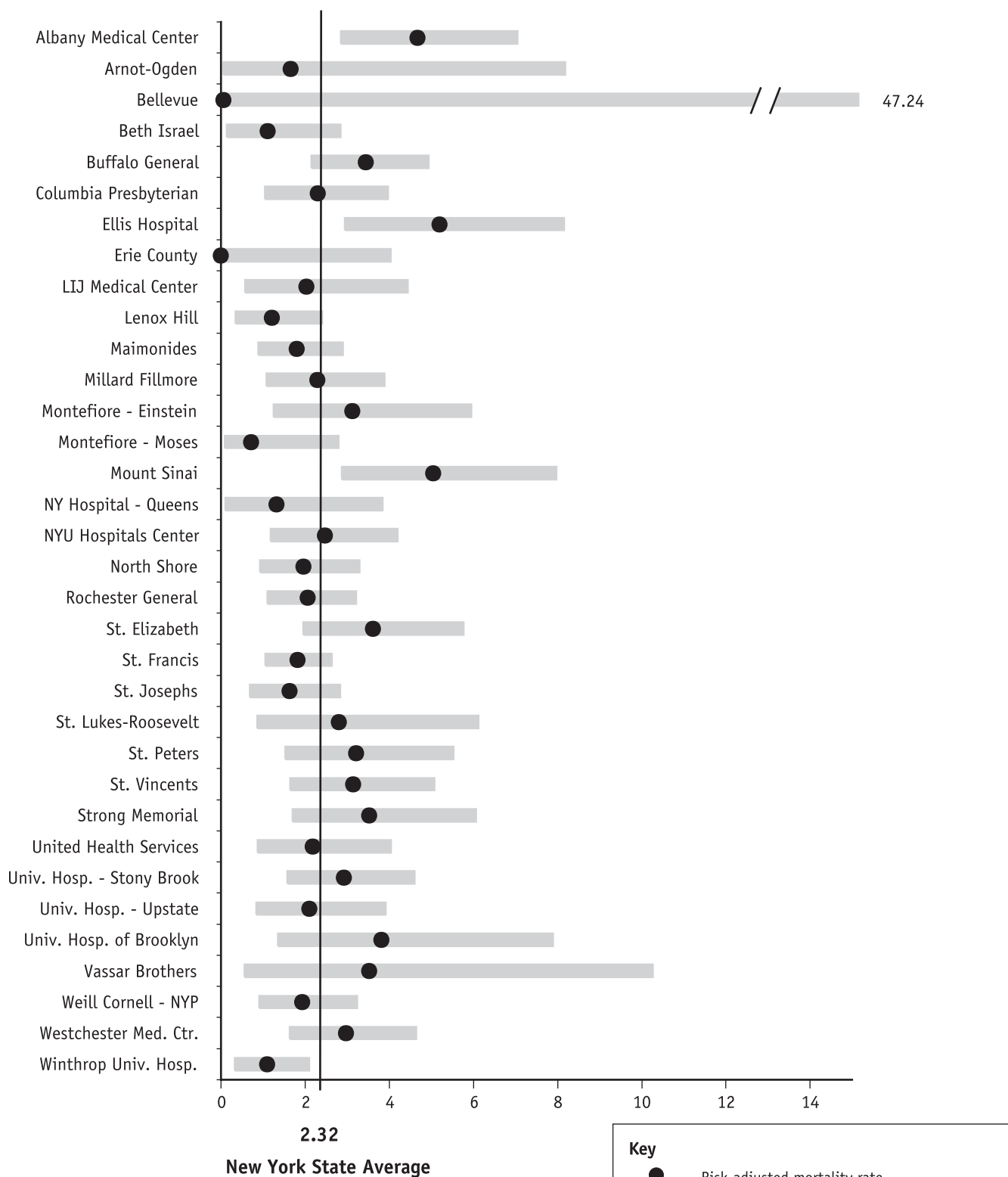


Figure 2: Risk-Adjusted Mortality Rates for Valve or Valve/CABG in New York State, 1998-2000 Discharges (Listed Alphabetically by Hospital)

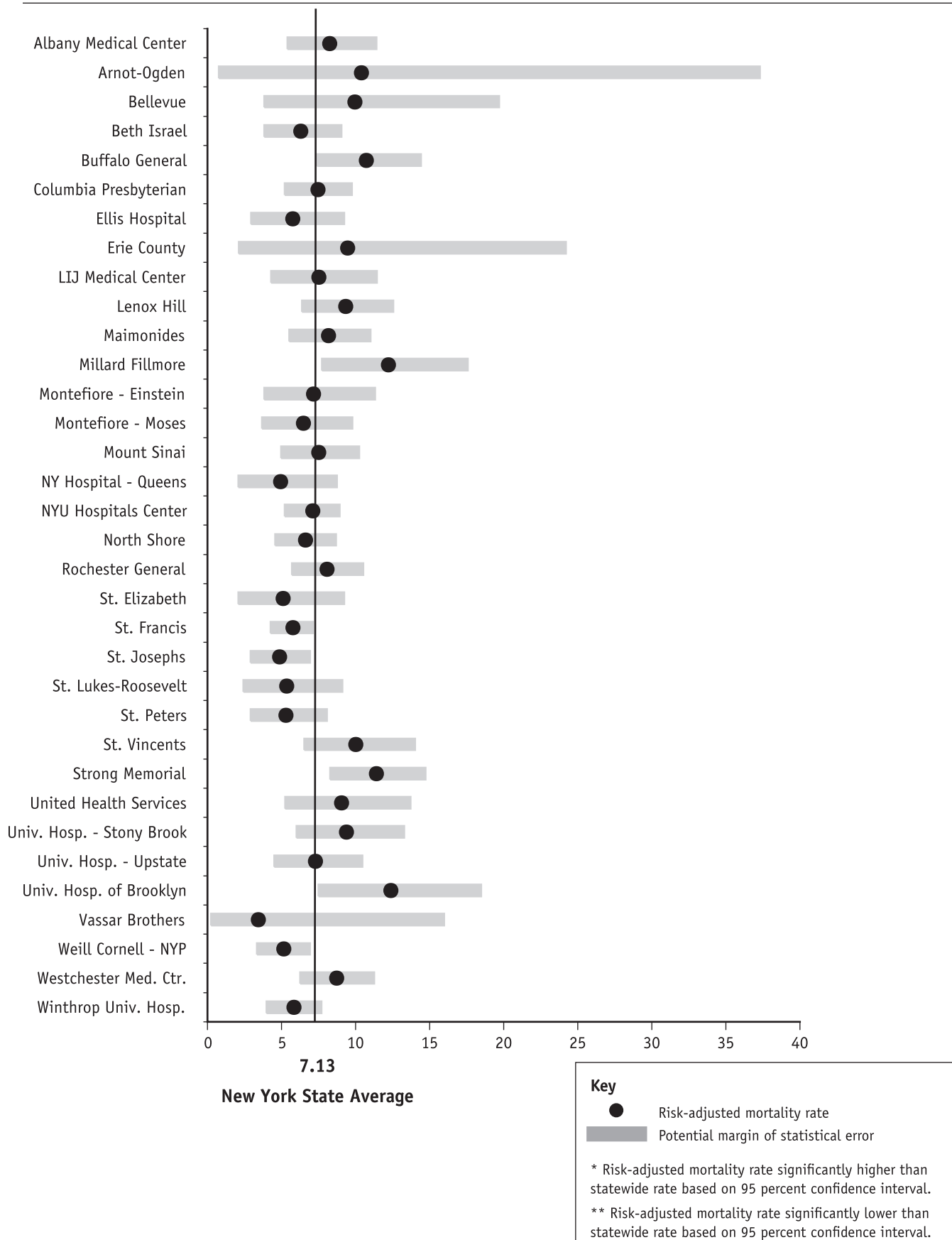


Table 4: Volume for Valve Procedures in New York State, 1998-2000 Discharges

Hospital	Aortic Valve Replace Surgery	Aortic Valve and CABG	Mitral Valve Replace Surgery	Mitral Valve and CABG	Mitral Valve Repair Surgery	Mitral Repair and CABG	Multiple Valve Replace Surgery	Multiple Valve and CABG	Total Valve or Valve/CABG
Albany Medical Center	139	246	48	39	17	55	25	27	596
Arnot-Ogden	20	10	6	0	1	2	1	0	40
Bellevue	38	4	29	2	8	5	14	0	100
Beth Israel	72	125	55	57	19	35	60	26	449
Buffalo General	142	124	67	50	45	41	24	16	509
Columbia Presbyterian-NYP	264	207	102	48	113	92	103	28	957
Ellis Hospital	69	137	41	20	26	54	19	12	378
Erie County	15	14	9	6	0	1	0	3	48
LIJ Medical Center	71	95	54	53	25	24	28	15	365
Lenox Hill	119	99	78	51	41	59	56	16	519
Maimonides	177	170	103	48	8	31	60	12	609
Millard Fillmore	88	104	20	19	24	29	17	9	310
Montefiore - Einstein	76	38	64	32	19	16	30	6	281
Montefiore - Moses	101	105	53	30	16	32	44	15	396
Mount Sinai	144	148	103	54	28	26	82	26	611
NYU Hospitals Center	321	160	147	62	281	63	158	42	1234
New York Hospital - Queens	65	78	34	38	5	25	19	9	273
North Shore	274	295	142	127	20	11	71	15	955
Rochester General	188	194	79	61	46	52	47	28	695
St. Elizabeth	71	91	18	12	23	28	10	12	265
St. Francis	523	571	253	228	63	59	156	101	1954
St. Josephs	217	244	95	80	44	47	45	32	804
St. Lukes-Roosevelt	61	60	43	22	13	25	27	11	262
St. Peters	185	179	100	48	37	35	30	21	635
St. Vincents	99	100	60	55	4	10	21	13	362
Strong Memorial	132	132	55	52	22	52	40	34	519
United Health Services	102	84	28	22	7	4	11	4	262
Univ. Hosp. - Stony Brook	100	125	38	41	24	37	17	14	396
Univ. Hosp. - Upstate	100	102	54	42	18	32	42	17	407
Univ. Hosp. of Brooklyn	39	23	36	16	26	30	35	4	209
Vassar Brothers	9	11	8	8	0	2	0	3	41
Weill Cornell-NYP	276	270	198	162	66	35	107	47	1161
Westchester Medical Center	166	222	80	70	26	57	55	29	705
Winthrop Univ. Hosp.	202	240	76	104	12	115	40	29	818
Total	4665	4807	2376	1759	1127	1221	1494	676	18125
Statewide Mortality Rate(%)	4.07	6.59	6.27	13.64	2.13	9.75	9.44	16.72	7.13

1998 - 2000 HOSPITAL AND SURGEON OUTCOMES

Table 5 provides the number of Isolated CABG operations, number of CABG patients who died in the hospital, observed mortality rate, expected mortality rate, risk-adjusted mortality rate, the 95% confidence interval for the risk-adjusted mortality rate for isolated CABG patients in 1998-2000. 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 1998-2000 for each of the 34 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 operations during 1998-2000, and/or (b) who performed at least one operation in each of the years 1998-2000.

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 1998-2000 are noted in Table 5 and listed under hospitals in which they performed these operations.

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

Table 5: Surgeon Observed, Expected, and Risk-Adjusted Mortality Rates for Isolated CABG and Valve Surgery (with or without CABG done in combination) in NYS, 1998 - 2000 Discharges

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95 % CI for RAMR	Cases	RAMR
STATE TOTAL	55051	1232	2.24	2.24	2.24		73176	3.45
Albany Medical Center Hospital								
#Banker M	2	0	0.00	0.56	0.00	(0.00, 100.0)	2	0.00
Britton L	347	2	0.58	1.44	0.89	(0.10, 3.22)	455	1.59
Canavan T	474	6	1.27	1.37	2.07	(0.76, 4.50)	563	3.97
Canver C	299	10	3.34	1.57	4.77 *	(2.29, 8.78)	363	6.27
##Dal Col R	3	0	0.00	0.52	0.00	(0.00, 100.0)	3	0.00
#Depan H	0	0	0.00	0.00	0.00	(0.00, 0.00)	2	0.00
#Joyce F	3	0	0.00	1.12	0.00	(0.00, 100.0)	6	0.00
Kelley J	532	16	3.01	1.54	4.36 *	(2.49, 7.08)	689	5.36 *
Miller S	437	9	2.06	1.74	2.65	(1.21, 5.03)	559	4.44
##Saifi J	3	0	0.00	1.15	0.00	(0.00, 100.0)	3	0.00
#Sardella G	3	0	0.00	1.40	0.00	(0.00, 100.0)	3	0.00
All Others	147	3	2.04	1.63	2.80	(0.56, 8.19)	198	3.37
TOTAL	2250	46	2.04	1.54	2.98	(2.18, 3.97)	2846	4.25
Arnot-Ogden Memorial Hospital								
#Quintos E	127	8	6.30	1.83	7.72 *	(3.32, 15.21)	139	9.96 *
All Others	159	1	0.63	1.60	0.88	(0.01, 4.89)	187	2.97
TOTAL	286	9	3.15	1.70	4.14	(1.89, 7.86)	326	6.06

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 Hospital Center								
#Colvin S	1	0	0.00	4.67	0.00	(0.00, 100.0)	11	8.31
#Galloway A	6	0	0.00	1.34	0.00	(0.00, 100.0)	13	0.00
#Glassman L	54	3	5.56	1.53	8.12	(1.63, 23.72)	63	8.59
#Ribakove G	40	3	7.50	1.97	8.52	(1.71, 24.91)	77	7.47
#Steinberg B	52	0	0.00	1.49	0.00	(0.00, 10.63)	89	2.43
TOTAL	153	6	3.92	1.64	5.34	(1.95, 11.62)	253	5.79
Beth Israel Medical Center								
##Geller C	43	0	0.00	1.62	0.00	(0.00, 11.79)	51	3.87
Harris L	284	5	1.76	2.21	1.79	(0.58, 4.17)	358	2.92
Hoffman D	246	5	2.03	2.14	2.13	(0.69, 4.97)	304	4.36
#Stelzer P	111	3	2.70	2.26	2.68	(0.54, 7.83)	231	3.72
#Tranbaugh R	526	4	0.76	2.39	0.71 **	(0.19, 1.82)	708	1.37 **
All Others	17	1	5.88	1.61	8.16	(0.11, 45.42)	24	8.33
TOTAL	1227	18	1.47	2.25	1.46	(0.87, 2.31)	1676	2.67
Buffalo General Hospital								
#Bergsland J	499	19	3.81	2.56	3.33	(2.00, 5.20)	548	4.94
Bhayana J	155	1	0.65	1.71	0.84	(0.01, 4.70)	332	3.25
Grosner G	654	7	1.07	1.83	1.31	(0.52, 2.69)	771	2.23
##Guarino R	3	0	0.00	2.07	0.00	(0.00, 100.0)	3	0.00
#Houck J	1	0	0.00	3.51	0.00	(0.00, 100.0)	2	0.00
##Kerr P	9	0	0.00	1.18	0.00	(0.00, 77.14)	13	12.93
#Lajos T	294	13	4.42	2.11	4.69 *	(2.49, 8.01)	306	7.22 *
#Levinsky L	352	10	2.84	1.83	3.47	(1.66, 6.39)	363	5.29
#Lewin A	453	10	2.21	1.66	2.97	(1.42, 5.46)	468	5.62
#Raza S	341	11	3.23	2.04	3.53	(1.76, 6.32)	419	6.93 *
Salerno T	107	5	4.67	4.44	2.36	(0.76, 5.50)	145	4.36
All Others	136	7	5.15	3.67	3.14	(1.26, 6.47)	143	4.44
TOTAL	3004	83	2.76	2.15	2.88 *	(2.29, 3.57)	3513	4.66 *
Columbia Presbyterian-NY Presbyterian Hospital								
Edwards N	324	6	1.85	2.48	1.67	(0.61, 3.64)	421	2.75
Esrig B	15	0	0.00	2.38	0.00	(0.00, 22.99)	20	4.08
Galantowicz M	2	0	0.00	0.73	0.00	(0.00, 100.0)	5	0.00
Ginsburg M	0	0	0.00	0.00	0.00	(0.00, 0.00)	1	0.00
Gorenstein L	1	0	0.00	3.39	0.00	(0.00, 100.0)	1	0.00
Naka Y	104	1	0.96	2.48	0.87	(0.01, 4.82)	156	4.28
Oz M	625	13	2.08	2.12	2.20	(1.17, 3.75)	905	4.07
Quaegebeur J	0	0	0.00	0.00	0.00	(0.00, 0.00)	8	0.00

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
Rose E	149	4	2.68	1.62	3.70	(1.00, 9.48)	276	2.69
Smith C	548	8	1.46	1.53	2.13	(0.92, 4.20)	925	2.97
All Others	21	4	19.05	3.62	11.77 *	(3.17, 30.12)	28	11.94 *
TOTAL	1789	36	2.01	2.00	2.25	(1.57, 3.11)	2746	3.50
Ellis Hospital								
##Dal Col R	1	0	0.00	0.60	0.00	(0.00, 100.0)	1	0.00
#Depan H	411	17	4.14	1.80	5.13 *	(2.99, 8.22)	596	5.34 *
Reich H	393	8	2.04	1.84	2.47	(1.06, 4.87)	452	3.62
#Saifi J	427	7	1.64	2.02	1.82	(0.73, 3.74)	547	2.05
All Others	100	2	2.00	1.35	3.32	(0.37, 12.00)	114	4.81
TOTAL	1332	34	2.55	1.85	3.09	(2.14, 4.32)	1710	3.77
Erie County Medical Center								
Datta S	171	2	1.17	1.41	1.86	(0.21, 6.72)	172	2.86
##Guarino R	7	0	0.00	0.74	0.00	(0.00, 100.0)	7	0.00
#Houck J	64	1	1.56	1.81	1.93	(0.03, 10.76)	75	3.58
##Kerr P	1	0	0.00	4.47	0.00	(0.00, 100.0)	1	0.00
All Others	160	2	1.25	1.75	1.60	(0.18, 5.78)	196	3.39
TOTAL	403	5	1.24	1.60	1.73	(0.56, 4.04)	451	3.26
Long Island Jewish Medical Center								
Graver L	646	14	2.17	2.03	2.39	(1.31, 4.01)	883	3.90
Kline G	84	3	3.57	1.13	7.10	(1.43, 20.74)	104	6.28
Palazzo R	442	2	0.45	1.57	0.65	(0.07, 2.33)	548	1.63
#Vatsia S	0	0	0.00	0.00	0.00	(0.00, 0.00)	1	0.00
All Others	0	0	0.00	0.00	0.00	(0.00, 0.00)	1	0.00
TOTAL	1172	19	1.62	1.79	2.03	(1.22, 3.17)	1537	3.35
Lenox Hill								
#Connolly M	545	8	1.47	2.14	1.53	(0.66, 3.02)	733	2.89
##Geller C	23	1	4.35	2.29	4.25	(0.06, 23.67)	26	5.47
#Genovesi M	82	2	2.44	2.10	2.59	(0.29, 9.37)	95	4.12
##Jacobowitz I	25	1	4.00	3.79	2.36	(0.03, 13.13)	30	8.67
McCabe J	28	1	3.57	1.77	4.51	(0.06, 25.09)	41	2.26
##Sabado M	108	4	3.70	3.77	2.20	(0.59, 5.64)	174	3.02
#Spier L	15	0	0.00	1.29	0.00	(0.00, 42.31)	16	0.00
Subramanian V	946	28	2.96	2.70	2.45	(1.63, 3.54)	1112	4.88 *
All Others	68	0	0.00	2.19	0.00	(0.00, 5.52)	132	0.64
TOTAL	1840	45	2.45	2.54	2.16	(1.57, 2.89)	2359	3.82

Table 5 continued:

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Maimonides								
Acinapura A	274	5	1.82	2.21	1.85	(0.60, 4.31)	341	2.72
#Anderson J	5	0	0.00	3.99	0.00	(0.00, 41.10)	6	0.00
#Burack J	1	0	0.00	1.36	0.00	(0.00, 100.0)	1	0.00
#Connolly M	201	3	1.49	2.28	1.47	(0.29, 4.28)	244	3.43
Cunningham J N	216	16	7.41	2.87	5.77 *	(3.29, 9.37)	291	7.43 *
#Genovesi M	85	4	4.71	3.26	3.23	(0.87, 8.27)	91	5.79
##Jacobowitz I	1044	26	2.49	2.94	1.90	(1.24, 2.78)	1287	3.22
#Ketosugbo A	14	0	0.00	1.62	0.00	(0.00, 36.27)	17	0.00
Lazzaro R	73	7	9.59	3.69	5.81 *	(2.33, 11.98)	79	8.36
#Reddy RC	14	1	7.14	1.56	10.24	(0.13, 56.96)	16	11.53
##Sabado M	92	6	6.52	4.06	3.60	(1.31, 7.83)	126	4.95
Zisbrod Z	623	13	2.09	2.73	1.71	(0.91, 2.92)	728	2.86
All Others	134	1	0.75	2.19	0.76	(0.01, 4.24)	158	0.87
TOTAL	2776	82	2.95	2.79	2.37	(1.89, 2.95)	3385	3.74
Millard Fillmore								
Aldridge J	331	7	2.11	2.13	2.23	(0.89, 4.59)	391	3.73
Ashraf M	628	4	0.64	1.91	0.75 **	(0.20, 1.91)	748	1.52 **
#Bergsland J	17	0	0.00	3.60	0.00	(0.00, 13.43)	18	0.00
##Guarino R	410	11	2.68	1.61	3.72	(1.85, 6.65)	443	7.34 *
Jennings L	327	5	1.53	1.92	1.78	(0.57, 4.16)	369	3.00
## Kerr P	236	9	3.81	2.41	3.54	(1.62, 6.72)	282	6.92 *
#Lajos T	1	0	0.00	0.92	0.00	(0.00, 100.0)	1	0.00
#Levinsky L	8	0	0.00	0.89	0.00	(0.00, 100.0)	8	0.00
#Lewin A	1	0	0.00	1.35	0.00	(0.00, 100.0)	1	0.00
#Raza S	14	0	0.00	2.22	0.00	(0.00, 26.44)	16	0.00
All Others	57	3	5.26	2.92	4.03	(0.81, 11.78)	63	8.56
TOTAL	2030	39	1.92	1.99	2.17	(1.54, 2.96)	2340	4.10
Montefiore - Einstein								
##Brodman R	1	0	0.00	0.83	0.00	(0.00, 100.0)	2	0.00
#Camacho M	1	0	0.00	0.84	0.00	(0.00, 100.0)	2	0.00
#Crooke G	2	0	0.00	2.09	0.00	(0.00, 100.0)	2	0.00
#Frater R	59	1	1.69	1.84	2.06	(0.03, 11.47)	113	4.13
#Frymus M	355	10	2.82	2.29	2.75	(1.32, 5.06)	423	4.54
#Gold J	38	0	0.00	1.57	0.00	(0.00, 13.75)	64	0.00
#Merav A	1	0	0.00	2.69	0.00	(0.00, 100.0)	1	0.00

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
#Plestis K	123	1	0.81	2.35	0.78	(0.01, 4.31)	167	0.58 **
##Tortolani A	189	9	4.76	2.17	4.92 *	(2.25, 9.34)	241	6.55 *
All Others	127	3	2.36	2.23	2.37	(0.48, 6.93)	162	3.22
TOTAL	896	24	2.68	2.20	2.72	(1.75, 4.05)	1177	3.80
Montefiore - Moses								
Attai L	313	3	0.96	1.83	1.18	(0.24, 3.43)	414	2.03
##Brodman R	170	1	0.59	1.96	0.67	(0.01, 3.74)	237	1.94
#Camacho M	232	3	1.29	2.38	1.22	(0.24, 3.56)	297	2.99
#Crooke G	16	0	0.00	2.80	0.00	(0.00, 18.30)	21	3.75
#Frater R	0	0	0.00	0.00	0.00	(0.00, 0.00)	1	0.00
#Frymus M	1	0	0.00	1.06	0.00	(0.00, 100.0)	1	0.00
#Gold J	151	0	0.00	1.76	0.00	(0.00, 3.08)	218	1.12
#Merav A	253	3	1.19	2.00	1.33	(0.27, 3.88)	334	3.40
#Plestis K	24	0	0.00	1.60	0.00	(0.00, 21.38)	31	0.00
##Tortolani A	1	0	0.00	5.09	0.00	(0.00, 100.0)	2	0.00
All Others	4	0	0.00	1.95	0.00	(0.00, 100.0)	5	0.00
TOTAL	1165	10	0.86	2.00	0.96 **	(0.46, 1.77)	1561	2.33 **
Mount Sinai								
Ergin M	247	4	1.62	1.83	1.98	(0.53, 5.07)	419	2.92
Galla J	252	13	5.16	2.61	4.42 *	(2.35, 7.56)	356	4.65
Griep R	30	0	0.00	1.64	0.00	(0.00, 16.64)	121	3.42
Lansman S	308	14	4.55	3.18	3.20	(1.75, 5.36)	418	5.27 *
McCullough J	191	5	2.62	2.32	2.52	(0.81, 5.88)	244	4.28
Nguyen K	55	2	3.64	3.03	2.69	(0.30, 9.70)	70	3.01
Spielvogel D	140	6	4.29	2.42	3.96	(1.45, 8.63)	206	3.60
TOTAL	1223	44	3.60	2.53	3.19 *	(2.32, 4.28)	1834	4.12
NYU Hospitals Center								
#Colvin S	84	1	1.19	2.12	1.26	(0.02, 6.99)	512	3.29
Culliford A	333	8	2.40	2.40	2.24	(0.96, 4.41)	505	2.52
Esposito R	286	8	2.80	2.70	2.32	(1.00, 4.57)	412	4.62
#Galloway A	212	5	2.36	2.44	2.16	(0.70, 5.05)	471	2.75
#Glassman L	5	0	0.00	2.42	0.00	(0.00, 67.77)	7	12.77
Grossi E	88	4	4.55	4.65	2.19	(0.59, 5.60)	141	2.95
#Ribakove G	244	4	1.64	3.48	1.05	(0.28, 2.70)	384	3.24
#Steinberg B	77	4	5.19	2.95	3.94	(1.06, 10.09)	109	4.55
All Others	17	0	0.00	5.60	0.00	(0.00, 8.62)	39	2.73
TOTAL	1346	34	2.53	2.87	1.97	(1.36, 2.75)	2580	3.27

Table 5 continued:

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
New York Hospital - Queens								
#Aronis M	182	3	1.65	1.72	2.15	(0.43, 6.27)	247	1.78
#Isom O	1	0	0.00	9.04	0.00	(0.00, 90.78)	1	0.00
#Ko W	450	4	0.89	1.65	1.20	(0.32, 3.08)	563	2.50
##Lang S	290	5	1.72	1.73	2.23	(0.72, 5.21)	385	2.76
TOTAL	923	12	1.30	1.70	1.71	(0.88, 2.99)	1196	2.47
North Shore								
Hall M	795	13	1.64	2.20	1.67	(0.89, 2.85)	1185	2.48
Levy M	528	15	2.84	2.06	3.08	(1.73, 5.09)	692	4.75
Parnell V	2	0	0.00	11.58	0.00	(0.00, 35.44)	4	0.00
Pogo G	746	13	1.74	2.45	1.59	(0.85, 2.72)	997	2.70
#Vatsia S	296	4	1.35	2.12	1.43	(0.38, 3.65)	444	2.79
TOTAL	2367	45	1.90	2.25	1.89	(1.38, 2.53)	3322	3.04
Rochester General								
Cheeran D	755	18	2.38	2.56	2.08	(1.23, 3.29)	934	2.94
Fong J	122	6	4.92	2.69	4.09	(1.49, 8.89)	130	4.72
Kirshner R	617	13	2.11	3.20	1.48	(0.78, 2.52)	763	3.37
Knight P	715	17	2.38	2.81	1.89	(1.10, 3.03)	1008	3.38
Kwan S	360	8	2.22	2.72	1.83	(0.79, 3.60)	429	3.60
TOTAL	2569	62	2.41	2.81	1.92	(1.47, 2.46)	3264	3.34
St. Elizabeth								
Carr T	274	6	2.19	1.82	2.70	(0.99, 5.87)	320	4.08
Hatton P	398	11	2.76	1.87	3.31	(1.65, 5.92)	499	3.12
#Joyce F	417	7	1.68	1.72	2.18	(0.87, 4.50)	535	3.38
TOTAL	1089	24	2.20	1.80	2.74	(1.76, 4.08)	1354	3.41
St. Francis								
Bercow N	894	18	2.01	2.40	1.88	(1.11, 2.97)	1165	2.52
Colangelo R	690	13	1.88	2.20	1.92	(1.02, 3.28)	871	3.54
Damus P	534	3	0.56	1.61	0.78	(0.16, 2.28)	1003	1.53 **
Durban L	163	4	2.45	2.99	1.84	(0.49, 4.71)	217	3.03
Lamendola C	836	17	2.03	2.43	1.87	(1.09, 3.00)	1100	3.07
Robinson N	835	11	1.32	1.65	1.79	(0.89, 3.20)	1160	3.81
Taylor J	996	12	1.20	2.09	1.29	(0.67, 2.26)	1318	2.31 **
Weisz D	309	3	0.97	2.14	1.02	(0.20, 2.97)	377	1.10 **
TOTAL	5257	81	1.54	2.12	1.63 **	(1.29, 2.02)	7211	2.70 **

Table 5 continued:

	Isolated CABG					95% CI for RAMR	Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR		Cases	RAMR
St. Josephs								
Marvasti M	538	3	0.56	2.02	0.62 **	(0.12, 1.81)	724	1.10 **
Nast E	479	11	2.30	2.61	1.97	(0.98, 3.52)	592	2.81
Nazem A	636	3	0.47	2.88	0.37 **	(0.07, 1.07)	806	1.36 **
Rosenberg J	610	13	2.13	2.67	1.79	(0.95, 3.06)	945	2.88
TOTAL	2263	30	1.33	2.56	1.16 **	(0.78, 1.65)	3067	2.09 **
St. Lukes-Roosevelt								
#Aronis M	51	3	5.88	2.46	5.35	(1.08, 15.63)	66	6.00
Connery C	51	4	7.84	2.72	6.45	(1.74, 16.52)	72	5.39
##Geller C	42	2	4.76	2.74	3.88	(0.44, 14.02)	76	2.49
Safavi A	13	0	0.00	2.36	0.00	(0.00, 26.74)	18	0.00
#Stelzer P	7	0	0.00	3.62	0.00	(0.00, 32.39)	45	2.26
Swistel D	493	14	2.84	3.09	2.06	(1.12, 3.45)	605	2.71
#Tranbaugh R	4	0	0.00	1.08	0.00	(0.00, 100.0)	4	0.00
All Others	99	4	4.04	1.95	4.63	(1.24, 11.84)	136	7.40
TOTAL	760	27	3.55	2.84	2.80	(1.85, 4.08)	1022	3.47
St. Peters								
#Banker M	369	7	1.90	1.81	2.34	(0.94, 4.82)	427	3.94
Bennett E	348	7	2.01	1.53	2.94	(1.18, 6.05)	600	2.57
##Dal Col R	500	5	1.00	1.23	1.82	(0.59, 4.24)	688	3.43
##Saifi J	65	1	1.54	1.19	2.90	(0.04, 16.13)	78	2.14
#Sardella G	531	9	1.69	1.47	2.59	(1.18, 4.91)	655	2.69
TOTAL	1813	29	1.60	1.48	2.43	(1.62, 3.49)	2448	3.04
St. Vincents								
Galdieri	400	21	5.25	2.06	5.70 *	(3.52, 8.71)	466	8.92 *
Klein J	84	3	3.57	2.19	3.66	(0.73, 10.68)	92	7.12
##Lang S	281	11	3.91	2.69	3.26	(1.63, 5.84)	354	4.59
McGinn J	537	12	2.23	2.35	2.13	(1.10, 3.72)	651	3.58
Tyras D	383	14	3.66	1.88	4.35 *	(2.38, 7.30)	483	4.57
All Others	7	1	14.29	1.72	18.59	(0.24, 100.0)	8	27.02
TOTAL	1692	62	3.66	2.22	3.69 *	(2.83, 4.73)	2054	5.31 *
Strong Memorial								
Hicks G	447	18	4.03	2.26	3.99 *	(2.36, 6.31)	688	5.26 *
Risher W	468	12	2.56	2.29	2.51	(1.30, 4.38)	717	4.86 *
All Others	131	5	3.82	2.15	3.97	(1.28, 9.26)	160	8.77 *
TOTAL	1046	35	3.35	2.26	3.32 *	(2.31, 4.61)	1565	5.32 *

Table 5 continued:

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
United Health Services								
#Quintos E	186	1	0.54	2.49	0.48	(0.01, 2.69)	216	2.10
Wong K	353	5	1.42	2.36	1.34	(0.43, 3.14)	457	2.12
Yousuf M	315	12	3.81	3.03	2.81	(1.45, 4.91)	422	4.56
All Others	157	9	5.73	2.27	5.65 *	(2.58, 10.72)	178	9.35 *
TOTAL	1011	27	2.67	2.58	2.32	(1.53, 3.37)	1273	3.87
Univ. Hosp. - Stony Brook								
Bilfinger T	418	6	1.44	2.60	1.23	(0.45, 2.69)	483	2.77
Krukenkamp I	464	13	2.80	1.72	3.64	(1.94, 6.22)	606	4.67
McLarty A	328	6	1.83	1.64	2.49	(0.91, 5.42)	367	3.87
Saltman A E	246	8	3.25	1.65	4.41	(1.90, 8.69)	266	7.28 *
Seifert F	726	14	1.93	1.88	2.29	(1.25, 3.84)	856	3.89
TOTAL	2182	47	2.15	1.92	2.50	(1.84, 3.33)	2578	4.09
Univ. Hosp. - Upstate								
Alfieris G	169	4	2.37	2.93	1.80	(0.49, 4.62)	286	2.56
Brandt B	427	3	0.70	2.53	0.62 **	(0.12, 1.81)	517	2.07
Myers S	190	5	2.63	2.56	2.30	(0.74, 5.37)	206	4.44
Parker F	149	5	3.36	2.39	3.15	(1.01, 7.34)	204	3.97
Picone A	381	11	2.89	2.46	2.62	(1.31, 4.69)	496	3.88
All Others	72	5	6.94	2.98	5.22	(1.68, 12.18)	86	5.91
TOTAL	1388	33	2.38	2.57	2.07	(1.42, 2.90)	1795	3.31
Univ. Hosp. of Brooklyn								
#Anderson J	95	6	6.32	2.52	5.61	(2.05, 12.22)	135	5.05
#Burack J	123	2	1.63	2.98	1.22	(0.14, 4.41)	150	1.43
##Jacobowitz I	88	5	5.68	2.22	5.73	(1.85, 13.37)	108	6.47
#Ketosugbo A	102	3	2.94	2.03	3.24	(0.65, 9.47)	120	6.81
Picone V	11	1	9.09	1.51	13.46	(0.18, 74.86)	12	18.72
#Reddy RC	155	10	6.45	2.50	5.78 *	(2.77, 10.63)	213	8.80 *
##Sabado M	93	7	7.53	2.55	6.60 *	(2.64, 13.60)	134	8.65 *
All Others	21	0	0.00	1.12	0.00	(0.00, 34.86)	25	0.00
TOTAL	688	34	4.94	2.43	4.55 *	(3.15, 6.36)	897	6.47 *
Vassar Brothers								
Ciaburri D	150	3	2.00	1.31	3.42	(0.69, 9.98)	191	2.99
TOTAL	150	3	2.00	1.31	3.42	(0.69, 9.98)	191	2.99
Weill Cornell-NYP								
Altorki N	99	5	5.05	2.04	5.53	(1.78, 12.91)	115	7.21
##Brodman R	88	1	1.14	2.00	1.27	(0.02, 7.09)	109	2.41

Table 5 continued:

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Girardi L	591	8	1.35	2.72	1.11 **	(0.48, 2.20)	824	2.18 **
#Isom O	188	3	1.60	1.30	2.76	(0.55, 8.05)	464	2.52
#Ko W	120	1	0.83	2.00	0.93	(0.01, 5.19)	171	2.72
Krieger K	671	8	1.19	2.21	1.21	(0.52, 2.38)	1010	2.10 **
##Lang S	41	5	12.20	2.50	10.94 *	(3.53, 25.53)	68	5.51
Rosengart T	358	15	4.19	3.14	2.99	(1.67, 4.93)	516	3.89
##Tortolani A	203	3	1.48	2.60	1.27	(0.26, 3.71)	243	3.16
TOTAL	2359	49	2.08	2.42	1.92	(1.42, 2.54)	3520	2.77 **
Westchester Medical Center								
Axelrod H	411	11	2.68	2.57	2.33	(1.16, 4.17)	495	3.74
Fleisher A	434	14	3.23	1.90	3.80	(2.07, 6.37)	561	5.86 *
Lafaro R	253	9	3.56	2.07	3.85	(1.76, 7.30)	344	5.40
Moggio R	356	8	2.25	2.15	2.34	(1.01, 4.62)	488	4.01
Sarabu M	429	5	1.17	2.51	1.04	(0.33, 2.42)	592	1.38 **
Zias E	462	13	2.81	1.91	3.30	(1.76, 5.64)	542	5.31
All Others	123	6	4.88	2.20	4.95	(1.81, 10.78)	151	4.85
TOTAL	2468	66	2.67	2.19	2.74	(2.12, 3.48)	3173	4.18 *
Winthrop Univ. Hosp.								
Hartman A	398	4	1.01	3.08	0.73 **	(0.20, 1.87)	741	2.24 **
Kofsky E	592	13	2.20	3.06	1.61	(0.85, 2.75)	741	2.67
Schubach S	595	7	1.18	2.40	1.10	(0.44, 2.26)	800	1.48 **
Scott W	265	4	1.51	2.51	1.35	(0.36, 3.45)	326	3.69
#Spier L	107	2	1.87	3.31	1.26	(0.14, 4.56)	118	4.54
Williams L	76	1	1.32	3.70	0.80	(0.01, 4.43)	93	0.89
All Others	101	1	0.99	2.48	0.89	(0.01, 4.98)	133	2.23
TOTAL	2134	32	1.50	2.82	1.19 **	(0.81, 1.68)	2952	2.35 **
STATEWIDE TOTAL	55051	1232	2.24	2.24	2.24		73176	3.45

* Risk-adjusted mortality rate is significantly higher than statewide rate.

** Risk-adjusted mortality rate is significantly lower than statewide rate.

Performed operations in another New York State hospital.

Performed operations in three or more New York State hospital.

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

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

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

Table 6: Summary Information for Surgeons Practicing at More than One Hospital, 1998-2000.

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Anderson J	100	6	6.00	2.59	5.18	(1.89,11.28)	141	4.82
Maimonides	5	0	0.00	3.99	0.00	(0.00,41.10)	6	0.00
Univ. Hosp. of Brooklyn	95	6	6.32	2.52	5.61	(2.05,12.22)	135	5.05
Aronis M	233	6	2.58	1.88	3.06	(1.12, 6.67)	313	2.98
New York Hospital - Queens	182	3	1.65	1.72	2.15	(0.43, 6.27)	247	1.78
St. Lukes-Roosevelt	51	3	5.88	2.46	5.35	(1.08,15.63)	66	6.00
Banker M	371	7	1.89	1.81	2.34	(0.94, 4.81)	429	3.93
Albany Medical Center	2	0	0.00	0.56	0.00	(0.00,100.0)	2	0.00
St. Peters	369	7	1.90	1.81	2.34	(0.94, 4.82)	427	3.94
Bergsland J	516	19	3.68	2.59	3.18	(1.91, 4.96)	566	4.76
Buffalo General	499	19	3.81	2.56	3.33	(2.00, 5.20)	548	4.94
Millard Fillmore	17	0	0.00	3.60	0.00	(0.00,13.43)	18	0.00
Brodman R	259	2	0.77	1.97	0.88	(0.10, 3.17)	348	2.04
Montefiore - Einstein	1	0	0.00	0.83	0.00	(0.00,100.0)	2	0.00
Montefiore - Moses	170	1	0.59	1.96	0.67	(0.01, 3.74)	237	1.94
Weill Cornell-NYP	88	1	1.14	2.00	1.27	(0.02, 7.09)	109	2.41
Burack J	124	2	1.61	2.97	1.22	(0.14, 4.39)	151	1.43
Maimonides	1	0	0.00	1.36	0.00	(0.00,100.0)	1	0.00
Univ. Hosp. of Brooklyn	123	2	1.63	2.98	1.22	(0.14, 4.41)	150	1.43
Camacho M	233	3	1.29	2.37	1.22	(0.24, 3.55)	299	2.98
Montefiore - Einstein	1	0	0.00	0.84	0.00	(0.00,100.0)	2	0.00
Montefiore - Moses	232	3	1.29	2.38	1.22	(0.24, 3.56)	297	2.99
Colvin S	85	1	1.18	2.15	1.22	(0.02, 6.81)	523	3.43
Bellevue	1	0	0.00	4.67	0.00	(0.00,100.0)	11	8.31
NYU Hospitals Center	84	1	1.19	2.12	1.26	(0.02, 6.99)	512	3.29
Connolly M	746	11	1.47	2.18	1.52	(0.76, 2.71)	977	3.03
Lenox Hill	545	8	1.47	2.14	1.53	(0.66, 3.02)	733	2.89
Maimonides	201	3	1.49	2.28	1.47	(0.29, 4.28)	244	3.43
Crooke G	18	0	0.00	2.72	0.00	(0.00,16.74)	23	3.59
Montefiore - Einstein	2	0	0.00	2.09	0.00	(0.00,100.0)	2	0.00
Montefiore - Moses	16	0	0.00	2.80	0.00	(0.00,18.30)	21	3.75

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
Dal Col R	504	5	0.99	1.23	1.81	(0.58, 4.23)	692	3.42
Albany Medical Center	3	0	0.00	0.52	0.00	(0.00,100.0)	3	0.00
Ellis Hospital	1	0	0.00	0.60	0.00	(0.00,100.0)	1	0.00
St. Peters	500	5	1.00	1.23	1.82	(0.59, 4.24)	688	3.43
Depan H	411	17	4.14	1.80	5.13 *	(2.99, 8.22)	598	5.31 *
Albany Medical Center	0	0	0.00	0.00	0.00	(0.00, 0.00)	2	0.00
Ellis Hospital	411	17	4.14	1.80	5.13 *	(2.99, 8.22)	596	5.34 *
Frater R	59	1	1.69	1.84	2.06	(0.03,11.47)	114	3.66
Montefiore - Einstein	59	1	1.69	1.84	2.06	(0.03,11.47)	113	4.13
Montefiore - Moses	0	0	0.00	0.00	0.00	(0.00, 0.00)	1	0.00
Frymus M	356	10	2.81	2.29	2.75	(1.32, 5.06)	424	4.53
Montefiore - Einstein	355	10	2.82	2.29	2.75	(1.32, 5.06)	423	4.54
Montefiore - Moses	1	0	0.00	1.06	0.00	(0.00,100.0)	1	0.00
Galloway A	218	5	2.29	2.41	2.13	(0.69, 4.97)	484	2.72
Bellevue	6	0	0.00	1.34	0.00	(0.00,100.0)	13	0.00
NYU Hospitals Center	212	5	2.36	2.44	2.16	(0.70, 5.05)	471	2.75
Geller C	108	3	2.78	2.20	2.83	(0.57, 8.26)	153	3.21
Beth Israel	43	0	0.00	1.62	0.00	(0.00,11.79)	51	3.87
Lenox Hill	23	1	4.35	2.29	4.25	(0.06,23.67)	26	5.47
St. Lukes-Roosevelt	42	2	4.76	2.74	3.88	(0.44,14.02)	76	2.49
Genovesi M	167	6	3.59	2.69	2.99	(1.09, 6.50)	186	5.02
Lenox Hill	82	2	2.44	2.10	2.59	(0.29, 9.37)	95	4.12
Maimonides	85	4	4.71	3.26	3.23	(0.87, 8.27)	91	5.79
Glassman L	59	3	5.08	1.61	7.08	(1.42,20.69)	70	9.35
Bellevue	54	3	5.56	1.53	8.12	(1.63,23.72)	63	8.59
NYU Hospitals Center	5	0	0.00	2.42	0.00	(0.00,67.77)	7	12.77
Gold J	189	0	0.00	1.73	0.00	(0.00, 2.52)	282	0.79 **
Montefiore - Einstein	38	0	0.00	1.57	0.00	(0.00,13.75)	64	0.00
Montefiore - Moses	151	0	0.00	1.76	0.00	(0.00, 3.08)	218	1.12
Guarino R	420	11	2.62	1.60	3.66	(1.82, 6.54)	453	7.24 *
Buffalo General	3	0	0.00	2.07	0.00	(0.00,100.0)	3	0.00
Erie County	7	0	0.00	0.74	0.00	(0.00,100.0)	7	0.00
Millard Fillmore	410	11	2.68	1.61	3.72	(1.85, 6.65)	443	7.34 *

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
Houck J	65	1	1.54	1.83	1.88	(0.02,10.44)	77	3.05
Buffalo General	1	0	0.00	3.51	0.00	(0.00,100.0)	2	0.00
Erie County	64	1	1.56	1.81	1.93	(0.03,10.76)	75	3.58
Isom O	189	3	1.59	1.34	2.66	(0.53, 7.76)	465	2.51
New York Hospital - Queens	1	0	0.00	9.04	0.00	(0.00,90.78)	1	0.00
Weill Cornell-NYP	188	3	1.60	1.30	2.76	(0.55, 8.05)	464	2.52
Jacobowitz I	1157	32	2.77	2.90	2.13	(1.46, 3.01)	1425	3.57
Lenox Hill	25	1	4.00	3.79	2.36	(0.03,13.13)	30	8.67
Maimonides	1044	26	2.49	2.94	1.90	(1.24, 2.78)	1287	3.22
Univ. Hosp. of Brooklyn	88	5	5.68	2.22	5.73	(1.85,13.37)	108	6.47
Joyce F	420	7	1.67	1.72	2.17	(0.87, 4.48)	541	3.36
Albany Medical Center	3	0	0.00	1.12	0.00	(0.00,100.0)	6	0.00
St. Elizabeth	417	7	1.68	1.72	2.18	(0.87, 4.50)	535	3.38
Kerr P	246	9	3.66	2.37	3.45	(1.57, 6.55)	296	7.05 *
Buffalo General	9	0	0.00	1.18	0.00	(0.00,77.14)	13	12.93
Erie County	1	0	0.00	4.47	0.00	(0.00,100.0)	1	0.00
Millard Fillmore	236	9	3.81	2.41	3.54	(1.62, 6.72)	282	6.92 *
Ketosugbo A	116	3	2.59	1.98	2.92	(0.59, 8.54)	137	6.34
Maimonides	14	0	0.00	1.62	0.00	(0.00,36.27)	17	0.00
Univ. Hosp. of Brooklyn	102	3	2.94	2.03	3.24	(0.65, 9.47)	120	6.81
Ko W	570	5	0.88	1.72	1.14	(0.37, 2.66)	734	2.57
New York Hospital - Queens	450	4	0.89	1.65	1.20	(0.32, 3.08)	563	2.50
Weill Cornell-NYP	120	1	0.83	2.00	0.93	(0.01, 5.19)	171	2.72
Lajos T	295	13	4.41	2.11	4.68 *	(2.49, 8.00)	307	7.21 *
Buffalo Genera	294	13	4.42	2.11	4.69 *	(2.49, 8.01)	306	7.22 *
Millard Fillmore	1	0	0.00	0.92	0.00	(0.00,100.0)	1	0.00
Lang S	612	21	3.43	2.22	3.46	(2.14, 5.29)	807	4.00
New York Hospital - Queens	290	5	1.72	1.73	2.23	(0.72, 5.21)	385	2.76
St. Vincents	281	11	3.91	2.69	3.26	(1.63, 5.84)	354	4.59
Weill Cornell-NYP	41	5	12.20	2.50	10.94 *	(3.53,25.53)	68	5.51
Levinsky L	360	10	2.78	1.81	3.44	(1.64, 6.32)	371	5.24
Buffalo General	352	10	2.84	1.83	3.47	(1.66, 6.39)	363	5.29
Millard Fillmore	8	0	0.00	0.89	0.00	(0.00,100.0)	8	0.00

Table 6 continued:

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Lewin A	454	10	2.20	1.66	2.97	(1.42, 5.45)	469	5.62
Buffalo General	453	10	2.21	1.66	2.97	(1.42, 5.46)	468	5.62
Millard Fillmore	1	0	0.00	1.35	0.00	(0.00,100.0)	1	0.00
Merav A	254	3	1.18	2.00	1.32	(0.27, 3.86)	335	3.39
Montefiore - Einstein	1	0	0.00	2.69	0.00	(0.00,100.0)	1	0.00
Montefiore - Moses	253	3	1.19	2.00	1.33	(0.27, 3.88)	334	3.40
Plestis K	147	1	0.68	2.22	0.68	(0.01, 3.81)	198	0.49 **
Montefiore - Einstein	123	1	0.81	2.35	0.78	(0.01, 4.31)	167	0.58 **
Montefiore - Moses	24	0	0.00	1.60	0.00	(0.00,21.38)	31	0.00
Quintos E	313	9	2.88	2.22	2.90	(1.32, 5.50)	355	4.43
Arnot-Ogden	127	8	6.30	1.83	7.72 *	(3.32,15.21)	139	9.96 *
United Health Services	186	1	0.54	2.49	0.48	(0.01, 2.69)	216	2.10
Raza S	355	11	3.10	2.05	3.38	(1.69, 6.05)	435	6.67 *
Buffalo General	341	11	3.23	2.04	3.53	(1.76, 6.32)	419	6.93 *
Millard Fillmore	14	0	0.00	2.22	0.00	(0.00,26.44)	16	0.00
Reddy RC	169	11	6.51	2.42	6.02 *	(3.00,10.77)	229	8.90 *
Maimonides	14	1	7.14	1.56	10.24	(0.13,56.96)	16	11.53
Univ. Hosp. of Brooklyn	155	10	6.45	2.50	5.78 *	(2.77,10.63)	213	8.80 *
Ribakove G	284	7	2.46	3.27	1.69	(0.68, 3.48)	461	3.83
Bellevue	40	3	7.50	1.97	8.52	(1.71,24.91)	77	7.47
NYU Hospitals Center	244	4	1.64	3.48	1.05	(0.28, 2.70)	384	3.24
Sabado M	293	17	5.80	3.47	3.74	(2.18, 5.99)	434	5.02
Lenox Hill	108	4	3.70	3.77	2.20	(0.59, 5.64)	174	3.02
Maimonides	92	6	6.52	4.06	3.60	(1.31, 7.83)	126	4.95
Univ. Hosp. of Brooklyn	93	7	7.53	2.55	6.60 *	(2.64,13.60)	134	8.65 *
Saifi J	495	8	1.62	1.91	1.90	(0.82, 3.74)	628	2.05
Albany Medical Center	3	0	0.00	1.15	0.00	(0.00,100.0)	3	0.00
Ellis Hospital	427	7	1.64	2.02	1.82	(0.73, 3.74)	547	2.05
St. Peters	65	1	1.54	1.19	2.90	(0.04,16.13)	78	2.14
Sardella G	534	9	1.69	1.47	2.57	(1.17, 4.88)	658	2.69
Albany Medical Center	3	0	0.00	1.40	0.00	(0.00,100.0)	3	0.00
St. Peters	531	9	1.69	1.47	2.59	(1.18, 4.91)	655	2.69

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
Spier L	122	2	1.64	3.06	1.20	(0.13, 4.32)	134	4.34
Lenox Hill	15	0	0.00	1.29	0.00	(0.00,42.31)	16	0.00
Winthrop Univ. Hosp.	107	2	1.87	3.31	1.26	(0.14, 4.56)	118	4.54
Steinberg B	129	4	3.10	2.36	2.94	(0.79, 7.53)	198	3.74
Bellevue	52	0	0.00	1.49	0.00	(0.00,10.63)	89	2.43
NYU Hospitals Center	77	4	5.19	2.95	3.94	(1.06,10.09)	109	4.55
Stelzer P	118	3	2.54	2.34	2.43	(0.49, 7.11)	276	3.40
Beth Israel	111	3	2.70	2.26	2.68	(0.54, 7.83)	231	3.72
St. Lukes-Roosevelt	7	0	0.00	3.62	0.00	(0.00,32.39)	45	2.26
Tortolani A	393	12	3.05	2.40	2.85	(1.47, 4.97)	486	4.69
Montefiore - Einstein	189	9	4.76	2.17	4.92 *	(2.25, 9.34)	241	6.55 *
Montefiore - Moses	1	0	0.00	5.09	0.00	(0.00,100.0)	2	0.00
Weill Cornell-NYP	203	3	1.48	2.60	1.27	(0.26, 3.71)	243	3.16
Tranbaugh R	530	4	0.75	2.38	0.71 **	(0.19, 1.82)	712	1.37 **
Beth Israel	526	4	0.76	2.39	0.71 **	(0.19, 1.82)	708	1.37 **
St. Lukes-Roosevelt	4	0	0.00	1.08	0.00	(0.00,100.0)	4	0.00
Vatsia S	296	4	1.35	2.12	1.43	(0.38, 3.65)	445	2.78
LIJ Medical Center	0	0	0.00	0.00	0.00	(0.00, 0.00)	1	0.00
North Shore	296	4	1.35	2.12	1.43	(0.38, 3.65)	444	2.79

SURGEON AND HOSPITAL VOLUMES FOR TOTAL ADULT CARDIAC SURGERY, 1998-2000

Table 7 presents, for each hospital and for each surgeon performing at least 200 cardiac operations in any hospital in 1998 – 2000 and/or performing one or more cardiac operations in each of the years 1998 – 2000, 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 disease during the same admission.

Valve or Valve/CABG volumes include the total number of cases for the 8 Valve or Valve/CABG groups that were identified in Table 4. Other cardiac surgery includes cardiac procedures that 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, 1998-2000.

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Albany Medical Center Hospital				
Banker M	2	0	0	2
Britton L	347	108	48	503
Canavan T	474	89	9	572
Canver C	299	64	45	408
Dal Col R	3	0	0	3
Depan H	0	2	0	2
Joyce F	3	3	0	6
Kelley J	532	157	84	773
Miller S	437	122	26	585
Saifi J	3	0	0	3
Sardella G	3	0	0	3
All Others	147	51	17	215
TOTAL	2250	596	229	3075
Arnot-Ogden Memorial Hospital				
Quintos E	127	12	7	146
All Others	159	28	13	200
TOTAL	286	40	20	346
Bellevue Hospital Center				
Colvin S	1	10	5	16
Galloway A	6	7	8	21
Glassman L	54	9	12	75

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Bellevue Hospital Center (continued)				
Ribakove G	40	37	18	95
Steinberg B	52	37	22	111
TOTAL	153	100	65	318
Beth Israel Medical Center				
Geller C	43	8	6	57
Harris L	284	74	30	388
Hoffman D	246	58	20	324
Stelzer P	111	120	134	365
Tranbaugh R	526	182	54	762
All Others	17	7	0	24
TOTAL	1227	449	244	1920
Buffalo General Hospital				
Bergsland J	499	49	22	570
Bhayana J	155	177	41	373
Grosner G	654	117	41	812
Guarino R	3	0	0	3
Houck J	1	1	16	18
Kerr P	9	4	8	21
Lajos T	294	12	17	323
Levinsky L	352	11	6	369
Lewin A	453	15	4	472
Raza S	341	78	62	481
Salerno T	107	38	17	162
All Others	136	7	8	151
TOTAL	3004	509	242	3755
Columbia Presbyterian-NY Presbyterian Hospital				
Edwards N	324	97	119	540
Esrig B	15	5	29	49
Galantowicz M	2	3	44	49
Ginsburg M	0	1	31	32
Gorenstein L	1	0	17	18
Naka Y	104	52	112	268
Oz M	625	280	196	1101
Quaegebeur J	0	8	97	105
Rose E	149	127	33	309
Smith C	548	377	122	1047
All Others	21	7	59	87
TOTAL	1789	957	859	3605

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Ellis Hospital				
Dal Col R	1	0	0	1
Depan H	411	185	60	656
Reich H	393	59	11	463
Saifi J	427	120	21	568
All Others	100	14	1	115
TOTAL	1332	378	93	1803
Erie County Medical Center				
Datta S	171	1	4	176
Guarino R	7	0	0	7
Houck J	64	11	13	88
Kerr P	1	0	0	1
All Others	160	36	18	214
TOTAL	403	48	35	486
Lenox Hill Hospital				
Connolly M	545	188	59	792
Geller C	23	3	3	29
Genovesi M	82	13	4	99
Jacobowitz I	25	5	1	31
McCabe J	28	13	9	50
Sabado M	108	66	19	193
Spier L	15	1	2	18
Subramanian V	946	166	35	1147
All Others	68	64	16	148
TOTAL	1840	519	148	2507
Long Island Jewish Medical Center				
Graver L	646	237	84	967
Kline G	84	20	13	117
Palazzo R	442	106	20	568
Vatsia S	0	1	0	1
All Others	0	1	2	3
TOTAL	1172	365	119	1656
Maimonides Medical Center				
Acinapura A	274	67	22	363
Anderson J	5	1	2	8
Burack J	1	0	0	1
Connolly M	201	43	12	256
Cunningham J N	216	75	18	309
Genovesi M	85	6	4	95

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Maimonides Medical Center (continued)				
Jacobowitz I	1044	243	37	1324
Ketosugbo A	14	3	1	18
Lazzaro R	73	6	8	87
Reddy RC	14	2	0	16
Sabado M	92	34	9	135
Zisbrod Z	623	105	18	746
All Others	134	24	7	165
TOTAL	2776	609	138	3523
Millard Fillmore Hospital				
Aldridge J	331	60	24	415
Ashraf M	628	120	17	765
Bergsland J	17	1	2	20
Guarino R	410	33	7	450
Jennings L	327	42	5	374
Kerr P	236	46	22	304
Lajos T	1	0	0	1
Levinsky L	8	0	0	8
Lewin A	1	0	0	1
Raza S	14	2	0	16
All Others	57	6	3	66
TOTAL	2030	310	80	2420
Montefiore Medical Center - Einstein Division				
Brodman R	1	1	0	2
Camacho M	1	1	1	3
Crooke G	2	0	0	2
Frater R	59	54	19	132
Frymus M	355	68	26	449
Gold J	38	26	5	69
Merav A	1	0	0	1
Plestis K	123	44	36	203
Tortolani A	189	52	14	255
All Others	127	35	15	177
TOTAL	896	281	116	1293
Montefiore Medical Center - Moses Division				
Attai L	313	101	21	435
Brodman R	170	67	16	253
Camacho M	232	65	34	331
Crooke G	16	5	7	28

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Montefiore Medical Center - Moses Division (continued)				
Frater R	0	1	0	1
Frymus M	1	0	0	1
Gold J	151	67	18	236
Merav A	253	81	13	347
Plestis K	24	7	12	43
Tortolani A	1	1	0	2
All Others	4	1	0	5
TOTAL	1165	396	121	1682
Mount Sinai Hospital				
Ergin M	247	172	57	476
Galla J	252	104	130	486
Griep R	30	91	247	368
Lansman S	308	110	127	545
McCullough J	191	53	39	283
Nguyen K	55	15	35	105
Spielvogel D	140	66	81	287
All Others	0	0	6	6
TOTAL	1223	611	722	2556
New York Hospital - Queens				
Aronis M	182	65	5	252
Isom O	1	0	0	1
Ko W	450	113	47	610
Lang S	290	95	17	402
TOTAL	923	273	69	1265
NYU Hospitals Medical Center				
Colvin S	84	428	160	672
Culliford A	333	172	109	614
Esposito R	286	126	46	458
Galloway A	212	259	74	545
Glassman L	5	2	13	20
Grossi E	88	53	66	207
Ribakove G	244	140	40	424
Steinberg B	77	32	20	129
All Others	17	22	15	54
TOTAL	1346	1234	543	3123
North Shore University Hospital				
Hall M	795	390	42	1227
Levy M	528	164	52	744

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
North Shore University Hospital (continued)				
Parnell V	2	2	18	22
Pogo G	746	251	49	1046
Vatsia S	296	148	40	484
TOTAL	2367	955	201	3523
Rochester General Hospital				
Cheeran D	755	179	30	964
Fong J	122	8	9	139
Kirshner R	617	146	30	793
Knight P	715	293	74	1082
Kwan S	360	69	15	444
TOTAL	2569	695	158	3422
St. Elizabeth Hospital				
Carr T	274	46	7	327
Hatton P	398	101	27	526
Joyce F	417	118	24	559
TOTAL	1089	265	58	1412
St. Francis Hospital				
Bercow N	894	271	37	1202
Colangelo R	690	181	20	891
Damus P	534	469	95	1098
Durban L	163	54	11	228
Lamendola C	836	264	46	1146
Robinson N	835	325	63	1223
Taylor J	996	322	47	1365
Weisz D	309	68	11	388
TOTAL	5257	1954	330	7541
St. Joseph's Hospital Health Center				
Marvasti M	538	186	41	765
Nast E	479	113	15	607
Nazem A	636	170	20	826
Rosenberg J	610	335	97	1042
TOTAL	2263	804	173	3240
St. Luke's Roosevelt Hospital - St. Luke's Division				
Aronis M	51	15	1	67
Connery C	51	21	13	85
Geller C	42	34	18	94
Safavi A	13	5	3	21
Stelzer P	7	38	62	107

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
St. Luke's Roosevelt Hospital - St. Luke's Division (continued)				
Swistel D	493	112	28	633
Tranbaugh R	4	0	0	4
All Others	99	37	29	165
TOTAL	760	262	154	1176
St. Peter's Hospital				
Banker M	369	58	18	445
Bennett E	348	252	79	679
Dal Col R	500	188	35	723
Saifi J	65	13	6	84
Sardella G	531	124	16	671
TOTAL	1813	635	154	2602
St. Vincent's Hospital and Medical Center				
Galdieri R	400	66	17	483
Klein J	84	8	18	110
Lang S	281	73	24	378
McGinn J	537	114	25	676
Tyras D	383	100	10	493
All Others	7	1	0	8
TOTAL	1692	362	94	2148
State University Hospital Upstate Medical Center				
Alfieris G	169	117	60	346
Brandt B	427	90	43	560
Myers S	190	16	21	227
Parker F	149	55	13	217
Picone A	381	115	29	525
All Others	72	14	3	89
TOTAL	1388	407	169	1964
Strong Memorial Hospital				
Hicks G	447	241	67	755
Risher W	468	249	141	858
All Others	131	29	34	194
TOTAL	1046	519	242	1807
United Health Services - Wilson Division				
Quintos E	186	30	5	221
Wong K	353	104	22	479
Yousuf M	315	107	29	451
All Others	157	21	5	183
TOTAL	1011	262	61	1334

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
University Hospital at Stony Brook				
Bilfinger T	418	65	26	509
Krukenkamp I	464	142	44	650
McLarty A	328	39	20	387
Saltman A E	246	20	25	291
Seifert F	726	130	29	885
TOTAL	2182	396	144	2722
University Hospital of Brooklyn				
Anderson J	95	40	33	168
Burack J	123	27	16	166
Jacobowitz I	88	20	6	114
Ketosugbo A	102	18	7	127
Piccone V	11	1	2	14
Reddy RC	155	58	14	227
Sabado M	93	41	13	147
All Others	21	4	3	28
TOTAL	688	209	94	991
Vassar Brothers Hospital				
Ciaburri D	150	41	9	200
TOTAL	150	41	9	200
Weill Cornell-NY Presbyterian Hospital				
Altorki N	99	16	2	117
Brodman R	88	21	1	110
Girardi L	591	233	372	1196
Isom O	188	276	34	498
Ko W	120	51	14	185
Krieger K	671	339	46	1056
Lang S	41	27	1	69
Rosengart T	358	158	53	569
Tortolani A	203	40	9	252
All Others	0	0	25	25
TOTAL	2359	1161	557	4077
Westchester Medical Center				
Axelrod H	411	84	16	511
Fleisher A	434	127	24	585
Lafaro R	253	91	62	406
Moggio R	356	132	28	516

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Westchester Medical Center (continued)				
Sarabu M	429	163	53	645
Zias E	462	80	27	569
All Others	123	28	21	172
TOTAL	2468	705	231	3404
Winthrop - University Hospital				
Hartman A	398	343	72	813
Kofsky E	592	149	30	771
Schubach S	595	205	30	830
Scott W	265	61	28	354
Spier L	107	11	7	125
Williams L	76	17	6	99
All Others	101	32	9	142
TOTAL	2134	818	182	3134
STATE TOTAL	55051	18125	6855	80031

Criteria Used in Reporting Significant Risk Factors (2000) Based on Documentation in Medical Record

Patient Risk Factor	Definitions
Hemodynamic State	
<ul style="list-style-type: none"> • Unstable • Shock • Cardiopulmonary Resuscitation 	<p>Determined just prior to surgery.</p> <p>Patient requires pharmacologic or mechanical support to maintain blood pressure.</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>Patient requires cardiopulmonary resuscitation within one hour of the procedure.</p>
Comorbidities	
<ul style="list-style-type: none"> • Cerebrovascular Disease <ul style="list-style-type: none"> • Carotid Cerebrovascular Disease • Previous Stroke • Chronic Obstructive Pulmonary Disease (COPD) • Hepatic Failure • Malignant Ventricular Arrhythmia • Peripheral Vascular Disease <ul style="list-style-type: none"> • Aortoiliac Disease 	<p>Patient has either Carotid/Cerebrovascular Disease or Previous Stroke as defined below:</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>A history of stroke, with or without residual deficit.</p> <p>Patients who require chronic (longer than three months), bronchodilator therapy to avoid disability from obstructive airway disease; or have a forced expiratory volume in one second of less than 75% of the predicted value or less than 1.25 liters; or have a room air pO₂ <60 or a pCO₂ >50</p> <p>The patient has cirrhosis or other liver disease and has a bilirubin greater than 2 mg/dl and a serum albumin less than 3.5 grams/dl.</p> <p>Recent (within the past 7 days) recurrent ventricular tachycardia or ventricular fibrillation requiring electrical defibrillation or the use of intravenous antiarrhythmic agents. Excludes a single episode of V-Tach or V-Fib occurring within 6 hours of the diagnosis of a myocardial infarction and responding well to treatment.</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>

Comorbidities (continued):

• Peripheral Vascular Disease (continued)

- Femoral/Popliteal Disease

Angiographic demonstration of at least 50% narrowing in a major femoral/popliteal vessel, previous surgery for such disease, absent pedal pulses, or inability to insert a catheter or intra-aortic balloon due to obstruction in the femoral arteries.

• Renal Failure, Creatinine > 2.5 mg/dl

Pre-operative creatinine greater than 2.5 mg/dl.

• Renal Failure Requiring Dialysis

The patient is on chronic peritoneal or hemodialysis.

Ventricular Function

• Ejection Fraction

Value of the ejection fraction taken closest to the procedure. When a calculated measure is unavailable the ejection fraction should be estimated visually from the ventriculogram or by echocardiography. Intraoperative direct observation of the heart is not an adequate basis for a visual estimate of the ejection fraction

Previous Open Heart Operations

Open heart surgery previous to the hospitalization. For the purpose of this reporting system, minimally invasive procedures are considered open heart surgery.

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.

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

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, pulmonary, and aortic valves.

incompetent valve- A valve that does not close tightly

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

myocardial infarction - partial destruction of the heart muscle due to interrupted blood supply, also called a heart attack or coronary thrombosis.

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

risk factors for heart disease - certain risk factors have been found to increase the likelihood of developing heart disease. Some are controllable or avoidable, and some cannot be controlled. The biggest heart disease risk factors are heredity, gender and age; none of these 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 insufficient 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 1998-2000 Risk Factors For Isolated CABG In-Hospital Mortality

The significant pre-procedural risk factors for in-hospital mortality following isolated CABG in the 1998-2000 time period are presented in the table below.

Roughly speaking, the odds ratio for a risk factor represents the number of times more likely a patient with that risk factor is of dying in the hospital during or after CABG than a patient without the risk factor, all other risk factors being the same. For example, the odds ratio for the risk factor COPD is 2.060. This means that a patient with COPD is approximately 2.060 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, body surface area, ejection fraction, previous MI, 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 6 groups: occurring less than 24 hours prior to the procedure with a stent thrombosis; occurring more than 24 hours prior to the procedure with a stent thrombosis; occurring less than 24 hours prior to the procedure without a stent thrombosis; occurring 1-7 days prior to the procedure without a stent thrombosis; occurring 8 or more days prior to the procedure without a stent thrombosis; and no MI prior to the procedure. The last range, which does not appear in the table below, is referred to as the reference category. The odds ratios for the Previous MI ranges listed below are relative to patients who have not had a previous MI.

Ejection fraction, which is the percentage of blood in the heart's left ventricle that is expelled when it

contracts (with more denoting a healthier heart), is subdivided into four ranges (0-19%, 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 2.055 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 1.058 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.

Body surface area is a function of height and weight, and is a proxy for vessel size. Since larger vessels are easier to work with, the odds ratio for body surface area indicates that for each additional unit of body surface area, the odds of dying in the hospital is only 0.624 times the odds for someone with a body surface area one unit smaller, all other risk factors being the same.

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

Appendix 1: Multivariable risk factor equation for isolated CABG hospital deaths in NYS, 1998-2000.

Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
Demographic				
Age: Number of years greater than 60	—	0.0567	<.0001	1.058
Body Surface Area	—	-0.4713	0.0015	0.624
Female Gender	28.66	0.6055	<.0001	1.832
Hemodynamic State				
Unstable	1.22	1.2437	<.0001	3.468
Shock	0.40	1.9492	<.0001	7.023
Cardiopulmonary Resuscitation	0.17	1.8353	<.0001	6.267
Ventricular Function				
Ejection Fraction 0-19%	1.77	1.2517	<.0001	3.496
Ejection Fraction 20-29%	7.06	0.7203	<.0001	2.055
Ejection Fraction 30-39%	13.93	0.6404	<.0001	1.897
Previous MI with Stent Thrombosis				
Less than 24 hours	0.09	1.9915	<.0001	7.327
More than 24 hours	0.74	1.3062	<.0001	3.692
Previous MI without Stent Thrombosis				
Less than 24 hours	1.57	0.9801	<.0001	2.665
1 to 7 days	14.96	0.6705	<.0001	1.955
8 or more days	36.84	0.4242	<.0001	1.528
Comorbidities				
Cerebrovascular Disease	18.54	0.5426	<.0001	1.721
COPD	16.20	0.7227	<.0001	2.060
Diabetes	31.59	0.5227	<.0001	1.687
Extensively Calcified Ascending Aorta	5.89	0.8460	<.0001	2.330
Hepatic Failure	0.11	2.6202	<.0001	13.738
Malignant Ventricular Arrhythmia	1.90	0.9522	<.0001	2.591
Peripheral Vascular Disease	11.56	0.5615	<.0001	1.753
Renal Failure, Creatinine >2.5 mg/dl	1.90	0.9836	<.0001	2.674
Renal Failure Requiring Dialysis	1.36	1.7876	<.0001	5.975
Previous Open Heart Operations	5.73	1.2078	<.0001	3.346
Sum of Binary Risk Factors Squared	—	-0.0287	0.0014	0.972

Intercept = -4.9570

C Statistic = 0.797

Appendix 2 1998-2000 Risk Factors For Valve Surgery In-Hospital Mortality

The significant pre-procedural risk factors for in-hospital mortality following valve surgery in the 1998-2000 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 1.774. This means that a patient with COPD is approximately 1.774 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 1.536 times as likely to die in the hospital during or after surgery as a patient with aortic valve replacement surgery, all other significant risk factors being the same.

For all risk factors in the table except age and body surface area, there are only two possibilities – having the risk factor or not having it. For example, a

patient either has COPD or does not have it. Since renal failure is expressed in terms of renal failure with dialysis and without dialysis, the odds ratios for both categories are relative to patients with no renal failure.

With regard to age, the odds ratio roughly represents the number of times more likely a patient who is over age 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 valve surgery who is 63 years old has a chance of dying in the hospital that is approximately 1.061 times the chance that a 62 year-old patient undergoing valve 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.

Body surface area is a function of height and weight, and is a proxy for vessel size. Since larger vessels are easier to work with, the odds ratio for body surface area indicates that for each additional unit of body surface area, the odds of dying in the hospital is only 0.458 times the odds for someone with a body surface area one unit smaller, all other risk factors being the same.

Appendix 2: Multivariable risk factor equation for valve surgery hospital deaths in NYS, 1998-2000.

Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
Demographic				
Age: Number of years greater than 60	—	0.0588	<.0001	1.061
Body Surface Area	—	-0.7819	0.0002	0.458
Type of Valve Surgery				
Aortic Valve Replacement	48.29	Valve Reference Group		
Mitral Valve Replacement	24.59	0.4290	0.0007	1.536
Mitral Valve Repair	11.66	-0.1588	0.4909	0.853
Multiple Valve Repair/Replacement	15.46	0.8335	<.0001	2.301
Hemodynamic State				
Unstable	1.29	1.2814	<.0001	3.602
Shock	0.50	1.6286	<.0001	5.097
Cardiopulmonary Resuscitation	0.08	3.9768	0.0003	53.347
Comorbidities				
Cerebrovascular Disease	12.74	0.3448	0.0046	1.412
COPD	16.43	0.5733	<.0001	1.774
Diabetes	12.45	0.3580	0.0052	1.430
Extensively Calcified Ascending Aorta	5.37	0.4685	0.0031	1.598
Hepatic Failure	0.62	1.1271	0.0011	3.087
Malignant Ventricular Arrhythmia	1.30	0.9060	0.0015	2.474
Peripheral Vascular Disease	5.12	0.4084	0.0120	1.504
Renal Failure, Creatinine > 2.5 mg/dl	2.01	1.4152	<.0001	4.117
Renal Failure Requiring Dialysis	2.39	1.7787	<.0001	5.992
Previous Open Heart Operations	19.65	0.6140	<.0001	1.848
Intercept = -3.1137				
C Statistic = 0.798				

Appendix 3 1998-2000 Risk Factors For Valve and CABG In-Hospital Mortality

The significant pre-procedural risk factors for in-hospital mortality following valve and CABG surgery in the 1998-2000 time period are presented in the table below.

Roughly speaking, the odds ratio for a risk factor represents the number of times more likely a patient with that risk factor is of dying in the hospital during or after valve and CABG surgery than a patient without the risk factor, all other risk factors being the same. For example, the odds ratio for the risk factor COPD is 1.403. This means that a patient with COPD is approximately 1.403 times as likely to die in the hospital during or after undergoing valve and CABG surgery as a patient without COPD who has the same other significant risk factors.

The odds ratio for type of valve with CABG surgery represents the number of times more likely a patient with a specific valve with CABG surgery has of dying in the hospital during or after that particular surgery than a patient who has had aortic valve replacement and CABG surgery, all other risk factors being the same. For example, a patient who has a mitral valve replacement and CABG surgery is 1.784 times as likely to die in the hospital during or after surgery as a patient with aortic valve replacement and CABG surgery, all other significant risk factors being the same.

For all risk factors in the table except age, ejection fraction, and previous MI, there are only two possibilities – having the risk factor or not having it. For example, a patient either has 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.

Ejection fraction, which is the percentage of blood in the heart's left ventricle that is expelled when it contracts (with more denoting a healthier heart), is

subdivided into three ranges (0-19%, 20-29%, 30% or more). The last range, which does not appear in the Appendix 3 table, is referred to as the reference category. This means that the odds ratios that appear for the other ejection fraction categories in the table are relative to patients with an ejection fraction of 30% or more. Thus, a patient with an ejection fraction of between 20% and 29% is about 1.531 times as likely to die in the hospital as a patient with an ejection fraction of 30% or higher, all other significant risk factors being the same.

Previous MI is subdivided into 4 groups (occurring less than 6 hours prior to the procedure, between 6 and 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 a previous MI within 7 days prior to the procedure.

With regard to age, the odds ratio roughly represents the number of times more likely a patient who is over age 65 is to die in the hospital than another patient who is one year younger all other significant risk factors being the same. Thus, a patient undergoing valve and CABG surgery who is 69 years old has a chance of dying in the hospital that is approximately 1.052 times the chance that a 68 year-old patient undergoing valve and CABG surgery has of dying in the hospital, all other risk factors being the same. All patients age 65 or under have roughly the same odds of dying in the hospital if their risk factors are identical.

Appendix 3: Multivariable risk factor equation for valve and CABG surgery hospital deaths in NYS, 1998-2000.

Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
Demographic				
Age: Number of years greater than 65	—	0.0504	<.0001	1.052
Female Gender	40.53	0.4698	<.0001	1.600
Type of Valve (with CABG)				
Aortic Valve Replacement	56.80	Valve Reference Group		
Mitral Valve Replacement	20.78	0.5788	<.0001	1.784
Mitral Valve Repair	14.43	0.2314	0.0636	1.260
Multiple Valve Repair/Replacement	7.99	0.8902	<.0001	2.436
Ventricular Function				
Ejection Fraction 0-19%	3.06	0.7337	<.0001	2.083
Ejection Fraction 20-29 %	10.82	0.4260	0.0002	1.531
Previous MI less than 6 hours	0.47	2.0660	<.0001	7.893
Previous MI 6-23 hours	0.53	1.3445	0.0002	3.836
Previous MI 1 to 7 days	7.31	0.4439	0.0008	1.559
Hemodynamic State				
Unstable	1.95	0.7677	<.0001	2.155
Shock	1.29	1.1731	<.0001	3.232
Cardiopulmonary Resuscitation	0.27	1.9620	0.0003	7.113
Comorbidities				
COPD	20.45	0.3386	0.0002	1.403
Diabetes	26.41	0.4246	<.0001	1.529
Extensively Calcified Ascending Aorta	10.88	0.3583	0.0015	1.431
Hepatic Failure	0.15	1.6297	0.0099	5.102
Peripheral Vascular Disease	12.55	0.6049	<.0001	1.831
Renal Failure, Creatinine > 2.5 mg/dl	3.21	1.0090	<.0001	2.743
Renal Failure Requiring Dialysis	2.41	1.2962	<.0001	3.655
Previous Open Heart Operations	10.63	0.5967	<.0001	1.816
Intercept = -3.9962				
C Statistic = 0.751				

NEW YORK STATE CARDIAC SURGERY CENTERS

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

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

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

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

Buffalo General Hospital
100 High Street
Buffalo, New York 14203

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

Ellis Hospital
1101 Nott Street
Schenectady, New York 12308

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

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

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

Maimonides Medical Center
4802 Tenth Avenue
Brooklyn, New York 11219

Millard Fillmore Hospital
3 Gates Circle
Buffalo, New York 14209

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

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

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

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

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

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

Rochester General Hospital
1425 Portland Avenue
Rochester, New York 14621

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

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

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

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

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

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

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

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

Westchester Medical Center
Grasslands Road
Valhalla, New York 10595

Winthrop – University Hospital
259 First Street
Mineola, New York 11501

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George E. Pataki, Governor

Department of Health
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