

**ADULT
CARDIAC
SURGERY**

in

New York State

1999-2001

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INTRODUCTION

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

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

We are pleased to be able to continue to provide expanded information in this year's report that encompasses outcomes for isolated coronary artery bypass surgery (CABG), valve surgery, and the two procedures done in combination. Isolated CABG represents the majority of adult cardiac surgeries performed, and we have reported risk-adjusted outcomes for that procedure for over 10 years. However, many additional patients undergo procedures each year to repair or replace heart valves or undergo valve surgery done in combination with CABG. This report provides important information on the risk factors and outcomes for both CABG and valve surgery.

We encourage doctors to discuss this information with their patients and colleagues as they develop treatment plans. While these statistics are an important tool in making informed health care choices, individual treatment plans must be made by doctors and patients together after careful consideration of all pertinent factors. It is important to recognize that many factors can influence the outcome of cardiac surgery. These include the patient's health before the procedure, the skill of the operating team and general after care. In addition, keep in mind that the information in this booklet does not include data after 2001. Important changes may have taken place in some hospitals during that time period.

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

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

CORONARY ARTERY BYPASS GRAFT SURGERY (CABG)

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

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

CABG surgery is a procedure in which a vein or artery from another part of the body is used to create an alternate path for blood to flow to the heart, bypassing the arterial blockage. Typically, a section of one of the large (saphenous) veins in the leg, the radial artery in the arm or the mammary artery in the chest is used to

construct the bypass. One or more bypasses may be performed during a single operation, since providing several routes for the blood supply to travel is believed to improve long-term success for the procedure. Triple and quadruple bypasses are often done for this reason, not necessarily because the patient's condition is more severe. CABG surgery is one of the most common, successful major operations currently performed in the United States.

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

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

CARDIAC VALVE PROCEDURES

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

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

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

The most common heart valve surgeries involve the aortic and mitral valves. Patients undergoing heart surgery are totally anesthetized and 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 2001 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, 1999 and December 31, 2001 are included in the three-year results.

Isolated CABG surgery represented 67.82 percent of all adult cardiac surgery for the three-year period covered by this report. Valve or combined valve/CABG surgery represented 23.64 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 1999 through 2001.

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 (2.18% in 2001) to obtain the provider's risk-adjusted rate. For the three year period 1999-2001, the ratio is then multiplied by 2.25% 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

2001 Risk Factors for CABG Surgery

The significant pre-operative risk factors for coronary artery bypass surgery in 2001 are presented in Table 1.

Roughly speaking, the odds ratio for a risk factor represents the number of times more likely a patient with that risk factor has of dying in the hospital during or after CABG surgery than a patient without the risk factor, all other risk factors being the same. For example, the odds ratio for the risk factor shock is 5.223. This means that a patient who was in shock prior to surgery is approximately 5.223 times as likely to die in the hospital as a patient who was not

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.

in shock but who has the same other significant risk factors.

For most of the risk factors in the table, there are only two possibilities: having the risk factor or not having it (for example, a patient either is in shock or is not in shock). Exceptions are age: number of years greater than 55 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 55 is to die in the hospital than a patient who is one year younger. Thus, a patient undergoing CABG surgery

who is 72 years old has a chance of dying that is approximately 1.065 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 3.853 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 2001.

Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
Demographic				
Age: Number of years greater than 55 ...		0.0629	< .0001	1.065
Female Gender	28.43	0.4695	< .0001	1.599
Hemodynamic State				
Unstable	0.97	0.8940	0.0021	2.445
Shock	0.49	1.6531	< .0001	5.223
Ventricular Function				
Ejection Fraction < 20 %	1.81	1.3488	< .0001	3.853
Ejection Fraction 20-29 %	6.71	0.7004	< .0001	2.015
Ejection Fraction 30-39 %	13.23	0.4986	0.0004	1.646
Previous MI < 6 hours	0.63	2.0343	< .0001	7.647
Previous MI 6-23 hours	0.88	0.8863	0.0268	2.426
Previous MI 1-20 days	22.38	0.7662	< .0001	2.151
Previous MI > 21 days	29.32	0.3634	0.0120	1.438
Comorbidities				
Renal Failure, Creatinine > 2.5 mg/dl	2.08	1.0934	< .0001	2.985
Renal Failure, Dialysis	1.53	1.7807	< .0001	5.934
Previous Open Heart Operations	4.86	1.2311	< .0001	3.425
Left Main Diseased	26.21	0.3956	0.0005	1.485
Intercept = -5.8735				
C Statistic = 0.788				

2001 HOSPITAL OUTCOMES FOR CABG

Table 2 presents the CABG surgery results for the 35 hospitals performing this operation in New York during the year 2001. The table contains, for each hospital, the number of isolated CABG operations (CABG operations with no other major heart surgery) resulting in 2001 discharges, the number of in-hospital deaths, the observed mortality rate, the expected mortality rate based on the statistical model presented in Table 1, the risk-adjusted mortality rate, and a 95% confidence interval for the risk-adjusted mortality rate.

As indicated in Table 2, the overall mortality rate for the 16,983 CABG procedures performed at the 35 hospitals was 2.18%. Observed mortality rates ranged from 0.00% to 4.17%. The range of expected

mortality rates, which measure patient severity of illness, was 0.94% to 2.90%.

The risk-adjusted mortality rates, which are used to measure performance, ranged from 0.00% to 3.95%. Two hospitals (Columbia Presbyterian-NYP and Westchester Medical Center) had risk-adjusted mortality rates that were significantly higher than the statewide rate. Two hospitals (Staten Island University-North and Weill Cornell-NYP) had significantly lower risk-adjusted rates than the State.

1999 - 2001 HOSPITAL OUTCOMES

Table 3 presents the combined Valve Only and Valve/CABG surgery results for the 35 hospitals performing these operations in New York during the years 1999-2001. The table contains, for each hospital, the number of combined Valve Only and Valve/CABG operations resulting in 1999-2001 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 18,548 combined Valve Only and Valve/CABG procedures performed at the 35 hospitals was 7.13%. Observed mortality rates ranged from 1.72% to 12.85%. The range of expected mortality rates, which measure patient severity of illness, was 3.05% to 10.03%.

The risk-adjusted mortality rates, which are used to measure performance, ranged from 2.08% to 12.33%. Five hospitals (Lenox Hill, Millard Fillmore Hospital, Strong Memorial Hospital, University Hospital at Stony Brook and University Hospital of Brooklyn) had risk-adjusted mortality rates that were significantly higher than the statewide rate. Four hospitals (St. Francis Hospital, St. Peter's Hospital, Weill Cornell – NY Presbyterian Hospital, and Winthrop University Hospital) had significantly lower risk-adjusted rates than the State.

Table 4 presents valve procedures performed at the 35 cardiac surgery hospitals in New York during 1999-2001. 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 1999-2001 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 2.25% for isolated CABG patients in 1999-2001 or 7.13% for Valve or Valve/CABG patients in 1999-2001).

Confidence Intervals are used to identify which hospitals had significantly more or fewer deaths than expected given the risk factors of their patients. The confidence interval identifies the range in which the risk-adjusted mortality rate may fall. Hospitals with significantly higher rates than expected after adjusting for risk are those where the

confidence interval range falls entirely above the statewide mortality rate. Hospitals with significantly lower rates than expected given the severity of illness of their patients before surgery have the entire confidence interval range entirely below the statewide mortality rate.

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

Table 2: Observed, Expected, and Risk-Adjusted Mortality Rates (RAMR) for isolated CABG Surgery in New York State, 2001 Discharges (Listed Alphabetically by Hospital)

Hospital	Cases	Deaths	OMR	EMR	RAMR	95% CI for RAMR
Albany Medical Center	570	14	2.46	1.90	2.82	(1.54, 4.74)
Arnot-Ogden	124	0	0.00	1.45	0.00	(0.00, 4.45)
Bellevue	45	0	0.00	0.94	0.00	(0.00,18.97)
Beth Israel	473	10	2.11	1.73	2.67	(1.28, 4.91)
Buffalo General	787	18	2.29	1.99	2.50	(1.48, 3.95)
Columbia Presbyterian	486	18	3.70	2.05	3.93 *	(2.33, 6.21)
Ellis Hospital	472	11	2.33	1.94	2.61	(1.30, 4.68)
Erie County	251	2	0.80	1.89	0.92	(0.10, 3.32)
LIJ Medical Center	324	4	1.23	1.81	1.48	(0.40, 3.80)
Lenox Hill	686	17	2.48	2.39	2.26	(1.32, 3.62)
Maimonides	769	22	2.86	2.80	2.22	(1.39, 3.37)
Millard Fillmore	517	5	0.97	1.67	1.27	(0.41, 2.95)
Montefiore - Einstein	239	2	0.84	2.08	0.88	(0.10, 3.17)
Montefiore - Moses	286	6	2.10	1.76	2.60	(0.95, 5.65)
Mount Sinai	348	11	3.16	2.45	2.81	(1.40, 5.02)
NY Hospital - Queens	379	6	1.58	2.08	1.65	(0.60, 3.60)
NYU Hospitals Center	385	10	2.60	2.90	1.95	(0.93, 3.59)
North Shore	722	9	1.25	2.01	1.35	(0.62, 2.56)
Rochester General	685	14	2.04	2.71	1.64	(0.90, 2.75)
St. Elizabeth	375	10	2.67	1.87	3.11	(1.49, 5.72)
St. Francis	1723	37	2.15	2.38	1.96	(1.38, 2.70)
St. Josephs	641	15	2.34	2.17	2.34	(1.31, 3.87)
St. Lukes - Roosevelt	209	2	0.96	2.60	0.80	(0.09, 2.90)
St. Peters	553	10	1.81	1.86	2.12	(1.02, 3.90)
St. Vincents	405	11	2.72	2.35	2.52	(1.26, 4.51)
Staten Island - North	279	1	0.36	2.28	0.34 **	(0.00, 1.90)
Strong Memorial	312	13	4.17	2.56	3.55	(1.89, 6.07)
United Health Services	325	6	1.85	2.33	1.73	(0.63, 3.76)
Univ. Hosp. - Stony Brook	626	19	3.04	1.98	3.34	(2.01, 5.22)
Univ. Hosp. - Upstate	364	10	2.75	2.12	2.82	(1.35, 5.19)
Univ. Hosp. of Brooklyn	253	10	3.95	2.18	3.95	(1.89, 7.26)
Vassar Brothers	223	4	1.79	1.65	2.37	(0.64, 6.07)
Weill Cornell - NYP	775	6	0.77	1.78	0.95 **	(0.35, 2.06)
Westchester Med. Ctr.	732	30	4.10	2.73	3.27 *	(2.20, 4.67)
Winthrop Univ. Hosp.	640	7	1.09	2.17	1.10	(0.44, 2.26)
Total	16983	370	2.18	2.18	2.18	

* 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, 1999-2001 Discharges.

Hospital	Cases	Deaths	OMR	EMR	RAMR	95% CI for RAMR
Albany Medical Center	570	40	7.02	6.28	7.97	(5.69,10.85)
Arnot-Ogden	49	1	2.04	3.05	4.77	(0.06,26.55)
Bellevue	71	5	7.04	4.84	10.38	(3.34,24.21)
Beth Israel	455	30	6.59	8.03	5.85	(3.95, 8.36)
Buffalo General	510	40	7.84	6.16	9.07	(6.48,12.36)
Columbia Presbyterian	1016	68	6.69	5.74	8.30	(6.45,10.53)
Ellis Hospital	366	18	4.92	6.37	5.51	(3.26, 8.70)
Erie County	58	1	1.72	5.90	2.08	(0.03,11.59)
LIJ Medical Center	398	26	6.53	6.77	6.88	(4.49,10.08)
Lenox Hill	651	64	9.83	7.10	9.87 *	(7.60,12.60)
Maimonides	622	53	8.52	7.58	8.01	(6.00,10.48)
Millard Fillmore	281	26	9.25	6.03	10.93 *	(7.14,16.02)
Montefiore - Einstein	281	24	8.54	6.77	8.99	(5.76,13.38)
Montefiore - Moses	380	22	5.79	6.40	6.44	(4.04, 9.76)
Mount Sinai	542	40	7.38	6.73	7.81	(5.58,10.64)
NY Hospital - Queens	280	12	4.29	6.22	4.91	(2.54, 8.58)
NYU Hospitals Center	1356	90	6.64	6.48	7.30	(5.87, 8.97)
North Shore	906	68	7.51	7.71	6.94	(5.39, 8.80)
Rochester General	725	64	8.83	8.26	7.61	(5.86, 9.72)
St. Elizabeth	279	18	6.45	7.17	6.41	(3.80,10.14)
St. Francis	1915	118	6.16	7.99	5.50 **	(4.55, 6.58)
St. Josephs	824	44	5.34	7.10	5.36	(3.89, 7.19)
St. Lukes - Roosevelt	259	15	5.79	6.02	6.86	(3.84,11.32)
St. Peters	731	24	3.28	5.61	4.17 **	(2.67, 6.21)
St. Vincents	342	35	10.23	8.28	8.81	(6.14,12.26)
Staten Island - North	40	2	5.00	5.26	6.78	(0.76,24.46)
Strong Memorial	537	69	12.85	7.43	12.33 *	(9.59,15.60)
United Health Services	263	21	7.98	7.37	7.73	(4.78,11.81)
Univ. Hosp. - Stony Brook	420	39	9.29	6.50	10.18 *	(7.24,13.91)
Univ. Hosp. - Upstate	368	32	8.70	8.82	7.03	(4.81, 9.92)
Univ. Hosp. of Brooklyn	233	25	10.73	6.33	12.09 *	(7.82,17.85)
Vassar Brothers	110	3	2.73	6.86	2.83	(0.57, 8.28)
Weill Cornell - NYP	1158	56	4.84	6.72	5.13 **	(3.87, 6.66)
Westchester Med. Ctr.	685	61	8.91	7.53	8.43	(6.45,10.83)
Winthrop Univ. Hosp.	867	68	7.84	10.03	5.57 **	(4.33, 7.07)
Total	18548	1322	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.

Table 4: Volume for Valve Procedures in New York State, 1999-2001 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	136	234	37	37	15	53	30	28	570
Arnot - Ogden	26	8	4	2	4	4	1	0	49
Bellevue	25	4	21	0	3	4	14	0	71
Beth Israel	86	110	56	51	23	39	58	32	455
Buffalo General	140	126	62	50	54	41	21	16	510
Columbia Presbyterian	279	227	110	50	124	101	96	29	1016
Ellis Hospital	73	133	36	18	22	55	15	14	366
Erie County	13	24	12	6	0	0	1	2	58
LIJ Medical Center	78	111	61	35	35	33	23	22	398
Lenox Hill	141	114	71	53	86	92	67	27	651
Maimonides	174	168	90	53	15	48	58	16	622
Millard Fillmore	79	89	21	20	19	31	15	7	281
Montefiore - Einstein	64	44	72	34	15	14	32	6	281
Montefiore - Moses	96	94	60	29	15	26	49	11	380
Mount Sinai	141	113	85	47	32	30	74	20	542
NY Hospital - Queens	73	68	34	27	6	40	22	10	280
NYU Hospitals Center	371	182	140	62	323	66	160	52	1356
North Shore	251	257	133	139	25	25	59	17	906
Rochester General	208	195	92	67	51	50	42	20	725
St. Elizabeth	53	95	17	18	23	42	19	12	279
St. Francis	539	540	219	183	69	87	182	96	1915
St. Josephs	220	251	92	83	48	46	54	30	824
St. Lukes - Roosevelt	56	56	40	21	15	31	29	11	259
St. Peters	205	202	102	60	50	53	35	24	731
St. Vincents	93	85	53	53	2	10	30	16	342
Staten Island - North	8	15	11	3	1	1	1	0	40
Strong Memorial	148	135	56	33	29	51	52	33	537
United Health Services	89	100	23	27	9	4	6	5	263
Univ. Hosp. - Stony Brook	111	116	37	48	30	48	19	11	420
Univ. Hosp. - Upstate	84	95	41	41	21	26	43	17	368
Univ. Hosp. of Brooklyn	44	22	41	20	18	39	42	7	233
Vassar Brothers	24	37	19	15	1	9	1	4	110
Weill Cornell - NYP	284	272	200	126	83	38	106	49	1158
Westchester Medical Center	173	202	81	58	34	62	48	27	685
Winthrop Univ. Hosp.	207	243	76	96	16	138	55	36	867
Total	4792	4767	2305	1665	1316	1437	1559	707	18548
Statewide Mortality Rate(%)	3.71	6.92	6.72	14.11	1.90	9.12	9.30	17.40	7.13

1999 - 2001 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 1999-2001. 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 1999-2001 for each of the 35 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 1999-2001, and/or (b) who performed at least one operation in each of the years 1999-2001.

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 1999-2001 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 New York State, 1999 - 2001 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	53220	1197	2.25	2.25	2.25		71768	3.51
Albany Medical Center								
#Banker M	2	0	0.00	0.64	0.00	(0.00, 100.0)	2	0.00
Britton L	320	6	1.88	1.53	2.75	(1.01, 5.99)	447	2.79
#Canavan T	455	8	1.76	1.45	2.72	(1.17, 5.37)	540	4.09
Canver C	324	12	3.70	1.69	4.94 *	(2.55, 8.63)	402	6.34 *
##Dal Col R	3	0	0.00	0.51	0.00	(0.00, 100.0)	3	0.00
#Depan H	4	0	0.00	1.00	0.00	(0.00, 100.0)	10	0.00
Kelley J	416	10	2.40	1.66	3.25	(1.56, 5.98)	564	4.38
##Miller S	433	13	3.00	1.97	3.43	(1.82, 5.87)	553	5.39 *
##Saifi J	4	0	0.00	1.20	0.00	(0.00, 100.0)	4	0.00
#Sardella G	3	0	0.00	1.09	0.00	(0.00, 100.0)	3	0.00
All Others	22	0	0.00	2.01	0.00	(0.00, 18.68)	28	4.93
TOTAL	1986	49	2.47	1.66	3.34 *	(2.47, 4.41)	2556	4.54 *
Arnot-Ogden								
Curiale S V	169	1	0.59	1.73	0.77	(0.01, 4.28)	200	0.93
#Nast E	39	0	0.00	1.49	0.00	(0.00,14.16)	45	0.00
#Quintos E	36	3	8.33	1.72	10.92	(2.20,31.91)	41	11.28
Zama N	47	0	0.00	1.40	0.00	(0.00,12.52)	53	4.53

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
Arnot-Ogden (continued)								
All Others	13	0	0.00	1.54	0.00	(0.00,41.16)	14	0.00
Total	304	4	1.32	1.64	1.81	(0.49, 4.62)	353	2.71
Bellevue								
#Glassman L	29	0	0.00	1.17	0.00	(0.00,24.37)	35	0.00
#Grossi E	10	0	0.00	1.23	0.00	(0.00,66.82)	14	0.00
#Ribakove G	39	2	5.13	1.98	5.84	(0.66,21.08)	68	8.72
#Steinberg B	49	0	0.00	1.31	0.00	(0.00,12.90)	77	2.91
All Others	16	0	0.00	1.04	0.00	(0.00,49.79)	20	0.00
TOTAL	143	2	1.40	1.43	2.21	(0.25, 7.97)	214	4.49
Beth Israel								
#Geller C	155	2	1.29	2.08	1.39	(0.16, 5.03)	180	3.74
Harris L	310	5	1.61	2.15	1.68	(0.54, 3.93)	387	2.86
#Hoffman D	145	2	1.38	2.07	1.50	(0.17, 5.42)	193	4.35
#Stelzer P	67	2	2.99	2.24	3.00	(0.34, 10.84)	201	1.88
#Tranbaugh R	560	11	1.96	2.11	2.10	(1.05, 3.76)	724	2.78
All Others	17	1	5.88	1.48	8.97	(0.12, 49.89)	24	8.93
TOTAL	1254	23	1.83	2.11	1.96	(1.24, 2.94)	1709	2.95
Buffalo General								
#Ashraf M	6	0	0.00	0.99	0.00	(0.00, 100.0)	9	0.00
#Bergsland J	363	17	4.68	2.81	3.75	(2.19, 6.01)	411	5.58
Grosner G	688	7	1.02	1.93	1.19	(0.48, 2.44)	885	2.08 **
##Guarino R	3	0	0.00	1.98	0.00	(0.00, 100.0)	3	0.00
#Houck J	1	0	0.00	2.85	0.00	(0.00, 100.0)	1	0.00
#Karamanoukian H L	273	12	4.40	2.91	3.40	(1.75, 5.93)	289	4.67
##Kerr P	9	0	0.00	1.46	0.00	(0.00, 62.97)	13	12.35
##Lajos T	179	10	5.59	2.20	5.70 *	(2.73, 10.49)	188	8.44 *
#Levinsky L	277	11	3.97	1.86	4.80 *	(2.39, 8.59)	287	7.14 *
#Lewin A	433	7	1.62	1.67	2.17	(0.87, 4.47)	445	5.20
#Raza S	364	14	3.85	2.12	4.08	(2.23, 6.85)	453	5.94 *
All Others	113	3	2.65	3.24	1.84	(0.37, 5.38)	235	4.09
TOTAL	2709	81	2.99	2.19	3.07 *	(2.43, 3.81)	3219	4.68 *
Columbia Presbyterian-NYP								
Edwards N	277	3	1.08	2.51	0.97	(0.20, 2.84)	385	2.44
Esrig B	14	0	0.00	2.57	0.00	(0.00, 22.93)	20	3.88
Ginsburg M	0	0	0.00	0.00	0.00	(0.00, 0.00)	1	0.00
Gorenstein L	1	0	0.00	2.86	0.00	(0.00, 100.0)	1	0.00

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
Columbia Presbyterian-NYP (continued)								
Naka Y	201	7	3.48	2.56	3.05	(1.22, 6.29)	284	5.82 *
Oz M	574	14	2.44	2.06	2.67	(1.46, 4.48)	890	4.44
Quaegebeur J	1	0	0.00	1.44	0.00	(0.00, 100.0)	12	10.44
Rose E	93	5	5.38	1.34	9.02 *	(2.91, 21.05)	179	3.39
Smith C	478	12	2.51	1.36	4.15	(2.14, 7.26)	867	4.29
All Others	37	3	8.11	2.36	7.73	(1.55, 22.59)	53	8.88
TOTAL	1676	44	2.63	1.96	3.01	(2.18, 4.04)	2692	4.31 *
Ellis Hospital								
Afi A	244	7	2.87	1.39	4.63	(1.86, 9.54)	271	5.69
#Canavan T	1	0	0.00	1.06	0.00	(0.00, 100.0)	1	0.00
##Dal Col R	1	0	0.00	0.67	0.00	(0.00, 100.0)	1	0.00
#Depan H	416	15	3.61	2.09	3.88	(2.17, 6.40)	608	5.00
##Miller S	4	0	0.00	2.54	0.00	(0.00, 81.21)	4	0.00
Reich H	398	10	2.51	2.18	2.59	(1.24, 4.77)	468	3.30
##Saifi J	283	7	2.47	2.33	2.39	(0.96, 4.92)	358	2.07
All Others	10	0	0.00	2.42	0.00	(0.00, 34.14)	12	0.00
TOTAL	1357	39	2.87	2.04	3.16 *	(2.25, 4.33)	1723	3.92
Erie County								
Bell-Thomson J	164	2	1.22	2.20	1.25	(0.14, 4.50)	196	1.28
Datta S	209	2	0.96	1.45	1.48	(0.17, 5.35)	215	2.13
##Guarino R	7	0	0.00	0.89	0.00	(0.00, 100.0)	7	0.00
#Houck J	84	1	1.19	1.83	1.46	(0.02, 8.14)	100	2.76
##Kerr P	3	0	0.00	1.96	0.00	(0.00, 100.0)	3	0.00
##Lajos T	4	0	0.00	4.07	0.00	(0.00, 50.70)	4	0.00
All Others	10	0	0.00	0.79	0.00	(0.00, 100.0)	14	0.00
TOTAL	481	5	1.04	1.78	1.32	(0.42, 3.07)	539	1.76
LIJ Medical Center								
Graver L	602	9	1.50	2.00	1.68	(0.77, 3.18)	876	3.22
Kline G	56	2	3.57	1.45	5.53	(0.62, 19.98)	73	6.14
Palazzo R	414	2	0.48	1.74	0.63	(0.07, 2.26)	520	1.80
#Vatsia S	1	0	0.00	0.89	0.00	(0.00, 100.0)	2	0.00
TOTAL	1073	13	1.21	1.87	1.46	(0.77, 2.49)	1471	2.91
Lenox Hill								
#Connolly M	800	12	1.50	2.15	1.57	(0.81, 2.74)	1077	3.27
Fonger J D	65	1	1.54	2.85	1.21	(0.02, 6.76)	69	1.79
##Genovesi M	83	2	2.41	1.99	2.72	(0.31, 9.81)	96	4.25

Table 5 continued:

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Lenox Hill (continued)								
Loulmet D F	34	1	2.94	1.49	4.45	(0.06, 24.76)	216	4.28
McCabe J	36	0	0.00	1.96	0.00	(0.00, 11.70)	51	0.00
##Sabado M	12	0	0.00	4.91	0.00	(0.00, 14.01)	25	3.26
Subramanian V	847	22	2.60	2.60	2.25	(1.41, 3.40)	985	4.75 *
All Others	96	1	1.04	1.69	1.38	(0.02, 7.70)	105	3.62
TOTAL	1973	39	1.98	2.34	1.90	(1.35, 2.60)	2624	3.91
Maimonides								
Acinapura A	223	6	2.69	2.44	2.48	(0.91, 5.40)	274	3.65
#Anderson J	23	1	4.35	3.02	3.24	(0.04, 18.02)	27	3.67
#Burack J	2	0	0.00	0.88	0.00	(0.00, 100.0)	3	0.00
#Connolly M	1	0	0.00	9.91	0.00	(0.00, 83.23)	1	0.00
Cunningham J N	194	13	6.70	2.53	5.96 *	(3.17, 10.20)	263	6.63 *
##Genovesi M	4	0	0.00	1.59	0.00	(0.00, 100.0)	4	0.00
#Jacobowitz I	1099	24	2.18	2.91	1.69	(1.08, 2.51)	1379	3.31
#Ketosugbo A	4	0	0.00	0.65	0.00	(0.00, 100.0)	5	0.00
Lazzaro R	37	2	5.41	2.83	4.30	(0.48, 15.52)	40	6.39
##Molinaro P J	26	1	3.85	2.65	3.27	(0.04, 18.19)	29	4.65
##Reddy R C	18	1	5.56	1.60	7.80	(0.10, 43.38)	20	8.66
##Sabado M	129	6	4.65	3.36	3.11	(1.14, 6.77)	177	4.11
Vaynblat M	195	2	1.03	2.56	0.90	(0.10, 3.26)	232	1.06
Zisbrod Z	570	18	3.16	2.85	2.50	(1.48, 3.95)	689	4.17
All Others	41	0	0.00	2.26	0.00	(0.00, 8.92)	45	0.00
TOTAL	2566	74	2.88	2.80	2.32	(1.82, 2.91)	3188	3.75
Millard Fillmore								
Aldridge J	352	8	2.27	2.07	2.47	(1.06, 4.87)	408	3.46
#Ashraf M	665	4	0.60	1.89	0.71 **	(0.19, 1.83)	786	1.67 **
#Bergsland J	30	1	3.33	3.57	2.10	(0.03, 11.69)	33	2.90
##Guarino R	304	10	3.29	1.65	4.50	(2.15, 8.27)	324	8.37 *
Jennings L	274	5	1.82	1.90	2.16	(0.69, 5.03)	311	4.16
#Karamanoukian H L	12	1	8.33	4.32	4.34	(0.06, 24.17)	13	12.40
##Kerr P	214	9	4.21	2.34	4.04	(1.84, 7.66)	254	7.08 *
##Lajos T	1	0	0.00	1.10	0.00	(0.00, 100.0)	1	0.00
#Levinsky L	26	0	0.00	1.23	0.00	(0.00, 25.74)	26	0.00
#Lewin A	10	0	0.00	1.05	0.00	(0.00, 78.38)	10	0.00
#Raza S	17	0	0.00	1.96	0.00	(0.00, 24.77)	19	0.00
All Others	0	0	0.00	0.00	0.00	(0.00, 0.00)	1	16.02
TOTAL	1905	38	1.99	1.97	2.28	(1.61, 3.13)	2186	4.13

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
Montefiore - Einstein								
##Brodman R	1	0	0.00	0.74	0.00	(0.00, 100.0)	2	0.00
#Camacho M	1	0	0.00	0.73	0.00	(0.00, 100.0)	6	15.86
#Croke G	2	0	0.00	2.04	0.00	(0.00, 100.0)	2	0.00
#Frymus M	349	8	2.29	2.20	2.34	(1.01, 4.61)	423	4.56
#Gold J	43	0	0.00	1.25	0.00	(0.00, 15.29)	79	0.00
#Merav A	1	0	0.00	2.36	0.00	(0.00, 100.0)	1	0.00
#Plestis K A	215	2	0.93	2.35	0.89	(0.10, 3.21)	297	2.35
##Tortolani A	190	9	4.74	2.24	4.76	(2.17, 9.04)	242	6.50 *
All Others	28	1	3.57	2.35	3.42	(0.04, 19.05)	59	5.07
TOTAL	830	20	2.41	2.20	2.46	(1.50, 3.80)	1111	4.14
Montefiore - Moses								
Attai L	256	2	0.78	1.33	1.32	(0.15, 4.76)	355	1.76
##Brodman R	75	0	0.00	1.97	0.00	(0.00, 5.60)	105	0.00
#Camacho M	199	2	1.01	1.93	1.17	(0.13, 4.22)	286	3.15
#Croke G	1	0	0.00	0.64	0.00	(0.00, 100.0)	3	10.80
#Frymus M	1	0	0.00	1.17	0.00	(0.00, 100.0)	1	0.00
#Gold J	162	0	0.00	1.81	0.00	(0.00, 2.82)	221	1.84
#Merav A	247	6	2.43	1.86	2.94	(1.08, 6.41)	333	4.40
#Plestis K A	51	0	0.00	1.55	0.00	(0.00, 10.41)	63	0.00
##Tortolani A	1	0	0.00	5.72	0.00	(0.00, 100.0)	2	0.00
All Others	7	1	14.29	1.32	24.39	(0.32, 100.0)	11	9.54
TOTAL	1000	11	1.10	1.72	1.44	(0.72, 2.57)	1380	2.79
Mount Sinai								
Ergin M	124	1	0.81	1.67	1.09	(0.01, 6.06)	211	1.42
Galla J	243	13	5.35	2.46	4.90 *	(2.60, 8.37)	352	6.49 *
Griep R	33	0	0.00	1.62	0.00	(0.00, 15.39)	111	4.51
Lansman S	305	12	3.93	2.85	3.10	(1.60, 5.42)	410	4.66
Nguyen K	22	1	4.55	4.94	2.07	(0.03, 11.51)	28	2.65
Spielvogel D	293	8	2.73	2.48	2.48	(1.07, 4.89)	429	3.23
All Others	118	2	1.69	2.23	1.71	(0.19, 6.18)	139	4.82
TOTAL	1138	37	3.25	2.48	2.95	(2.07, 4.06)	1680	4.18
NYU Hospitals Center								
Colvin S	79	1	1.27	2.51	1.14	(0.01, 6.32)	578	3.41
Culliford A	319	8	2.51	2.70	2.09	(0.90, 4.11)	507	2.77
Esposito R	277	6	2.17	2.76	1.77	(0.64, 3.84)	425	3.91

Table 5 continued:

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
NYU Hospitals Center (continued)								
Galloway A	175	6	3.43	2.65	2.91	(1.06, 6.34)	442	3.49
#Glassman L	1	0	0.00	6.54	0.00	(0.00, 100.0)	1	0.00
#Grossi E	91	4	4.40	4.73	2.09	(0.56, 5.35)	149	3.19
#Ribakove G	241	4	1.66	3.43	1.09	(0.29, 2.78)	393	3.15
#Steinberg B	85	5	5.88	3.06	4.33	(1.39, 10.09)	129	6.75
TOTAL	1268	34	2.68	3.01	2.01	(1.39, 2.80)	2624	3.45
New York Hospital - Queens								
#Aronis M	323	6	1.86	1.67	2.50	(0.91, 5.43)	418	2.98
#Isom O	1	0	0.00	10.18	0.00	(0.00, 81.02)	1	0.00
#Ko W	535	4	0.75	1.88	0.89	(0.24, 2.29)	668	2.10
##Lang S	99	1	1.01	1.84	1.24	(0.02, 6.88)	136	2.51
##Tortolani A	40	1	2.50	3.07	1.83	(0.02, 10.20)	55	1.58
All Others	1	0	0.00	0.39	0.00	(0.00, 100.0)	1	0.00
TOTAL	999	12	1.20	1.86	1.45	(0.75, 2.53)	1279	2.34 **
North Shore								
Hall M	782	10	1.28	2.30	1.25	(0.60, 2.30)	1133	2.56
Levy M	514	10	1.95	1.93	2.27	(1.08, 4.17)	683	4.64
Parnell V	0	0	0.00	0.00	0.00	(0.00, 0.00)	2	0.00
Pogo G	736	13	1.77	2.22	1.79	(0.95, 3.06)	997	2.98
#Vatsia S	273	2	0.73	2.38	0.69	(0.08, 2.50)	396	1.70 **
TOTAL	2305	35	1.52	2.20	1.55 **	(1.08, 2.16)	3211	3.00
Rochester General								
Cheeran D	771	20	2.59	2.57	2.27	(1.39, 3.51)	969	3.31
Kirshner R	645	10	1.55	3.05	1.14 **	(0.55, 2.10)	818	2.95
#Knight P	663	13	1.96	2.96	1.49	(0.79, 2.54)	971	3.06
Kwan S	199	5	2.51	2.92	1.93	(0.62, 4.51)	241	3.66
All Others	56	3	5.36	2.65	4.55	(0.92, 13.31)	60	6.00
TOTAL	2334	51	2.19	2.85	1.73	(1.29, 2.27)	3059	3.20
St. Elizabeth								
Carr T	418	9	2.15	1.88	2.58	(1.18, 4.89)	474	3.80
Hatton P	346	13	3.76	2.49	3.39	(1.80, 5.79)	435	3.68
Joyce F	406	10	2.46	2.07	2.67	(1.28, 4.92)	540	4.19
TOTAL	1170	32	2.74	2.13	2.89	(1.98, 4.08)	1449	3.91

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. Francis								
Bercow N	923	29	3.14	2.69	2.63	(1.76, 3.78)	1170	3.22
Colangelo R	798	15	1.88	2.58	1.64	(0.92, 2.71)	1034	3.24
Damus P	551	2	0.36	1.64	0.50 **	(0.06, 1.80)	1019	1.90 **
Durban L	123	4	3.25	3.25	2.25	(0.61, 5.77)	158	3.50
Lamendola C	931	16	1.72	2.37	1.63	(0.93, 2.64)	1197	2.85
Robinson N	826	10	1.21	1.64	1.66	(0.79, 3.05)	1120	2.63
Taylor J	967	14	1.45	2.16	1.51	(0.82, 2.53)	1304	2.40 **
All Others	215	2	0.93	2.19	0.96	(0.11, 3.46)	247	1.22
TOTAL	5334	92	1.72	2.24	1.73 **	(1.39, 2.12)	7249	2.70 **
St. Josephs								
Marvasti M	541	5	0.92	2.07	1.00	(0.32, 2.34)	733	1.50 **
#Nast E	310	7	2.26	2.51	2.02	(0.81, 4.17)	386	3.43
Nazem A	627	9	1.44	2.50	1.29	(0.59, 2.45)	799	1.96 **
Rosenberg J	601	17	2.83	2.65	2.40	(1.40, 3.84)	984	3.52
All Others	1	0	0.00	2.79	0.00	(0.00, 100.0)	2	0.00
TOTAL	2080	38	1.83	2.43	1.69	(1.20, 2.32)	2904	2.64 **
St. Lukes-Roosevelt								
#Aronis M	1	0	0.00	7.17	0.00	(0.00, 100.0)	1	0.00
#Geller C	43	2	4.65	2.41	4.34	(0.49, 15.67)	77	2.52
#Hoffman D	17	0	0.00	2.17	0.00	(0.00, 22.40)	24	4.37
Safavi A	29	0	0.00	1.96	0.00	(0.00, 14.54)	41	0.00
#Stelzer P	7	0	0.00	3.68	0.00	(0.00, 32.02)	45	2.24
Swistel D	542	11	2.03	2.58	1.77	(0.88, 3.17)	688	3.33
#Tranbaugh R	6	0	0.00	1.21	0.00	(0.00, 100.0)	8	0.00
All Others	24	2	8.33	1.76	10.63	(1.19, 38.38)	44	8.41
TOTAL	669	15	2.24	2.51	2.01	(1.12, 3.32)	928	3.25
St. Peters								
#Banker M	207	2	0.97	1.89	1.15	(0.13, 4.16)	244	3.25
Bennett E	314	5	1.59	1.54	2.32	(0.75, 5.42)	596	1.97
##Dal Col R	505	6	1.19	1.31	2.04	(0.75, 4.44)	708	2.46
##Miller S	2	0	0.00	6.58	0.00	(0.00, 62.66)	2	0.00
##Saifi J	221	5	2.26	1.88	2.71	(0.87, 6.32)	293	2.42
#Sardella G	533	8	1.50	1.62	2.09	(0.90, 4.12)	670	3.01
TOTAL	1782	26	1.46	1.59	2.07	(1.35, 3.03)	2513	2.53 **

Table 5 continued:

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
St. Vincents								
Galdieri R	272	13	4.78	2.31	4.66 *	(2.48, 7.97)	322	7.36 *
##Lang S	451	16	3.55	2.49	3.21	(1.83, 5.21)	573	5.05 *
#McGinn J	377	7	1.86	2.57	1.62	(0.65, 3.34)	452	2.99
##Reddy R C	35	0	0.00	1.85	0.00	(0.00, 12.71)	50	0.00
Tyras D	279	7	2.51	2.14	2.63	(1.05, 5.42)	342	2.44
All Others	132	5	3.79	2.48	3.43	(1.10, 8.00)	149	5.25
TOTAL	1546	48	3.10	2.40	2.91	(2.14, 3.86)	1888	4.45 *
Staten Island Univ- North								
#McGinn J	276	1	0.36	2.09	0.39 **	(0.01, 2.17)	316	1.34
##Molinaro P J	3	0	0.00	0.38	0.00	(0.00, 100.0)	3	0.00
TOTAL	279	1	0.36	2.07	0.39 **	(0.01, 2.17)	319	1.34
Strong Memorial								
#Alfieris G	1	0	0.00	3.62	0.00	(0.00, 100.0)	1	0.00
Hicks G	417	21	5.04	2.25	5.04 *	(3.12, 7.70)	670	6.43 *
#Knight P	27	0	0.00	1.88	0.00	(0.00, 16.29)	39	3.22
Risher W	420	12	2.86	2.30	2.79	(1.44, 4.88)	636	5.55 *
All Others	146	6	4.11	2.34	3.96	(1.44, 8.61)	202	6.68 *
TOTAL	1011	39	3.86	2.27	3.82 *	(2.71, 5.22)	1548	6.03 *
United Health Services								
#Quintos E	292	4	1.37	2.73	1.13	(0.30, 2.89)	339	2.51
Wong K	354	6	1.69	2.53	1.51	(0.55, 3.28)	458	2.18
Yousuf M	311	10	3.22	2.93	2.47	(1.18, 4.55)	416	4.34
All Others	48	5	10.42	2.25	10.42 *	(3.36, 24.32)	55	14.96 *
TOTAL	1005	25	2.49	2.70	2.08	(1.34, 3.06)	1268	3.47
Univ. Hosp. - Stony Brook								
Bilfinger T	357	8	2.24	2.54	1.98	(0.85, 3.91)	420	4.17
Krukenkamp I	396	11	2.78	2.05	3.05	(1.52, 5.46)	554	4.42
McLarty A	274	9	3.28	1.92	3.84	(1.75, 7.29)	307	4.79
Saltman A E	331	12	3.63	1.81	4.51 *	(2.33, 7.88)	365	7.07 *
Seifert F	688	11	1.60	1.83	1.96	(0.98, 3.51)	819	4.11
All Others	0	0	0.00	0.00	0.00	(0.00, 0.00)	1	0.00
TOTAL	2046	51	2.49	2.01	2.79	(2.08, 3.67)	2466	4.62 *

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
Univ. Hosp. - Upstate								
#Alfieris G	88	4	4.55	2.19	4.68	(1.26,11.97)	157	3.05
Brandt B	334	2	0.60	2.59	0.52 **	(0.06, 1.87)	416	2.45
Fink GW	167	6	3.59	2.45	3.30	(1.21, 7.18)	209	4.73
Myers S	159	2	1.26	2.41	1.17	(0.13, 4.23)	174	4.43
Picone A	332	9	2.71	2.49	2.45	(1.12, 4.65)	439	3.08
All Others	149	5	3.36	2.90	2.60	(0.84, 6.08)	202	3.64
TOTAL	1229	28	2.28	2.53	2.03	(1.35, 2.93)	1597	3.31
Univ. Hosp. of Brooklyn								
#Anderson J	34	4	11.76	2.52	10.50 *	(2.83, 26.89)	48	10.07
#Burack J	57	2	3.51	2.56	3.09	(0.35, 11.14)	76	3.12
##Genovesi M	46	2	4.35	1.76	5.54	(0.62, 20.02)	55	10.02
#Jacobowitz I	127	7	5.51	2.44	5.08	(2.03, 10.46)	164	5.84
#Ketosugbo A	87	2	2.30	2.11	2.45	(0.28, 8.85)	104	6.55
##Molinaro P J	1	0	0.00	1.08	0.00	(0.00, 100.0)	1	0.00
Picone V	13	1	7.69	2.06	8.40	(0.11, 46.73)	13	13.11
##Reddy R C	176	10	5.68	2.40	5.32 *	(2.55, 9.78)	244	7.90 *
##Sabado M	174	11	6.32	2.71	5.25 *	(2.62, 9.39)	236	7.00 *
All Others	43	0	0.00	1.08	0.00	(0.00, 17.68)	50	0.00
TOTAL	758	39	5.15	2.34	4.94 *	(3.51, 6.76)	991	6.91 *
Vassar Brothers								
Ciaburri D	262	7	2.67	1.73	3.48	(1.39, 7.17)	366	2.96
All Others	111	0	0.00	1.06	0.00	(0.00, 7.04)	117	0.00
TOTAL	373	7	1.88	1.53	2.76	(1.11, 5.69)	483	2.65
Weill Cornell-NYP								
Altorki N	89	5	5.62	2.29	5.52	(1.78, 12.88)	100	6.82
##Brodman R	196	2	1.02	2.16	1.06	(0.12, 3.84)	245	1.99
Girardi L	772	9	1.17	2.38	1.10 **	(0.50, 2.09)	1077	2.33 **
#Isom O	175	2	1.14	1.26	2.04	(0.23, 7.37)	439	2.31
#Ko W	125	1	0.80	1.81	1.00	(0.01, 5.55)	169	1.44
Krieger K	633	9	1.42	2.12	1.51	(0.69, 2.86)	1003	2.36 **
##Lang S	8	1	12.50	3.25	8.65	(0.11, 48.14)	17	4.15
Rosengart T	143	5	3.50	3.82	2.06	(0.66, 4.80)	207	3.16
##Tortolani A	101	1	0.99	2.41	0.92	(0.01, 5.15)	135	2.77
All Others	31	0	0.00	3.43	0.00	(0.00, 7.75)	39	2.19
TOTAL	2273	35	1.54	2.28	1.52 **	(1.06, 2.11)	3431	2.46 **

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
Westchester Medical Center								
Axelrod H	413	19	4.60	2.94	3.52	(2.12, 5.50)	496	4.70
Fleisher A	409	17	4.16	2.15	4.34 *	(2.53, 6.95)	529	6.75 *
Lafaro R	211	7	3.32	1.87	3.98	(1.60, 8.20)	308	5.48
Moggio R	333	9	2.70	2.18	2.79	(1.28, 5.31)	469	3.47
Sarabu M	436	6	1.38	2.68	1.16	(0.42, 2.51)	598	1.53 **
Zias E	490	14	2.86	2.18	2.95	(1.61, 4.95)	576	5.24
All Others	42	7	16.67	2.50	15.02 *	(6.02,30.94)	43	22.69 *
TOTAL	2334	79	3.38	2.38	3.20 *	(2.53, 3.99)	3019	4.59 *
Winthrop Univ. Hosp.								
Hartman A	402	5	1.24	3.06	0.91 **	(0.29, 2.13)	801	2.39 **
Kofsky E	597	14	2.35	2.63	2.00	(1.09, 3.36)	757	3.20
Schubach S	592	6	1.01	2.32	0.98 **	(0.36, 2.14)	798	1.38 **
Scott W	318	4	1.26	2.44	1.16	(0.31, 2.97)	393	3.12
Williams L	59	1	1.69	3.01	1.27	(0.02, 7.04)	74	1.38
All Others	62	1	1.61	2.53	1.44	(0.02, 7.99)	74	6.74
TOTAL	2030	31	1.53	2.60	1.32 **	(0.90, 1.87)	2897	2.49 **
STATEWIDE TOTAL	53220	1197	2.25	2.25	2.25		71768	3.51

* 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, 1999-2001.

	Isolated CABG					Isolated CABG, or Valve or Valve/CABG		
	Cases	No of Deaths	OMR	EMR	RAMR	95 % CI for RAMR	Cases	RAMR
Alfieris G	89	4	4.49	2.20	4.59	(1.23, 11.75)	158	3.04
Strong Memorial	1	0	0.00	3.62	0.00	(0.00, 100.0)	1	0.00
Univ. Hosp. - Upstate	88	4	4.55	2.19	4.68	(1.26, 11.97)	157	3.05
Anderson J	57	5	8.77	2.72	7.25 *	(2.34, 16.92)	75	7.46
Maimonides	23	1	4.35	3.02	3.24	(0.04, 18.02)	27	3.67
Univ. Hosp. of Brooklyn	34	4	11.76	2.52	10.50 *	(2.83, 26.89)	48	10.07
Aronis M	324	6	1.85	1.69	2.46	(0.90, 5.36)	419	2.96
New York Hospital - Queens	323	6	1.86	1.67	2.50	(0.91, 5.43)	418	2.98
St. Lukes-Roosevelt	1	0	0.00	7.17	0.00	(0.00, 100.0)	1	0.00
Ashraf M	671	4	0.60	1.89	0.71 **	(0.19, 1.82)	795	1.66 **
Buffalo General	6	0	0.00	0.99	0.00	(0.00, 100.0)	9	0.00
Millard Fillmore	665	4	0.60	1.89	0.71 **	(0.19, 1.83)	786	1.67 **
Banker M	209	2	0.96	1.87	1.15	(0.13, 4.15)	246	3.24
Albany Medical Center	2	0	0.00	0.64	0.00	(0.00, 100.0)	2	0.00
St. Peters	207	2	0.97	1.89	1.15	(0.13, 4.16)	244	3.25
Bergsland J	393	18	4.58	2.86	3.60	(2.13, 5.69)	444	5.35
Buffalo General	363	17	4.68	2.81	3.75	(2.19, 6.01)	411	5.58
Millard Fillmore	30	1	3.33	3.57	2.10	(0.03, 11.69)	33	2.90
Brodman R	272	2	0.74	2.10	0.79	(0.09, 2.85)	352	1.37
Montefiore - Einstein	1	0	0.00	0.74	0.00	(0.00, 100.0)	2	0.00
Montefiore - Moses	75	0	0.00	1.97	0.00	(0.00, 5.60)	105	0.00
Weill Cornell-NYP	196	2	1.02	2.16	1.06	(0.12, 3.84)	245	1.99
Burack J	59	2	3.39	2.50	3.05	(0.34, 11.01)	79	3.03
Maimonides	2	0	0.00	0.88	0.00	(0.00, 100.0)	3	0.00
Univ. Hosp. of Brooklyn	57	2	3.51	2.56	3.09	(0.35, 11.14)	76	3.12
Camacho M	200	2	1.00	1.93	1.17	(0.13, 4.21)	292	3.43
Montefiore - Einstein	1	0	0.00	0.73	0.00	(0.00, 100.0)	6	15.86
Montefiore - Moses	199	2	1.01	1.93	1.17	(0.13, 4.22)	286	3.15
Canavan T	456	8	1.75	1.45	2.72	(1.17, 5.36)	541	4.09
Albany Medical Center	455	8	1.76	1.45	2.72	(1.17, 5.37)	540	4.09
Ellis Hospital	1	0	0.00	1.06	0.00	(0.00, 100.0)	1	0.00
Connolly M	801	12	1.50	2.16	1.56	(0.81, 2.73)	1078	3.26
Lenox Hill	800	12	1.50	2.15	1.57	(0.81, 2.74)	1077	3.27
Maimonides	1	0	0.00	9.91	0.00	(0.00,83.23)	1	0.00

Table 6 continued:

	Isolated CABG					Isolated CABG, or Valve or Valve/CABG		
	Cases	No of Deaths	OMR	EMR	RAMR	95 % CI for RAMR	Cases	RAMR
Crooke G	3	0	0.00	1.57	0.00	(0.00, 100.0)	5	9.60
Montefiore - Einstein	2	0	0.00	2.04	0.00	(0.00, 100.0)	2	0.00
Montefiore - Moses	1	0	0.00	0.64	0.00	(0.00, 100.0)	3	10.80
Dal Col R	509	6	1.18	1.30	2.04	(0.74, 4.43)	712	2.45
Albany Medical Center	3	0	0.00	0.51	0.00	(0.00, 100.0)	3	0.00
Ellis Hospital	1	0	0.00	0.67	0.00	(0.00, 100.0)	1	0.00
St. Peters	505	6	1.19	1.31	2.04	(0.75, 4.44)	708	2.46
Depan H	420	15	3.57	2.08	3.86	(2.16, 6.37)	618	4.91
Albany Medical Center	4	0	0.00	1.00	0.00	(0.00, 100.0)	10	0.00
Ellis Hospital	416	15	3.61	2.09	3.88	(2.17, 6.40)	608	5.00
Frymus M	350	8	2.29	2.20	2.34	(1.01, 4.61)	424	4.55
Montefiore - Einstein	349	8	2.29	2.20	2.34	(1.01, 4.61)	423	4.56
Montefiore - Moses	1	0	0.00	1.17	0.00	(0.00, 100.0)	1	0.00
Geller C	198	4	2.02	2.15	2.11	(0.57, 5.40)	257	3.28
Beth Israel	155	2	1.29	2.08	1.39	(0.16, 5.03)	180	3.74
St. Lukes-Roosevelt	43	2	4.65	2.41	4.34	(0.49, 15.67)	77	2.52
Genovesi M	133	4	3.01	1.90	3.56	(0.96, 9.10)	155	6.23
Lenox Hill	83	2	2.41	1.99	2.72	(0.31, 9.81)	96	4.25
Maimonides	4	0	0.00	1.59	0.00	(0.00, 100.0)	4	0.00
Univ. Hosp. of Brooklyn	46	2	4.35	1.76	5.54	(0.62, 20.02)	55	10.02
Glassman L	30	0	0.00	1.35	0.00	(0.00, 20.43)	36	0.00
Bellevue	29	0	0.00	1.17	0.00	(0.00, 24.37)	35	0.00
NYU Hospitals Center	1	0	0.00	6.54	0.00	(0.00, 100.0)	1	0.00
Gold J	205	0	0.00	1.69	0.00	(0.00, 2.38)	300	1.32
Montefiore - Einstein	43	0	0.00	1.25	0.00	(0.00, 15.29)	79	0.00
Montefiore - Moses	162	0	0.00	1.81	0.00	(0.00, 2.82)	221	1.84
Grossi E	101	4	3.96	4.38	2.03	(0.55, 5.20)	163	3.12
Bellevue	10	0	0.00	1.23	0.00	(0.00, 66.82)	14	0.00
NYU Hospitals Center	91	4	4.40	4.73	2.09	(0.56, 5.35)	149	3.19
Guarino R	314	10	3.18	1.63	4.39	(2.10, 8.07)	334	8.21 *
Buffalo General	3	0	0.00	1.98	0.00	(0.00, 100.0)	3	0.00
Erie County	7	0	0.00	0.89	0.00	(0.00, 100.0)	7	0.00
Millard Fillmore	304	10	3.29	1.65	4.50	(2.15, 8.27)	324	8.37 *

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
Hoffman D	162	2	1.23	2.08	1.34	(0.15, 4.82)	217	4.36
Beth Israel	145	2	1.38	2.07	1.50	(0.17, 5.42)	193	4.35
St. Lukes-Roosevelt	17	0	0.00	2.17	0.00	(0.00, 22.40)	24	4.37
Houck J	85	1	1.18	1.84	1.44	(0.02, 7.99)	101	2.73
Buffalo General	1	0	0.00	2.85	0.00	(0.00, 100.0)	1	0.00
Erie County	84	1	1.19	1.83	1.46	(0.02, 8.14)	100	2.76
Isom O	176	2	1.14	1.31	1.95	(0.22, 7.04)	440	2.29
New York Hospital - Queens	1	0	0.00	10.18	0.00	(0.00, 81.02)	1	0.00
Weill Cornell-NYP	175	2	1.14	1.26	2.04	(0.23, 7.37)	439	2.31
Jacobowitz I	1226	31	2.53	2.86	1.99	(1.35, 2.82)	1543	3.56
Maimonides	1099	24	2.18	2.91	1.69	(1.08, 2.51)	1379	3.31
Univ. Hosp. of Brooklyn	127	7	5.51	2.44	5.08	(2.03, 10.46)	164	5.84
Karamanoukian H L	285	13	4.56	2.97	3.45	(1.84, 5.91)	302	5.13
Buffalo General	273	12	4.40	2.91	3.40	(1.75, 5.93)	289	4.67
Millard Fillmore	12	1	8.33	4.32	4.34	(0.06, 24.17)	13	12.40
Kerr P	226	9	3.98	2.30	3.89	(1.77, 7.38)	270	7.20 *
Buffalo General	9	0	0.00	1.46	0.00	(0.00, 62.97)	13	12.35
Erie County	3	0	0.00	1.96	0.00	(0.00, 100.0)	3	0.00
Millard Fillmore	214	9	4.21	2.34	4.04	(1.84, 7.66)	254	7.08 *
Ketosugbo A	91	2	2.20	2.05	2.42	(0.27, 8.72)	109	6.13
Maimonides	4	0	0.00	0.65	0.00	(0.00, 100.0)	5	0.00
Univ. Hosp. of Brooklyn	87	2	2.30	2.11	2.45	(0.28, 8.85)	104	6.55
Knight P	690	13	1.88	2.92	1.45	(0.77, 2.48)	1010	3.07
Rochester General	663	13	1.96	2.96	1.49	(0.79, 2.54)	971	3.06
Strong Memorial	27	0	0.00	1.88	0.00	(0.00, 16.29)	39	3.22
Ko W	660	5	0.76	1.87	0.91 **	(0.29, 2.13)	837	1.97 **
New York Hospital - Queens	535	4	0.75	1.88	0.89	(0.24, 2.29)	668	2.10
Weill Cornell-NYP	125	1	0.80	1.81	1.00	(0.01, 5.55)	169	1.44
Lajos T	184	10	5.43	2.24	5.46 *	(2.61, 10.04)	193	8.13 *
Buffalo General	179	10	5.59	2.20	5.70 *	(2.73, 10.49)	188	8.44 *
Erie County	4	0	0.00	4.07	0.00	(0.00, 50.70)	4	0.00
Millard Fillmore	1	0	0.00	1.10	0.00	(0.00, 100.0)	1	0.00

Table 6 continued:

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95 % CI for RAMR	Cases	RAMR
Lang S	558	18	3.23	2.38	3.04	(1.80, 4.81)	726	4.66
New York Hospital - Queens	99	1	1.01	1.84	1.24	(0.02, 6.88)	136	2.51
St. Vincents	451	16	3.55	2.49	3.21	(1.83, 5.21)	573	5.05 *
Weill Cornell-NYP	8	1	12.50	3.25	8.65	(0.11, 48.14)	17	4.15
Levinsky L	303	11	3.63	1.81	4.52 *	(2.25, 8.08)	313	6.80 *
Buffalo General	277	11	3.97	1.86	4.80 *	(2.39, 8.59)	287	7.14 *
Millard Fillmore	26	0	0.00	1.23	0.00	(0.00, 25.74)	26	0.00
Lewin A	443	7	1.58	1.66	2.14	(0.86, 4.41)	455	5.13
Buffalo General	433	7	1.62	1.67	2.17	(0.87, 4.47)	445	5.20
Millard Fillmore	10	0	0.00	1.05	0.00	(0.00, 78.38)	10	0.00
McGinn J	653	8	1.23	2.37	1.16	(0.50, 2.29)	768	2.40
St. Vincents	377	7	1.86	2.57	1.62	(0.65, 3.34)	452	2.99
Staten Island Univ- North	276	1	0.36	2.09	0.39 **	(0.01, 2.17)	316	1.34
Merav A	248	6	2.42	1.86	2.93	(1.07, 6.38)	334	4.39
Montefiore - Einstein	1	0	0.00	2.36	0.00	(0.00, 100.0)	1	0.00
Montefiore - Moses	247	6	2.43	1.86	2.94	(1.08, 6.41)	333	4.40
Miller S	439	13	2.96	1.99	3.34	(1.78, 5.71)	559	5.32
Albany Medical Center	433	13	3.00	1.97	3.43	(1.82, 5.87)	553	5.39 *
Ellis Hospital	4	0	0.00	2.54	0.00	(0.00, 81.21)	4	0.00
St. Peters	2	0	0.00	6.58	0.00	(0.00, 62.66)	2	0.00
Molinaro P J	30	1	3.33	2.37	3.17	(0.04, 17.62)	33	4.52
Maimonides	26	1	3.85	2.65	3.27	(0.04, 18.19)	29	4.65
Staten Island Univ- North	3	0	0.00	0.38	0.00	(0.00, 100.0)	3	0.00
Univ. Hosp. of Brooklyn	1	0	0.00	1.08	0.00	(0.00, 100.0)	1	0.00
Nast E	349	7	2.01	2.40	1.88	(0.75, 3.88)	431	3.24
Arnot-Ogden	39	0	0.00	1.49	0.00	(0.00, 14.16)	45	0.00
St. Josephs	310	7	2.26	2.51	2.02	(0.81, 4.17)	386	3.43
Plestis K A	266	2	0.75	2.20	0.77	(0.09, 2.78)	360	2.03
Montefiore - Einstein	215	2	0.93	2.35	0.89	(0.10, 3.21)	297	2.35
Montefiore - Moses	51	0	0.00	1.55	0.00	(0.00, 10.41)	63	0.00
Quintos E	328	7	2.13	2.62	1.83	(0.73, 3.78)	380	3.19
Arnot-Ogden	36	3	8.33	1.72	10.92	(2.20, 31.91)	41	11.28
United Health Services	292	4	1.37	2.73	1.13	(0.30, 2.89)	339	2.51

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
Raza S	381	14	3.67	2.11	3.91	(2.14, 6.56)	472	5.74 *
Buffalo General	364	14	3.85	2.12	4.08	(2.23, 6.85)	453	5.94 *
Millard Fillmore	17	0	0.00	1.96	0.00	(0.00, 24.77)	19	0.00
Reddy R C	229	11	4.80	2.26	4.79 *	(2.39, 8.57)	314	6.72 *
Maimonides	18	1	5.56	1.60	7.80	(0.10, 43.38)	20	8.66
St. Vincents	35	0	0.00	1.85	0.00	(0.00, 12.71)	50	0.00
Univ. Hosp. of Brooklyn	176	10	5.68	2.40	5.32 *	(2.55, 9.78)	244	7.90 *
Ribakove G	280	6	2.14	3.23	1.49	(0.54, 3.25)	461	3.68
Bellevue	39	2	5.13	1.98	5.84	(0.66, 21.08)	68	8.72
NYU Hospitals Center	241	4	1.66	3.43	1.09	(0.29, 2.78)	393	3.15
Sabado M	315	17	5.40	3.06	3.96 *	(2.31, 6.35)	438	5.25 *
Lenox Hill	12	0	0.00	4.91	0.00	(0.00, 14.01)	25	3.26
Maimonides	129	6	4.65	3.36	3.11	(1.14, 6.77)	177	4.11
Univ. Hosp. of Brooklyn	174	11	6.32	2.71	5.25 *	(2.62, 9.39)	236	7.00 *
Saifi J	508	12	2.36	2.12	2.50	(1.29, 4.37)	655	2.23
Albany Medical Center	4	0	0.00	1.20	0.00	(0.00, 100.0)	4	0.00
Ellis Hospital	283	7	2.47	2.33	2.39	(0.96, 4.92)	358	2.07
St. Peters	221	5	2.26	1.88	2.71	(0.87, 6.32)	293	2.42
Sardella G	536	8	1.49	1.61	2.08	(0.90, 4.10)	673	3.01
Albany Medical Center	3	0	0.00	1.09	0.00	(0.00, 100.0)	3	0.00
St. Peters	533	8	1.50	1.62	2.09	(0.90, 4.12)	670	3.01
Steinberg B	134	5	3.73	2.42	3.47	(1.12, 8.10)	206	5.54
Bellevue	49	0	0.00	1.31	0.00	(0.00, 12.90)	77	2.91
NYU Hospitals Center	85	5	5.88	3.06	4.33	(1.39, 10.09)	129	6.75
Stelzer P	74	2	2.70	2.37	2.56	(0.29, 9.25)	246	1.95
Beth Israel	67	2	2.99	2.24	3.00	(0.34, 10.84)	201	1.88
St. Lukes-Roosevelt	7	0	0.00	3.68	0.00	(0.00, 32.02)	45	2.24
Tortolani A	332	11	3.31	2.40	3.11	(1.55, 5.56)	434	4.46
Montefiore - Einstein	190	9	4.74	2.24	4.76	(2.17, 9.04)	242	6.50 *
Montefiore - Moses	1	0	0.00	5.72	0.00	(0.00, 100.0)	2	0.00
New York Hospital - Queens	40	1	2.50	3.07	1.83	(0.02, 10.20)	55	1.58
Weill Cornell-NYP	101	1	0.99	2.41	0.92	(0.01, 5.15)	135	2.77
Tranbaugh R	566	11	1.94	2.10	2.09	(1.04, 3.73)	732	2.75
Beth Israel	560	11	1.96	2.11	2.10	(1.05, 3.76)	724	2.78
St. Lukes-Roosevelt	6	0	0.00	1.21	0.00	(0.00, 100.0)	8	0.00

Table 6 continued:

	Isolated CABG					95 % CI for RAMR	Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR		Cases	RAMR
Vatsia S	274	2	0.73	2.37	0.69	(0.08, 2.50)	398	1.70 **
LIJ Medical Center	1	0	0.00	0.89	0.00	(0.00, 100.0)	2	0.00
North Shore	273	2	0.73	2.38	0.69	(0.08, 2.50)	396	1.70 **

SURGEON AND HOSPITAL VOLUMES FOR TOTAL ADULT CARDIAC SURGERY, 1999-2001

Table 7 presents, for each hospital and for each surgeon performing at least 200 cardiac operations in any hospital in 1999 – 2001 and/or performing one or more cardiac operations in each of the years 1999 – 2001, 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 eight Valve or Valve/CABG groups that were identified in Table 4. Other cardiac surgery includes cardiac procedures not represented by isolated CABG or Valve or Valve/CABG operations and includes, but is not limited to: congenital procedures, heart transplants, aneurysm repairs, ventricular reconstruction, and ventricular assist device insertions. Total cardiac surgery is the sum of the previous three columns and includes any procedure to the heart or great vessels.

Table 7: Surgeon and Hospital Volume for Isolated CABG, Valve or Valve/CABG, Other Cardiac Surgery, and Total Adult Cardiac Surgery, 1999-2001.

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Albany Medical Center				
Banker M	2	0	0	2
Britton L	320	127	45	492
Canavan T	455	85	8	548
Canver C	324	78	77	479
Dal Col R	3	0	0	3
Depan H	4	6	0	10
Kelley J	416	148	92	656
Miller S	433	120	25	578
Saifi J	4	0	1	5
Sardella G	3	0	0	3
All Others	22	6	29	57
TOTAL	1986	570	277	2833
Arnot-Ogden				
Curiale S V	169	31	9	209
Nast E	39	6	1	46
Quintos E	36	5	1	42
Zama N	47	6	0	53
All Others	13	1	1	15
TOTAL	304	49	12	365
Bellevue				
Glassman L	29	6	5	40
Grossi E	10	4	3	17

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Bellevue (continued)				
Ribakove G	39	29	14	82
Steinberg B	49	28	21	98
All Others	16	4	9	29
TOTAL	143	71	52	266
Beth Israel				
Geller C	155	25	15	195
Harris L	310	77	22	409
Hoffman D	145	48	14	207
Stelzer P	67	134	121	322
Tranbaugh R	560	164	49	773
All Others	17	7	0	24
TOTAL	1254	455	221	1930
Buffalo General				
Ashraf M	6	3	0	9
Bergsland J	363	48	19	430
Grosner G	688	197	45	930
Guarino R	3	0	0	3
Houck J	1	0	1	2
Karamanoukian H L	273	16	16	305
Kerr P	9	4	8	21
Lajos T	179	9	14	202
Levinsky L	277	10	4	291
Lewin A	433	12	5	450
Raza S	364	89	70	523
All Others	113	122	36	271
TOTAL	2709	510	218	3437
Columbia Presbyterian-NYP				
Edwards N	277	108	112	497
Esrig B	14	6	38	58
Ginsburg M	0	1	33	34
Gorenstein L	1	0	16	17
Naka Y	201	83	167	451
Oz M	574	316	157	1047
Quaegebeur J	1	11	95	107

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Columbia Presbyterian-NYP (continued)				
Rose E	93	86	24	203
Smith C	478	389	114	981
All Others	37	16	108	161
TOTAL	1676	1016	864	3556
Ellis Hospital				
Afifi A	244	27	1	272
Canavan T	1	0	0	1
Dal Col R	1	0	0	1
Depan H	416	192	62	670
Miller S	4	0	0	4
Reich H	398	70	13	481
Saifi J	283	75	14	372
All Others	10	2	0	12
TOTAL	1357	366	90	1813
Erie County				
Bell-Thomson J	164	32	12	208
Datta S	209	6	7	222
Guarino R	7	0	0	7
Houck J	84	16	17	117
Kerr P	3	0	0	3
Lajos T	4	0	1	5
All Others	10	4	1	15
TOTAL	481	58	38	577
LIJ Medical Center				
Graver L	602	274	92	968
Kline G	56	17	12	85
Palazzo R	414	106	22	542
Vatsia S	1	1	0	2
All Others	0	0	4	4
TOTAL	1073	398	130	1601
Lenox Hill				
Connolly M	800	277	76	1153
Fonger J D	65	4	4	73
Genovesi M	83	13	4	100
Loulmet D F	34	182	29	245
McCabe J	36	15	8	59

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Lenox Hill (continued)				
Sabado M	12	13	3	28
Subramanian V	847	138	15	1000
All Others	96	9	3	108
TOTAL	1973	651	142	2766
Maimonides				
Acinapura A	223	51	20	294
Anderson J	23	4	5	32
Burack J	2	1	0	3
Connolly M	1	0	0	1
Cunningham J N	194	69	15	278
Genovesi M	4	0	0	4
Jacobowitz I	1099	280	36	1415
Ketosugbo A	4	1	2	7
Lazzaro R	37	3	10	50
Molinaro P J	26	3	1	30
Reddy R C	18	2	0	20
Sabado M	129	48	11	188
Vaynblat M	195	37	6	238
Zisbrod Z	570	119	19	708
All Others	41	4	5	50
TOTAL	2566	622	130	3318
Millard Fillmore				
Aldridge J	352	56	36	444
Ashraf M	665	121	17	803
Bergsland J	30	3	2	35
Guarino R	304	20	5	329
Jennings L	274	37	6	317
Karamanoukian H L	12	1	0	13
Kerr P	214	40	14	268
Lajos T	1	0	0	1
Levinsky L	26	0	1	27
Lewin A	10	0	0	10
Raza S	17	2	0	19
All Others	0	1	1	2
TOTAL	1905	281	82	2268

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Montefiore - Einstein				
Brodman R	1	1	0	2
Camacho M	1	5	1	7
Crooke G	2	0	0	2
Frymus M	349	74	27	450
Gold J	43	36	6	85
Merav A	1	0	0	1
Plestis K A	215	82	83	380
Tortolani A	190	52	14	256
All Others	28	31	13	72
TOTAL	830	281	144	1255
Montefiore - Moses				
Attai L	256	99	17	372
Brodman R	75	30	6	111
Camacho M	199	87	30	316
Crooke G	1	2	6	9
Frymus M	1	0	0	1
Gold J	162	59	17	238
Merav A	247	86	13	346
Plestis K A	51	12	21	84
Tortolani A	1	1	0	2
All Others	7	4	1	12
TOTAL	1000	380	111	1491
Mount Sinai				
Ergin M	124	87	34	245
Galla J	243	109	119	471
Griep R	33	78	214	325
Lansman S	305	105	125	535
Nguyen K	22	6	30	58
Spielvogel D	293	136	128	557
All Others	118	21	31	170
TOTAL	1138	542	681	2361
NYU Hospitals Center				
Colvin S	79	499	132	710
Culliford A	319	188	110	617
Esposito R	277	148	38	463

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
NYU Hospitals Center (continued)				
Galloway A	175	267	75	517
Glassman L	1	0	12	13
Grossi E	91	58	52	201
Ribakove G	241	152	43	436
Steinberg B	85	44	20	149
All Others	0	0	4	4
TOTAL	1268	1356	486	3110
New York Hospital - Queens				
Aronis M	323	95	10	428
Isom O	1	0	0	1
Ko W	535	133	62	730
Lang S	99	37	10	146
Tortolani A	40	15	1	56
All Others	1	0	0	1
TOTAL	999	280	83	1362
North Shore				
Hall M	782	351	45	1178
Levy M	514	169	53	736
Parnell V	0	2	13	15
Pogo G	736	261	40	1037
Vatsia S	273	123	35	431
TOTAL	2305	906	186	3397
Rochester General				
Cheeran D	771	198	30	999
Kirshner R	645	173	34	852
Knight P	663	308	63	1034
Kwan S	199	42	7	248
All Others	56	4	6	66
TOTAL	2334	725	140	3199
St. Elizabeth				
Carr T	418	56	9	483
Hatton P	346	89	23	458
Joyce F	406	134	24	564
TOTAL	1170	279	56	1505

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
St. Francis				
Bercow N	923	247	32	1202
Colangelo R	798	236	19	1053
Damus P	551	468	93	1112
Durban L	123	35	13	171
Lamendola C	931	266	49	1246
Robinson N	826	294	67	1187
Taylor J	967	337	50	1354
All Others	215	32	4	251
TOTAL	5334	1915	327	7576
St. Josephs				
Marvasti M	541	192	43	776
Nast E	310	76	14	400
Nazem A	627	172	18	817
Rosenberg J	601	383	101	1085
All Others	1	1	3	5
TOTAL	2080	824	179	3083
St. Lukes-Roosevelt				
Aronis M	1	0	0	1
Geller C	43	34	18	95
Hoffman D	17	7	3	27
Safavi A	29	12	4	45
Stelzer P	7	38	62	107
Swistel D	542	146	31	719
Tranbaugh R	6	2	0	8
All Others	24	20	8	52
TOTAL	669	259	126	1054
St. Peters				
Banker M	207	37	9	253
Bennett E	314	282	74	670
Dal Col R	505	203	32	740
Miller S	2	0	0	2
Saifi J	221	72	11	304
Sardella G	533	137	17	687
All Others	0	0	4	4
TOTAL	1782	731	147	2660

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
St. Vincents				
Galdieri R	272	50	15	337
Lang S	451	122	37	610
McGinn J	377	75	17	469
Reddy R C	35	15	7	57
Tyras D	279	63	5	347
All Others	132	17	13	162
TOTAL	1546	342	94	1982
Staten Island Univ- North				
McGinn J	276	40	2	318
Molinaro P J	3	0	1	4
TOTAL	279	40	3	322
Strong Memorial				
Alfieris G	1	0	20	21
Hicks G	417	253	60	730
Knight P	27	12	1	40
Risher W	420	216	148	784
All Others	146	56	35	237
TOTAL	1011	537	264	1812
United Health Services				
Quintos E	292	47	11	350
Wong K	354	104	14	472
Yousuf M	311	105	23	439
All Others	48	7	0	55
TOTAL	1005	263	48	1316
Univ. Hosp. - Stony Brook				
Bilfinger T	357	63	22	442
Krukenkamp I	396	158	49	603
McLarty A	274	33	20	327
Saltman A E	331	34	38	403
Seifert F	688	131	20	839
All Others	0	1	0	1
TOTAL	2046	420	149	2615
Univ. Hosp. - Upstate				
Alfieris G	88	69	50	207
Brandt B	334	82	37	453

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Univ. Hosp. - Upstate (continued)				
Fink G W	167	42	12	221
Myers S	159	15	20	194
Picone A	332	107	27	466
All Others	149	53	16	218
TOTAL	1229	368	162	1759
Univ. Hosp. of Brooklyn				
Anderson J	34	14	11	59
Burack J	57	19	9	85
Genovesi M	46	9	1	56
Jacobowitz I	127	37	8	172
Ketosugbo A	87	17	6	110
Molinaro P J	1	0	0	1
Picone V	13	0	2	15
Reddy R C	176	68	18	262
Sabado M	174	62	20	256
All Others	43	7	0	50
TOTAL	758	233	75	1066
Vassar Brothers				
Ciaburri D	262	104	17	383
All Others	111	6	2	119
TOTAL	373	110	19	502
Weill Cornell-NYP				
Altorki N	89	11	3	103
Brodman R	196	49	9	254
Girardi L	772	305	424	1501
Isom O	175	264	38	477
Ko W	125	44	7	176
Krieger K	633	370	44	1047
Lang S	8	9	1	18
Rosengart T	143	64	26	233
Tortolani A	101	34	1	136
All Others	31	8	20	59
TOTAL	2273	1158	573	4004

Table 7 continued:

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Westchester Medical Center				
Axelrod H	413	83	16	512
Fleisher A	409	120	29	558
Lafaro R	211	97	69	377
Moggio R	333	136	31	500
Sarabu M	436	162	46	644
Zias E	490	86	33	609
All Others	42	1	6	49
TOTAL	2334	685	230	3249
Winthrop Univ. Hosp.				
Hartman A	402	399	68	869
Kofsky E	597	160	27	784
Schubach S	592	206	27	825
Scott W	318	75	26	419
Williams L	59	15	4	78
All Others	62	12	8	82
TOTAL	2030	867	160	3057
STATE TOTAL	53220	18548	6699	78467

Criteria Used in Reporting Significant Risk Factors (2001)

Based on Documentation in Medical Record

Patient Risk Factor	Definitions
Hemodynamic State <ul style="list-style-type: none"> • Unstable • Shock 	<p>Determined just prior to or at the induction of anesthesia.</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>
Comorbidities <ul style="list-style-type: none"> • Renal Failure, Creatinine > 2.5 mg/dl • Renal Failure Requiring Dialysis 	<p>Pre-operative creatinine greater than 2.5 mg/dl.</p> <p>The patient is on chronic peritoneal or hemodialysis.</p>
Ventricular Function <ul style="list-style-type: none"> • Ejection Fraction 	<p>Value of the ejection fraction taken closest to the procedure. When a calculated measure is unavailable the ejection fraction should be estimated visually from the ventriculogram or by echocardiography. Intraoperative direct observation of the heart is not an adequate basis for a visual estimate of the ejection fraction</p>
Vessels Diseased <ul style="list-style-type: none"> • Left Main Diseased 	<p>The patient has at least a 50% blockage in their left main coronary artery.</p>
Previous Open Heart Operations	<p>Open heart surgery previous to the hospitalization. For the purpose of this reporting system, minimally invasive procedures are considered open heart surgery.</p>

MEDICAL TERMINOLOGY

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

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

angioplasty - also known as percutaneous transluminal coronary angioplasty (PTCA) or percutaneous coronary intervention (PCI). In this procedure, a balloon catheter is threaded up to the site of blockage in an artery in the heart, and is then inflated to push arterial plaque against the wall of the artery to create a wider channel in the artery.

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

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

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

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

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

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

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

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

incompetent valve- A valve that does not close tightly

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

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

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

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

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

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

stenotic valve- A valve that does not open fully

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

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

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

Appendix 1 1999-2001 Risk Factors For Isolated CABG In-Hospital Mortality

The significant pre-procedural risk factors for in-hospital mortality following isolated CABG in the 1999-2001 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 1.989. This means that a patient with COPD is approximately 1.989 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 6 hours; occurring 6-23 hours; occurring 1-7 days; occurring 8 to 20 days; occurring 21 days or more prior to the procedure; and no MI prior to the procedure. The last range, which does not appear in the table below, is referred to as the reference category. The odds ratios for the Previous MI ranges listed below are relative to patients who have not had a previous MI.

Ejection fraction, which is the percentage of blood in the heart's left ventricle that is expelled when it contracts (with more denoting a healthier heart), is subdivided into four ranges (< 20%, 20-29%, 30-39% and 40% or more). The last range, which does not appear in the Appendix 1 table, is referred to as the

reference category. This means that the odds ratios that appear for the other ejection fraction categories in the table are relative to patients with an ejection fraction of 40% or more. Thus, a patient with an ejection fraction of between 20% and 29% is about 2.011 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 1.054 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 0.622 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, 1999-2001.

Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
Demographic				
Age: Number of years greater than 60	—	0.0528	< .0001	1.054
Body Surface Area	—	-0.4742	0.0014	0.622
Female Gender	28.49	0.6270	< .0001	1.872
Hemodynamic State				
Unstable	1.10	1.2647	< .0001	3.542
Shock	0.42	2.1977	< .0001	9.004
Ventricular Function				
Ejection Fraction < 20 %	1.79	1.2574	< .0001	3.516
Ejection Fraction 20-29 %	6.82	0.6986	< .0001	2.011
Ejection Fraction 30-39 %	13.50	0.6260	< .0001	1.870
Previous MI < 6 hours	0.70	1.5484	< .0001	4.704
Previous MI 6-23 hours	0.87	1.1939	< .0001	3.300
Previous MI 1-7 days	15.92	0.8558	< .0001	2.353
Previous MI 8-20 days	6.63	0.7573	< .0001	2.133
Previous MI > 21 days	29.55	0.4821	< .0001	1.619
Comorbidities				
Cerebrovascular Disease	18.83	0.5747	< .0001	1.777
COPD	16.64	0.6878	< .0001	1.989
Diabetes	32.57	0.4637	< .0001	1.590
Extensively Calcified Ascending Aorta	5.24	0.7082	< .0001	2.030
Hepatic Failure	0.08	2.2264	< .0001	9.267
Malignant Ventricular Arrhythmia	1.57	0.8956	< .0001	2.449
Peripheral Vascular Disease	10.91	0.6623	< .0001	1.939
Renal Failure, Creatinine > 2.5 mg/dl	1.96	1.0482	< .0001	2.853
Renal Failure Requiring Dialysis	1.44	1.8280	< .0001	6.221
Stent Thrombosis	1.39	0.9861	< .0001	2.681
Previous Open Heart Operations	5.36	1.4161	< .0001	4.121
Left Main Diseased	25.53	0.4857	< .0001	1.625
Sum of Binary Risk Factors Squared	—	-0.0314	0.0002	0.969

Intercept = -5.0506

C Statistic = 0.796

Appendix 2 1999-2001 Risk Factors For Valve Surgery In-Hospital Mortality

The significant pre-procedural risk factors for in-hospital mortality following valve surgery in the 1999-2001 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 1.752. This means that a patient with COPD is approximately 1.752 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 1.966 times as likely to die in the hospital during or after surgery as a patient with aortic valve replacement surgery, all other significant risk factors being the same.

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

With regard to age, it is included in the model using two risk factors. All patients 50 years or younger have roughly the same odds of dying in the hospital if their other risk factors are identical. For patients between 51 and 70, the odds ratio roughly represents the number of times more likely a patient who is age 51 to 70 is to die in the hospital than another patient who is one year younger all other significant risk factors being the same. Thus, a patient undergoing valve surgery who is 63 years old has a chance of dying in the hospital that is approximately 1.040 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. For a patient aged 71 years and over, the chances of dying in the hospital is increased to 1.075 times the odds that a patient who is one year younger has of dying in the hospital, all other significant risk factors being the same. Thus, a patient undergoing valve surgery who is 83 years old has a chance of dying in the hospital that is approximately 1.075 times the chance that a 82 year old patient undergoing valve surgery has of dying in the hospital, all other risk factors being the same. The increased chance of dying is determined by multiplying the odd ratios for the two age variables from the table below: Age: Number of years greater than 50 (1.040) and Age: Number of years greater than 70 (1.034). This is done because a patient who is over 70 has both the increased chance of dying for being over age 50 and well as for being over as 70.

Appendix 2: Multivariable risk factor equation for valve surgery hospital deaths in NYS, 1999-2001.

Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
Demographic				
Age: Number of years greater than 50	—	0.0394	< .0001	1.040
Age: Number of years greater than 70	—	0.0332	0.0462	1.034
Type of Valve Surgery				
Aortic Valve Replacement	48.06	Valve Reference Group		
Mitral Valve Replacement	23.11	0.6762	< .0001	1.966
Mitral Valve Repair	13.20	-0.1926	0.3901	0.825
Multiple Valve Repair/Replacement	15.63	0.9713	< .0001	2.641
Hemodynamic State				
Unstable	1.23	1.5398	< .0001	4.664
Shock	0.50	2.1421	< .0001	8.517
Comorbidities				
Cerebrovascular Disease	12.87	0.4197	0.0004	1.521
COPD	17.35	0.5606	< .0001	1.752
Hepatic Failure	0.44	1.4385	0.0002	4.214
Malignant Ventricular Arrhythmia	1.07	1.0616	0.0002	2.891
Peripheral Vascular Disease	5.14	0.6495	< .0001	1.915
Renal Failure, Creatinine > 2.5 mg/dl	2.02	1.2354	< .0001	3.440
Renal Failure Requiring Dialysis	2.54	1.8092	< .0001	6.106
Previous Open Heart Operations	18.65	0.6257	< .0001	1.870

Intercept = -4.8916

C Statistic = 0.795

Appendix 3 1999-2001 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 1999-2001 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 1.559. This means that a patient with COPD is approximately 1.559 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 1.730 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 four ranges (< 20%, 20-29%, 30-39%, 40% 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 40% or more. Thus, a patient with an ejection fraction of between 20% and 29% is about 1.472 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.

Previous MI is subdivided into 4 groups (occurring less than 23 hours prior to the procedure, 1-7 days prior to the procedure, 8-14 days prior to the procedure, and no MI within 14 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 14 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 70 is to die in the hospital than another patient who is one year younger all other significant risk factors being the same. Thus, a patient undergoing valve and CABG surgery who is 72 years old has a chance of dying in the hospital that is approximately 1.070 times the chance that a 73 year-old patient undergoing valve and CABG surgery has of dying in the hospital, all other risk factors being the same. All patients age 70 or under have roughly the same odds of dying in the hospital if their risk factors are identical.

Appendix 3: Multivariable risk factor equation for valve and CABG surgery hospital deaths in NYS, 1999-2001.

Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
Demographic				
Age: Number of years greater than 70	—	0.0679	< .0001	1.070
Female Gender	40.35	0.4736	< .0001	1.606
Type of Valve (with CABG)				
Aortic Valve Replacement	55.59	Valve Reference Group		
Mitral Valve Replacement	19.41	0.5479	< .0001	1.730
Mitral Valve Repair	16.76	0.0261	0.8273	1.026
Multiple Valve Repair/Replacement	8.24	0.9138	< .0001	2.494
Ventricular Function				
Ejection Fraction < 20 %	3.44	0.9043	< .0001	2.470
Ejection Fraction 20-29 %	10.93	0.3868	0.0011	1.472
Ejection Fraction 30-39 %	16.98	0.2216	0.0299	1.248
Previous MI less than 23 hours	0.97	1.4153	< .0001	4.118
Previous MI 1 to 7 days	7.80	0.5018	< .0001	1.652
Previous MI 8 to 14 days	4.97	0.3463	0.0232	1.414
Hemodynamic State				
Unstable	2.12	0.6988	0.0003	2.011
Shock	1.27	1.2686	< .0001	3.556
Comorbidities				
COPD	21.57	0.4442	< .0001	1.559
Diabetes	27.24	0.3924	< .0001	1.480
Peripheral Vascular Disease	11.96	0.5174	< .0001	1.678
Renal Failure, Creatinine > 2.5 mg/dl	3.39	1.0154	< .0001	2.761
Renal Failure Requiring Dialysis	2.61	1.3819	< .0001	3.983
Previous Open Heart Operations	10.74	0.5604	< .0001	1.751
Intercept = -3.8629				
C Statistic = 0.749				

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

Staten Island
University-North
475 Seaview Avenue
Staten Island, New York 10305

Strong Memorial Hospital
601 Elmwood Avenue
Rochester, New York 14642

United Health Services
Wilson Hospital Division
33-57 Harrison Street
Johnson City, New York 13790
University Hospital at Stony Brook
SUNY Health Science Center at
Stony Brook
Stony Brook, New York 11794-8410

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

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

Vassar Brother's Hospital
45 Reade Place
Poughkeepsie, NY 12601

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

Westchester Medical Center
Grasslands Road
Valhalla, New York 10595

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

Additional copies of this report may be obtained through the
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or by writing to:

Cardiac
Box 2001
New York State Department of Health
Albany, New York 12220



State of New York
George E. Pataki, Governor

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