

**ADULT
CARDIAC
SURGERY**

in

New York State

2002 – 2004

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TABLE OF CONTENTS

- INTRODUCTION 7
- CORONARY ARTERY BYPASS GRAFT SURGERY (CABG) 8
- CARDIAC VALVE PROCEDURES 8
- THE HEALTH DEPARTMENT PROGRAM 9
- PATIENT POPULATION 9
- RISK ADJUSTMENT FOR ASSESSING PROVIDER PERFORMANCE 9
 - Data Collection, Data Validation and Identifying Deaths 9
 - Assessing Patient Risk 10
 - Predicting Patient Mortality Rates for Providers 10
 - Computing the Risk-Adjusted Rate 10
 - Interpreting the Risk-Adjusted Mortality Rate 11
 - How This Contributes to Quality Improvement 11
- RESULTS 12
 - 2004 Risk Factors for CABG Surgery 12
 - Table 1 Multivariable Risk Factor Equation for CABG In-Hospital/30-Day Deaths in New York State in 2004 13
 - 2004 HOSPITAL OUTCOMES FOR CABG SURGERY 14
 - 2002-2004 HOSPITAL OUTCOMES 14
 - Table 2 Observed, Expected and Risk-Adjusted Mortality Rates (RAMR) for Isolated CABG Surgery in New York State, 2004 Discharges 16
 - Table 3 Observed, Expected, and Risk-Adjusted Mortality Rates for Valve or Valve/CABG Surgery in New York State, 2002-2004 Discharges 17
 - Table 4 Volume for Valve Procedures in New York State, 2002-2004 Discharges 18
 - 2002 – 2004 Hospital and Surgeon Outcomes 19
 - Table 5 Observed, Expected, and Risk-Adjusted Mortality Rates by Surgeon for Isolated CABG And Valve Surgery (done in combination with or without CABG) in New York State, 2002-2004 Discharges 19
 - Table 6 Summary Information for Surgeons Practicing at More Than One Hospital, 2002-2004 28
- SURGEON AND HOSPITAL VOLUMES FOR TOTAL ADULT CARDIAC SURGERY, 2002-2004 32
 - Table 7 Surgeon and Hospital Volume for Isolated CABG, Valve or Valve/CABG, Other Cardiac Surgery, and Total Adult Cardiac Surgery, 2002-2004 32
- CRITERIA USED IN REPORTING SIGNIFICANT RISK FACTORS (2004) 41
- MEDICAL TERMINOLOGY 42

APPENDIX 1 2002-2004 RISK FACTORS FOR ISOLATED CABG IN-HOSPITAL MORTALITY 43

APPENDIX 2 2002-2004 RISK FACTORS FOR VALVE SURGERY IN-HOSPITAL MORTALITY 45

APPENDIX 3 2002-2004 RISK FACTORS FOR VALVE AND
CABG SURGERY IN-HOSPITAL MORTALITY 47

NEW YORK STATE CARDIAC SURGERY CENTERS 49

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 death following coronary artery bypass and heart valve surgery and lists hospital and physician-specific mortality rates which have been risk-adjusted to account for differences in patient severity of illness.

New York State 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. In addition, this year's report includes, for the first time, information on mortality outside the hospital but within 30 days following CABG. We believe this to be an important quality indicator that will provide useful information to patients and providers.

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 2004. 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 State 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 blockages, patients should continue to reduce their risk factors for heart disease.

CARDIAC VALVE PROCEDURES

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

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

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

The most common heart valve surgeries involve the aortic and mitral valves. Patients undergoing heart surgery are totally anesthetized and are usually placed on a heart-lung machine, whereby the heart is stopped for a short period of time using special drugs. As is the case for CABG surgery, there is a recovery period of several weeks at home after being discharged from the hospital. Some patients require replacement of more than one valve, and some patients with both coronary artery disease and valve disease require valve replacement and CABG surgery. This report contains outcomes for the following valve procedures when done alone or in combination with CABG: Aortic Valve Replacement, Mitral Valve Repair, Mitral Valve Replacement, and Multiple Valve Surgery.

THE HEALTH DEPARTMENT PROGRAM

The New York State Department of Health has been studying the effects of patient and treatment characteristics (called risk factors) on outcomes for patients with heart disease. Detailed statistical analyses of the information received from the study have been conducted under the guidance of the New York State Cardiac Advisory Committee (CAC), a group of independent practicing cardiac surgeons, cardiologists and other professionals in related fields.

The results have been used to create a cardiac profile system which assesses the performance of hospitals and surgeons over time, independent of the severity of individual patient's pre-operative conditions.

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

- understanding the health risks of patients 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 New York State residents 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 2004 are included in the one-year results for coronary artery bypass surgery. All patients, residing inside or outside New York State, undergoing isolated CABG and/or valve surgery who were discharged between January 1, 2002 and December 31, 2004 are included in the three-year results.

Isolated CABG surgery represented 62.04 percent of all adult cardiac surgery for the three-year period covered by this report. Valve or combined valve/CABG surgery represented 28.37 percent of all adult cardiac surgery for the same three year period. Total cardiac surgery, isolated CABG, valve or valve/CABG surgery, and other cardiac surgery volumes are tabulated in Table 7 by hospital and surgeon for the period 2002 through 2004.

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/30-Day 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 40 of these characteristics (called risk factors) are collected for each patient. Along with information about the procedure, physician and the patient's status at discharge, these data are entered into a computer, and sent to the Department of Health for analysis.

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

The analysis for the one-year CABG surgery results bases mortality on deaths occurring during the same hospital stay in which a patient underwent cardiac

surgery and on deaths that occur after discharge but within 30 days of surgery. All other analyses (i.e. three-year CABG, Valve, Combination and Physician-specific) are based on mortality during the same hospital stay in which the patient underwent cardiac surgery.

In this report, an in-hospital death is defined as a patient who died subsequent to CABG or valve surgery during the same admission, or was discharged to hospice care. Please note that in 2003 and 2004, patients who were still alive 30 days after discharge to hospice care are not considered mortalities. All other hospice discharges are counted as mortalities.

This is the first time that deaths after hospital discharge but within 30 days of surgery will be counted in the risk-adjusted mortality analyses for isolated CABG surgery in NYS. This is being done because hospital length of stay has been decreasing and in the opinion of the Cardiac Advisory Committee, most deaths that occur after hospital discharge but within 30 days of surgery are related to complications of surgery.

Please note that the three-year CABG surgery, valve surgery, and valve/CABG surgery results presented in this report are still all based on in-hospital mortality, not on in-hospital/30-day mortality. The reason for this is that the Department of Health does not have access to data on deaths outside of the hospital for all three of the years 2002-2004. We expect that all analyses in next year's report will be based on in-hospital/30-day mortality. Also, the 30-day mortality data available at this time is limited to NYS residents, so those are the only patients included in the 2004 isolated CABG analysis. It is expected that 30-day mortality data will be available for patients residing outside NYS for the next report.

Assessing Patient Risk

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

For example, an 80-year-old patient with a history of a previous stroke 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 death following CABG and/or valve surgery, and determining how to weight the significant risk factors to predict the chance each patient will have of dying, given his or her specific characteristics.

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

Predicting Patient Mortality Rates for Providers

The statistical methods used to predict mortality on the basis of the significant risk factors are tested to determine 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 (2.09% in-hospital/30-day mortality in 2004) to obtain the provider's risk-adjusted rate. For the three year period 2002-2004, the ratio is multiplied by 1.85% (in-hospital mortality rate) for isolated CABG patients or 6.04% (in-hospital mortality rate) for valve or valve/CABG patients.

Interpreting the Risk-Adjusted Mortality Rate

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

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

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

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

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

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

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 surgery, facilities have refined patient criteria, evaluated patients more closely for pre-operative risks and directed them to the appropriate surgeon. More importantly, many hospitals have identified medical care process problems that have led to less than optimal outcomes, and have altered those processes to achieve improved results.

RESULTS

2004 Risk Factors for CABG Surgery

The significant pre-operative risk factors for death in the hospital during the same admission as the surgery or after hospital discharge but within 30 days of surgery (in-hospital/30-day mortality) for coronary artery bypass surgery in 2004 are presented in Table 1.

Roughly speaking, the odds ratio for a risk factor represents the number of times more likely a patient with that risk factor is of dying in the hospital during or after CABG surgery or dying after discharge but within 30 days of the surgery than a patient without the risk factor, all other risk factors being the same. For example, the odds ratio for the risk factor COPD is 1.779. This means that a patient who has COPD prior to surgery is approximately 1.779 times as likely to die in the hospital or after discharge within 30 days of surgery as a patient who does not have COPD but who has the same other significant risk factors.

For some of the risk factors in the table, there are only two possibilities: having the risk factor or not having it (for example, a patient either has COPD or does not have COPD). Exceptions are: age – number of years greater than 70, hemodynamic state, ejection fraction (which is a measure of the heart's ability to pump blood), previous MI, and renal failure.

For age, the odds ratio roughly represents the number of times more likely a patient who is older than 70 is to die in the hospital or after discharge but within 30 days outside the hospital than a patient who is one year younger. Thus, a patient undergoing CABG

surgery who is 76 years old has a chance of dying that is approximately 1.103 times the chance that a patient 75 years old undergoing CABG has of in-hospital/30-day mortality.

The odds ratios for Hemodynamic State are relative to patients that are not hemodynamically unstable or in shock. So, for example, a patient that is unstable has odds of in-hospital/30-day mortality that are approximately 1.766 times the odds of a hemodynamically stable patient that has all the other significant risk factors the same.

The odds ratios for the categories for ejection fraction are relative to the reference category (40% and higher). Thus, patients with an ejection fraction of less than 20% have odds of in-hospital/30-day mortality that are 2.941 times the odds of a person with an ejection fraction of 40% or higher, all other risk factors being the same.

Previous MI is subdivided into three groups: occurring less than 1 day prior to surgery, occurring 1 day or more prior to surgery and no MI prior to surgery. The last group is referred to as the reference category. The odds ratios for the Previous MI categories are relative to patients who have not had an MI prior to the procedure.

Since renal failure is expressed in terms of renal failure with dialysis and elevated creatinine without dialysis, the odds ratios for all renal failure categories are relative to patients with no renal failure.

Table 1: Multivariable risk factor equation for CABG in-hospital/30-day deaths in New York State in 2004.

Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
Demographic				
Age: Number of years greater than 70	---	0.0982	<.0001	1.103
Female Gender	28.33	0.5170	<.0001	1.677
Hemodynamic State				
Hemodynamically Stable	97.32	---Reference---		1.000
Unstable	2.53	0.5684	0.0442	1.766
Shock	0.15	1.6679	0.0222	5.301
Ventricular Function				
Ejection Fraction				
Ejection Fraction \geq 40%	78.62	---Reference---		1.000
Ejection Fraction < 20%	1.90	1.0789	0.0002	2.941
Ejection Fraction 20-29 %	6.74	0.5981	0.0027	1.819
Ejection Fraction 30-39 %	12.74	0.3430	0.0414	1.409
Previous MI				
No Previous MI	51.30	---Reference---		1.000
Previous MI less than 1 day	2.15	0.9433	0.0039	2.568
Previous MI 1 day or more	46.55	0.3920	0.0050	1.480
Comorbidities				
COPD	17.41	0.5759	<.0001	1.779
Peripheral Vascular Disease	10.96	0.7960	<.0001	2.217
Renal Failure				
No Renal Failure	87.12	---Reference---		1.000
Renal Failure, Creatinine 1.6 - 2.0 mg/dl	7.15	0.7349	<.0001	2.085
Renal Failure, Creatinine 2.1 - 2.5 mg/dl	1.77	0.8083	0.0088	2.244
Renal Failure, Creatinine > 2.5 mg/dl	1.67	1.2398	<.0001	3.455
Renal Failure, Dialysis	2.29	1.9607	<.0001	7.104
Previous Open Heart Operations	4.04	0.9186	<.0001	2.506
Intercept = -5.4474				
C Statistic = 0.789				

2004 HOSPITAL OUTCOMES FOR CABG SURGERY

Table 2 presents the CABG surgery results for the 39 hospitals performing this operation in New York during the year 2004. The table contains, for each hospital, the number of isolated CABG operations (CABG operations with no other major heart surgery) for New York State residents discharged in 2004, the number of in-hospital/30-day deaths, the observed in-hospital/30-day mortality rate, the expected mortality rate based on the statistical model presented in Table 1, the risk-adjusted in-hospital/30-day mortality rate, and a 95% confidence interval for the risk-adjusted mortality rate.

As indicated in Table 2, the overall in-hospital/30-day mortality rate for the 12,988 CABG procedures performed on New York State residents at the 39 hospitals was 2.09%. Observed in-hospital/30-day mortality rates ranged from 0.00% to 3.63%. The range of expected mortality rates, which measure patient severity of illness, was 0.63% to 2.78%.

The risk-adjusted mortality rates, which are used to measure performance, ranged from 0.00% to 3.61%. One hospital (Weil Cornell–New York Presbyterian) had a risk-adjusted mortality rate that was significantly lower than the statewide rate. No hospitals had significantly higher risk-adjusted rates than the State.

Since the 2004 isolated CABG analysis is based on in-hospital/30-day mortality for New York State residents, the associated mortality rates cannot be compared directly to previous NYS publications or the 3-year analyses in this report which are all based on only in-hospital mortality.

The observed in-hospital mortality rate for 2004 isolated CABG discharges (not shown in Table 2) was 1.60% for all 13,591 patients and 1.61% for the 12,988 New York State residents included in Table 2.

2002 - 2004 HOSPITAL OUTCOMES

Table 3 presents the combined Valve Only and Valve/CABG surgery results for the 38 hospitals performing these operations in New York during the years 2002-2004. The table contains, for each hospital, the number of combined Valve Only and Valve/CABG operations resulting in 2002-2004 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 in-hospital mortality rate for the 20,309 combined Valve Only and Valve/CABG procedures performed at the 38 hospitals was 6.04%. Observed mortality rates ranged from 0.00% to 10.45%. The range of expected mortality rates, which measure patient severity of illness, was 2.71% to 8.04%.

The risk-adjusted mortality rates, which are used to measure performance, ranged from 0.00% to 9.57%. Three hospitals (Lenox Hill Hospital, Maimonides Medical Center and St. Elizabeth Medical Center) had risk-adjusted mortality rates that were significantly higher than the statewide rate. Three hospitals (St. Joseph's Hospital, St. Peter's Hospital and Vassar Brothers Medical Center) had significantly lower risk-adjusted rates than the State.

Table 4 presents valve procedures performed at the 38 cardiac surgery hospitals in New York during 2002-2004. The table contains, for each hospital, the number of valve operations (as defined by eight separate groups: Aortic Valve Replacements, Aortic Valve Repair or Replacements plus CABG, Mitral Valve Replacement, Mitral Valve Replacement plus CABG, Mitral Valve Repair, Mitral Valve Repair plus CABG, Multiple Valve Surgery, Multiple Valve Surgery plus CABG) resulting in 2002-2004 discharges. In addition to the hospital volumes, the rate of in-hospital death for the State (Statewide Mortality Rate) is given for each group. Unless otherwise specified, when the report refers to Valve or Valve/CABG procedures it is referring to the last column of Table 4.

Note on Hospitals Not Performing Cardiac Surgery During Entire 2002-2004 Period

Several hospitals began performing cardiac surgery during the 2002 - 2004 time period on which this report is based. These hospitals and the month of the first cardiac surgery are listed below. Mercy Hospital - January 2003; Mary Imogene Bassett Hospital - March 2003; New York Methodist Hospital - April 2004; Champlain Valley Physicians Hospital - November 2004.

DEFINITIONS OF KEY TERMS

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 1.85% for isolated CABG patients in 2002-2004 or 6.04% for Valve or Valve/CABG patients in 2002-2004).

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 In-Hospital/30-day Mortality Rates (RAMR) for Isolated CABG Surgery in New York State (NY residents only), 2004 Discharges (Listed Alphabetically by Hospital)

Hospital	Cases	Deaths	OMR	EMR	RAMR	95% CI for RAMR
Albany Medical Center	384	7	1.82	1.85	2.06	(0.83, 4.25)
Arnot-Ogden	118	2	1.69	2.18	1.63	(0.18, 5.88)
Bellevue	132	1	0.76	1.38	1.15	(0.01, 6.38)
Beth Israel	256	5	1.95	1.66	2.47	(0.80, 5.76)
Buffalo General	488	11	2.25	1.90	2.49	(1.24, 4.45)
Champlain Valley	1	0	0.00	0.63	0.00	(0.00,100.0)
Columbia Presbyterian-NYP	290	5	1.72	1.92	1.88	(0.60, 4.38)
Ellis Hospital	277	4	1.44	1.73	1.74	(0.47, 4.47)
Erie County	286	8	2.80	1.78	3.29	(1.42, 6.49)
LIJ Medical Center	307	4	1.30	2.78	0.98	(0.26, 2.51)
Lenox Hill	355	4	1.13	2.68	0.88	(0.24, 2.25)
Maimonides	579	21	3.63	2.45	3.10	(1.92, 4.74)
Mary Imogene Bassett Hosp.	81	1	1.23	1.94	1.33	(0.02, 7.41)
Mercy Hospital	224	7	3.13	1.85	3.53	(1.42, 7.28)
Millard Fillmore	251	6	2.39	1.70	2.95	(1.08, 6.43)
Montefiore - Einstein	212	7	3.30	1.91	3.61	(1.45, 7.44)
Montefiore - Moses	269	4	1.49	1.59	1.96	(0.53, 5.02)
Mount Sinai	257	6	2.33	2.00	2.45	(0.89, 5.32)
NYU Hospitals Center	155	4	2.58	1.96	2.75	(0.74, 7.05)
New York Hospital - Queens	223	7	3.14	2.04	3.22	(1.29, 6.64)
New York Methodist Hosp	89	2	2.25	1.43	3.29	(0.37,11.88)
North Shore	770	19	2.47	2.37	2.18	(1.31, 3.40)
Rochester General	595	15	2.52	2.67	1.98	(1.11, 3.26)
St. Elizabeth	297	10	3.37	2.20	3.21	(1.54, 5.90)
St. Francis	1188	23	1.94	2.00	2.03	(1.29, 3.05)
St. Josephs	558	8	1.43	2.01	1.50	(0.64, 2.95)
St. Lukes-Roosevelt	155	5	3.23	2.55	2.65	(0.86, 6.19)
St. Peters	459	6	1.31	1.59	1.72	(0.63, 3.75)
St. Vincents	217	2	0.92	2.20	0.88	(0.10, 3.16)
Staten Island Univ- North	488	10	2.05	2.14	2.01	(0.96, 3.69)
Strong Memorial	390	7	1.79	1.90	1.98	(0.79, 4.08)
United Health Services	288	4	1.39	2.32	1.26	(0.34, 3.22)
Univ. Hosp. - Stony Brook	426	12	2.82	1.69	3.49	(1.80, 6.10)
Univ. Hosp. - Upstate	295	10	3.39	2.28	3.12	(1.49, 5.73)
Univ. Hosp. of Brooklyn	115	2	1.74	1.87	1.94	(0.22, 7.02)
Vassar Brothers	169	3	1.78	2.15	1.73	(0.35, 5.05)
Weill Cornell-NYP	460	4	0.87	2.44	0.75 **	(0.20, 1.91)
Westchester Medical Center	503	10	1.99	1.96	2.12	(1.02, 3.90)
Winthrop Univ. Hosp.	381	6	1.57	2.64	1.25	(0.46, 2.72)
Total	12988	272	2.09	2.09	2.09	

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

Table 3: Observed, Expected, and Risk-Adjusted In-Hospital Mortality Rates for Valve or Valve/CABG Surgery in New York State, 2002-2004 Discharges.

Hospital	Cases	Deaths	OMR	EMR	RAMR	95% CI for RAMR
Albany Medical Center	510	21	4.12	5.61	4.43	(2.74, 6.77)
Arnot-Ogden	94	1	1.06	4.22	1.52	(0.02, 8.47)
Bellevue	140	6	4.29	2.71	9.53	(3.48,20.75)
Beth Israel	498	34	6.83	6.69	6.16	(4.27, 8.61)
Buffalo General	463	28	6.05	5.59	6.53	(4.34, 9.44)
Columbia Presbyterian-NYP	1263	56	4.43	4.82	5.56	(4.20, 7.22)
Ellis Hospital	414	14	3.38	4.56	4.47	(2.44, 7.51)
Erie County	224	9	4.02	4.89	4.96	(2.26, 9.41)
LIJ Medical Center	557	43	7.72	8.04	5.80	(4.19, 7.81)
Lenox Hill	839	69	8.22	5.61	8.84 *	(6.88,11.19)
Maimonides	582	58	9.97	6.97	8.63 *	(6.55,11.15)
Mary Imogene Bassett Hosp.	38	1	2.63	2.90	5.47	(0.07,30.44)
Mercy Hospital	67	7	10.45	7.25	8.70	(3.48,17.92)
Millard Fillmore	178	5	2.81	3.97	4.27	(1.38, 9.96)
Montefiore - Einstein	344	23	6.69	5.55	7.27	(4.61,10.91)
Montefiore - Moses	345	23	6.67	5.65	7.13	(4.52,10.69)
Mount Sinai	696	34	4.89	5.60	5.27	(3.65, 7.36)
NYU Hospitals Center	1560	101	6.47	5.30	7.38	(6.01, 8.97)
New York Hospital - Queens	192	5	2.60	4.35	3.62	(1.17, 8.44)
New York Methodist Hosp	17	0	0.00	2.78	0.00	(0.00,46.93)
North Shore	1310	104	7.94	7.66	6.26	(5.11, 7.58)
Rochester General	773	53	6.86	6.87	6.03	(4.51, 7.88)
St. Elizabeth	426	40	9.39	6.33	8.95 *	(6.39,12.19)
St. Francis	1893	96	5.07	6.13	5.00	(4.05, 6.10)
St. Josephs	782	27	3.45	6.86	3.04 **	(2.00, 4.42)
St. Lukes-Roosevelt	332	15	4.52	5.43	5.02	(2.81, 8.28)
St. Peters	726	25	3.44	5.94	3.50 **	(2.26, 5.16)
St. Vincents	277	25	9.03	6.20	8.79	(5.69,12.97)
Staten Island Univ- North	289	21	7.27	6.13	7.15	(4.43,10.93)
Strong Memorial	652	50	7.67	5.80	7.99	(5.93,10.53)
United Health Services	248	15	6.05	5.64	6.47	(3.62,10.68)
Univ. Hosp. - Stony Brook	402	31	7.71	6.25	7.45	(5.06,10.57)
Univ. Hosp. - Upstate	443	38	8.58	7.99	6.48	(4.59, 8.90)
Univ. Hosp. of Brooklyn	131	10	7.63	4.81	9.57	(4.58,17.60)
Vassar Brothers	307	6	1.95	5.70	2.07 **	(0.76, 4.50)
Weill Cornell-NYP	1231	56	4.55	5.22	5.26	(3.97, 6.83)
Westchester Medical Center	522	34	6.51	6.80	5.78	(4.00, 8.08)
Winthrop Univ. Hosp.	544	42	7.72	7.95	5.86	(4.23, 7.93)
Total	20309	1226	6.04	6.04	6.04	

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

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

Table 4: Hospital Volume for Valve Procedures in New York State, 2002-2004 Discharges

Hospital	Aortic Valve Replace Surgery	Aortic Valve and CABG	Mitral Valve Replace Surgery	Mitral Replace and CABG	Mitral Valve Repair Surgery	Mitral Repair and CABG	Multiple Valve Surgery	Multiple Valve and CABG	Total Valve or Valve/ CABG
Albany Medical Center	112	175	44	28	27	62	34	28	510
Arnot-Ogden	33	35	6	2	6	8	2	2	94
Bellevue	54	4	26	4	14	7	28	3	140
Beth Israel	75	102	66	57	38	55	73	32	498
Buffalo General	129	127	40	30	36	73	15	13	463
Columbia Presbyterian-NYP	351	227	123	72	230	105	123	32	1263
Ellis Hospital	111	129	36	21	58	38	13	8	414
Erie County	70	53	34	16	10	8	23	10	224
LIJ Medical Center	94	130	90	69	30	56	53	35	557
Lenox Hill	180	120	78	49	139	127	103	43	839
Maimonides	146	132	59	35	35	78	68	29	582
Mary Imogene Bassett Hosp.	12	15	4	3	1	1	1	1	38
Mercy Hospital	15	23	5	2	2	13	4	3	67
Millard Fillmore	49	78	11	11	9	15	3	2	178
Montefiore - Einstein	73	59	56	46	31	31	33	15	344
Montefiore - Moses	81	83	50	44	14	21	38	14	345
Mount Sinai	104	98	44	11	156	95	144	44	696
NYU Hospitals Center	515	155	158	29	454	85	144	20	1560
New York Hospital - Queens	58	42	38	12	13	10	14	5	192
New York Methodist Hospital	5	4	4	0	2	0	2	0	17
North Shore	385	294	184	110	73	90	118	56	1310
Rochester General	229	234	68	41	45	91	39	26	773
St. Elizabeth	81	129	30	21	25	66	37	37	426
St. Francis	533	529	178	127	112	140	179	95	1893
St. Josephs	222	230	64	71	50	48	54	43	782
St. Lukes-Roosevelt	52	70	50	17	43	43	34	23	332
St. Peters	189	205	65	54	46	78	49	40	726
St. Vincents	74	52	39	21	11	31	36	13	277
Staten Island Univ- North	53	100	40	50	14	14	11	7	289
Strong Memorial	193	143	72	40	68	51	61	24	652
United Health Services	74	93	29	17	8	9	11	7	248
Univ. Hosp. - Stony Brook	96	115	39	31	29	51	26	15	402
Univ. Hosp. - Upstate	90	104	38	27	40	69	50	25	443
Univ. Hosp. of Brooklyn	20	11	23	11	13	25	25	3	131
Vassar Brothers	61	63	39	35	20	56	21	12	307
Weill Cornell-NYP	360	243	171	92	105	62	136	62	1231
Westchester Medical Center	167	148	36	49	22	52	31	17	522
Winthrop Univ. Hosp.	128	164	47	56	22	75	33	19	544
Total	5274	4718	2184	1411	2051	1939	1869	863	20309
State-wide Mortality Rate (%)	3.32	5.15	5.45	12.69	1.46	8.82	9.15	15.99	6.04

2002 – 2004 HOSPITAL AND SURGEON OUTCOMES

Table 5 provides the number of Isolated CABG operations, number of CABG patients who died in the hospital, observed mortality rate, expected mortality rate, risk-adjusted mortality rate and the 95% confidence interval for the risk-adjusted mortality rate for isolated CABG patients in 2002-2004. 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 2002-2004 for each of the 39 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 met at least one of the following criteria: (a) performed 200 or more cardiac operations during 2002-2004, (b) performed at least one cardiac

operation in each of the years 2002-2004. A cardiac operation is defined as any reportable adult cardiac operation and may include cases not listed in Tables 5 or 6.

The results for surgeons not meeting either of the above criteria are grouped together and reported as “All Others” in the hospital in which the operations were performed. Surgeons who met the above criteria and who performed operations in more than one hospital during 2002-2004 are noted in Table 5 and listed under all hospitals in which they performed these operations.

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

Table 5: Observed, Expected, and Risk-Adjusted In-Hospital Mortality Rates by Surgeon for Isolated CABG and Valve Surgery (done in combination with or without CABG), in NYS, 2002 - 2004

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
STATEWIDE TOTAL	44403	821	1.85	1.85	1.85		64712	3.16
Albany Medical Center								
Britton L	398	3	0.75	1.41	0.99	(0.20, 2.90)	543	2.71
##Canavan T	73	0	0.00	1.29	0.00	(0.00, 7.22)	78	2.46
Canver C	160	4	2.50	2.29	2.02	(0.54, 5.16)	214	2.25
Devejian N	.	.	.	.	.	(. . .)	9	16.41
#Fuzesi L	21	0	0.00	2.13	0.00	(0.00,15.19)	28	0.00
#Kelley J	16	0	0.00	1.70	0.00	(0.00,24.95)	19	0.00
##Miller S	436	6	1.38	1.62	1.57	(0.57, 3.42)	571	1.84
#Sardella G	396	9	2.27	1.52	2.77	(1.26, 5.25)	520	3.03
All Others	83	3	3.61	1.38	4.84	(0.97,14.15)	111	6.84
Total	1583	25	1.58	1.59	1.84	(1.19, 2.71)	2093	2.71
Arnot-Ogden								
Curiale S V	160	2	1.25	1.40	1.65	(0.19, 5.97)	194	2.64
Nast E	246	2	0.81	1.82	0.82	(0.09, 2.98)	305	0.90
All Others	1	0	0.00	0.30	0.00	(0.00,100.0)	2	0.00
Total	407	4	0.98	1.65	1.10	(0.30, 2.82)	501	1.48

Table 5 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Bellevue								
#Ciuffo G B	2	0	0.00	1.56	0.00	(0.00,100.0)	3	0.00
#Grossi E	8	0	0.00	0.69	0.00	(0.00,100.0)	13	0.00
#Ribakove G	39	0	0.00	1.71	0.00	(0.00,10.16)	111	6.26
#Schwartz C F	97	1	1.03	0.86	2.20	(0.03,12.26)	123	2.10
#Zervos M	116	1	0.86	0.82	1.93	(0.03,10.76)	133	2.45
All Others	48	1	2.08	1.17	3.29	(0.04,18.29)	67	3.41
Total	310	3	0.97	1.00	1.78	(0.36, 5.21)	450	4.12
Beth Israel								
Geller C M	98	0	0.00	1.19	0.00	(0.00, 5.80)	125	2.58
Harris L	238	6	2.52	1.79	2.60	(0.95, 5.66)	291	3.85
Hoffman D	162	1	0.62	1.69	0.68	(0.01, 3.76)	188	2.88
Stelzer P	37	2	5.41	1.45	6.92	(0.78,24.97)	256	3.78
Tranbaugh R	449	8	1.78	1.48	2.22	(0.96, 4.38)	622	2.89
Total	984	17	1.73	1.56	2.05	(1.19, 3.28)	1482	3.31
Buffalo General								
##Aldridge J	1	0	0.00	1.33	0.00	(0.00,100.0)	1	0.00
##Ashraf M	14	0	0.00	0.89	0.00	(0.00,54.60)	14	0.00
##Brodman R	119	3	2.52	1.41	3.30	(0.66, 9.63)	164	6.20
Grosner G	741	7	0.94	1.73	1.01	(0.40, 2.08)	1118	2.52
#Karamanoukian H L	244	12	4.92	1.74	5.22 *	(2.69, 9.12)	255	9.14 *
#Lewin A	384	15	3.91	1.48	4.88 *	(2.73, 8.06)	388	8.17 *
##Raza S	199	6	3.02	1.66	3.36	(1.23, 7.32)	225	4.08
All Others	12	3	25.00	3.14	14.71 *	(2.96,42.98)	12	25.17 *
Total	1714	46	2.68	1.65	3.01 *	(2.20, 4.02)	2177	4.33 *
Champlain Valley								
#Bennett E	1	0	0.00	0.15	0.00	(0.00,100.0)	1	0.00
Total	1	0	0.00	0.15	0.00	(0.00,100.0)	1	0.00
Columbia Presbyterian-NYP								
Argenziano M	114	2	1.75	1.54	2.10	(0.24, 7.59)	196	3.50
#Chen J M	2	0	0.00	0.54	0.00	(0.00,100.0)	5	17.87
Esrig B	3	0	0.00	3.46	0.00	(0.00,65.32)	5	0.00
Mosca R S	1	0	0.00	0.32	0.00	(0.00,100.0)	11	0.00
Naka Y	227	5	2.20	2.07	1.97	(0.63, 4.59)	368	3.47
Oz M	451	2	0.44	1.44	0.57	(0.06, 2.05)	922	1.84 **
Quaegebeur J	.	.	.	.	.	(. , .)	8	0.00
Rose E	26	0	0.00	0.57	0.00	(0.00,45.58)	57	0.00
Smith C	380	6	1.58	1.15	2.54	(0.93, 5.54)	829	3.22
All Others	110	3	2.73	2.24	2.26	(0.45, 6.59)	176	3.87
Total	1314	18	1.37	1.53	1.66	(0.98, 2.62)	2577	2.89

Table 5 continued

	Isolated CABG					Isolated CABG, or Valve or Valve/CABG		
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Ellis Hospital								
Affi A	367	7	1.91	1.00	3.53	(1.41, 7.27)	448	6.20 *
##Canavan T	1	0	0.00	3.74	0.00	(0.00,100.0)	1	0.00
Depan H	312	6	1.92	1.80	1.98	(0.72, 4.30)	548	2.28
##Miller S	1	0	0.00	1.93	0.00	(0.00,100.0)	1	0.00
Reich H	347	2	0.58	1.41	0.76	(0.08, 2.73)	436	1.06 **
#Saifi J	2	0	0.00	0.61	0.00	(0.00,100.0)	3	0.00
#Singh C	21	0	0.00	1.39	0.00	(0.00,23.19)	28	0.00
All Others	4	0	0.00	2.51	0.00	(0.00,67.55)	4	0.00
Total	1055	15	1.42	1.39	1.90	(1.06, 3.13)	1469	2.74
Erie County								
##Aldridge J	7	0	0.00	1.18	0.00	(0.00,82.06)	11	0.00
##Ashraf M	37	0	0.00	1.69	0.00	(0.00,10.88)	50	2.97
Bell-Thomson J	444	6	1.35	1.57	1.59	(0.58, 3.46)	611	2.24
#Datta S	248	4	1.61	1.76	1.69	(0.46, 4.33)	265	3.07
#Jennings L	.	.	.	.	.	(. , .)	1	0.00
#Karamanoukian H L	.	.	.	.	.	(. , .)	1	0.00
##Raza S	60	2	3.33	1.84	3.35	(0.38,12.09)	80	5.37
All Others	3	0	0.00	2.73	0.00	(0.00,82.67)	4	17.08
Total	799	12	1.50	1.66	1.67	(0.86, 2.93)	1023	2.74
LIJ Medical Center								
Graver L	411	5	1.22	2.27	0.99	(0.32, 2.31)	764	2.98
Palazzo R	358	5	1.40	1.88	1.37	(0.44, 3.20)	520	2.35
#Vatsia S	1	0	0.00	2.26	0.00	(0.00,100.0)	1	0.00
All Others	116	1	0.86	1.79	0.89	(0.01, 4.97)	158	1.97
Total	886	11	1.24	2.05	1.12	(0.56, 2.00)	1443	2.71
Lenox Hill								
Fonger J D	62	2	3.23	2.05	2.91	(0.33,10.50)	83	6.88
Loulmet D F	21	0	0.00	1.24	0.00	(0.00,26.05)	236	1.81
McCabe J	20	0	0.00	0.96	0.00	(0.00,35.19)	27	9.82
Patel N C	234	2	0.85	1.82	0.87	(0.10, 3.13)	314	2.83
Patel N U	213	0	0.00	1.28	0.00	(0.00, 2.49)	247	3.89
##Reddy R C	83	0	0.00	1.66	0.00	(0.00, 4.91)	136	2.32
#Safavi A	6	0	0.00	0.67	0.00	(0.00,100.0)	9	0.00
Subramanian V	731	14	1.92	2.08	1.71	(0.93, 2.86)	968	4.39 *
All Others	200	4	2.00	1.88	1.97	(0.53, 5.03)	389	3.95
Total	1570	22	1.40	1.85	1.40	(0.88, 2.12)	2409	3.78

Table 5 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Maimonides								
Abrol S	186	2	1.08	2.88	0.69	(0.08, 2.50)	233	2.47
Acinapura A	27	0	0.00	1.05	0.00	(0.00,23.98)	36	3.49
##Anderson J	19	2	10.53	2.48	7.84	(0.88,28.30)	23	8.75
#Brevetti G R	7	0	0.00	2.12	0.00	(0.00,45.64)	11	0.00
Cunningham J N	192	8	4.17	1.61	4.80 *	(2.07, 9.45)	248	7.73 *
#Genovesi M H	72	8	11.11	2.71	7.58 *	(3.27,14.94)	84	9.56 *
#Jacobowitz I	665	22	3.31	2.55	2.40	(1.50, 3.63)	943	4.09
LaPunzina C S	5	0	0.00	0.68	0.00	(0.00,100.0)	5	0.00
##Reddy R C	1	0	0.00	0.84	0.00	(0.00,100.0)	1	0.00
#Sabado M	86	4	4.65	3.24	2.65	(0.71, 6.80)	124	4.88
Vaynblat M	281	4	1.42	2.03	1.30	(0.35, 3.32)	343	3.29
Zisbrod Z	281	6	2.14	2.12	1.86	(0.68, 4.05)	351	3.80
All Others	5	0	0.00	2.27	0.00	(0.00,59.78)	7	23.68
Total	1827	56	3.07	2.35	2.42	(1.83, 3.14)	2409	4.32 *
Mary Imogene Bassett Hosp.								
All Physicians	161	2	1.24	1.56	1.47	(0.17, 5.32)	199	2.63
Total	161	2	1.24	1.56	1.47	(0.17, 5.32)	199	2.63
Mercy Hospital								
Carlson R E	253	8	3.16	1.40	4.19	(1.80, 8.25)	276	6.14
Downing S W	278	6	2.16	2.06	1.93	(0.71, 4.21)	319	4.04
##Raza S	24	1	4.17	1.32	5.84	(0.08,32.48)	27	7.86
All Others	1	0	0.00	0.98	0.00	(0.00,100.0)	1	0.00
Total	556	15	2.70	1.73	2.89	(1.62, 4.77)	623	4.81
Millard Fillmore								
##Aldridge J	281	7	2.49	1.63	2.83	(1.13, 5.83)	317	4.06
##Ashraf M	588	6	1.02	1.34	1.41	(0.52, 3.08)	717	2.10
##Brodman R	49	1	2.04	1.65	2.29	(0.03,12.72)	54	5.99
#Datta S	6	0	0.00	1.10	0.00	(0.00,100.0)	6	0.00
#Jennings L	148	1	0.68	1.63	0.77	(0.01, 4.28)	154	1.25
#Lewin A	1	0	0.00	0.15	0.00	(0.00,100.0)	1	0.00
All Others	4	0	0.00	2.29	0.00	(0.00,74.12)	6	0.00
Total	1077	15	1.39	1.47	1.76	(0.98, 2.90)	1255	2.77
Montefiore - Einstein								
##Camacho M	1	0	0.00	2.74	0.00	(0.00,100.0)	9	0.00
#Frymus M	357	10	2.80	1.62	3.19	(1.53, 5.87)	466	5.88 *
#Garcia J P	9	1	11.11	5.58	3.68	(0.05,20.49)	21	7.43

Table 5 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Montefiore - Einstein, continued								
#Gold J	43	0	0.00	0.77	0.00	(0.00,20.57)	64	2.22
#Plestis K A	292	4	1.37	1.66	1.53	(0.41, 3.92)	486	2.42
Total	702	15	2.14	1.64	2.41	(1.35, 3.98)	1046	3.93
Montefiore - Moses								
Attai L	244	2	0.82	1.36	1.11	(0.13, 4.02)	340	3.10
##Camacho M	80	0	0.00	1.63	0.00	(0.00, 5.19)	107	1.33
Crooke G	10	0	0.00	0.71	0.00	(0.00,95.87)	15	0.00
#Frymus M	2	0	0.00	1.43	0.00	(0.00,100.0)	2	0.00
#Garcia J P	131	6	4.58	1.36	6.24 *	(2.28,13.59)	170	11.02 *
#Gold J	63	0	0.00	1.34	0.00	(0.00, 8.03)	91	1.44
Merav A	237	8	3.38	1.70	3.67	(1.58, 7.24)	344	4.23
#Plestis K A	108	1	0.93	1.63	1.05	(0.01, 5.85)	151	2.12
Total	875	17	1.94	1.50	2.39	(1.39, 3.83)	1220	3.88
Mount Sinai								
Adams DH	110	1	0.91	0.89	1.88	(0.02,10.48)	457	3.06
Aklog L	199	8	4.02	2.02	3.68	(1.58, 7.25)	275	5.90 *
Filsoufi F	106	1	0.94	1.13	1.55	(0.02, 8.61)	159	0.82
Galla J	26	0	0.00	2.03	0.00	(0.00,12.83)	48	0.00
Griep R	4	0	0.00	3.32	0.00	(0.00,51.08)	28	0.00
Lansman S	171	1	0.58	1.33	0.82	(0.01, 4.54)	251	3.03
Nguyen K	.	.	.	.	.	(. , .)	1	0.00
Spielvogel D	225	7	3.11	1.76	3.27	(1.31, 6.74)	318	3.18
Total	841	18	2.14	1.56	2.54	(1.51, 4.02)	1537	3.16
NYU Hospitals Center								
#Ciuffo G B	50	1	2.00	3.60	1.03	(0.01, 5.71)	98	2.29
Colvin S	42	0	0.00	1.28	0.00	(0.00,12.60)	759	3.92
Culliford A	239	7	2.93	2.01	2.69	(1.08, 5.54)	462	4.73 *
#Esposito R	59	2	3.39	1.64	3.82	(0.43,13.79)	92	5.72
Galloway A	130	5	3.85	1.69	4.21	(1.36, 9.82)	485	3.18
#Grossi E	55	5	9.09	3.77	4.45	(1.43,10.39)	104	7.60 *
#Ribakove G	129	3	2.33	2.18	1.97	(0.40, 5.76)	257	2.80
#Schwartz C F	14	0	0.00	2.13	0.00	(0.00,22.75)	21	3.35
#Zervos M	3	0	0.00	2.02	0.00	(0.00,100.0)	3	0.00
Total	721	23	3.19	2.16	2.73	(1.73, 4.10)	2281	4.00 *
New York Hospital - Queens								
Aronis M	225	3	1.33	1.40	1.76	(0.35, 5.14)	298	2.10
#Ko W	468	7	1.50	1.64	1.68	(0.67, 3.47)	563	2.87

Table 5 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
New York Hospital - Queens, continued								
##Mack CA	2	0	0.00	0.65	0.00	(0.00,100.0)	2	0.00
##Tortolani A	83	0	0.00	1.93	0.00	(0.00, 4.22)	98	0.00
All Others	23	1	4.35	1.45	5.56	(0.07,30.93)	32	5.13
Total	801	11	1.37	1.60	1.59	(0.79, 2.84)	993	2.39
New York Methodist Hospital								
#Lee L Y	18	0	0.00	1.36	0.00	(0.00,27.63)	21	0.00
##Mack CA	1	0	0.00	0.30	0.00	(0.00,100.0)	1	0.00
##Tortolani A	70	1	1.43	1.25	2.11	(0.03,11.73)	84	2.53
Total	89	1	1.12	1.26	1.64	(0.02, 9.14)	106	1.98
North Shore								
##Camacho M	133	7	5.26	1.95	5.00 *	(2.00,10.30)	192	8.31 *
#Esposito R	452	10	2.21	2.23	1.84	(0.88, 3.38)	645	2.34
Hall M	479	14	2.92	2.51	2.16	(1.18, 3.62)	720	3.17
#Hartman A	277	2	0.72	1.83	0.73	(0.08, 2.64)	621	2.87
Pogo G	495	13	2.63	1.87	2.60	(1.38, 4.44)	763	4.15
#Vatsia S	335	6	1.79	1.91	1.74	(0.63, 3.78)	479	3.04
All Others	127	1	0.79	1.52	0.96	(0.01, 5.33)	188	3.33
Total	2298	53	2.31	2.06	2.07	(1.55, 2.71)	3608	3.36
Rochester General								
Cheeran D	740	7	0.95	2.28	0.77 **	(0.31, 1.58)	1048	2.21
Green G R	393	9	2.29	2.22	1.91	(0.87, 3.62)	473	3.40
Kirshner R	658	18	2.74	2.44	2.07	(1.23, 3.28)	1041	3.24
#Knight P	.	.	.	.	.	(. , .)	2	9.49
Total	1791	34	1.90	2.33	1.51	(1.04, 2.11)	2564	2.90
St. Elizabeth								
#El Amir N	103	0	0.00	1.44	0.00	(0.00, 4.57)	152	4.39
Joyce F	365	12	3.29	1.71	3.56	(1.84, 6.23)	555	5.30 *
#Kelley J	371	10	2.70	2.16	2.31	(1.10, 4.24)	492	4.11
#Singh C	226	6	2.65	1.58	3.10	(1.13, 6.75)	278	5.07
All Others	52	2	3.85	1.55	4.57	(0.51,16.52)	66	4.23
Total	1117	30	2.69	1.80	2.76 *	(1.86, 3.94)	1543	4.70 *
St. Francis								
Bercow N	571	17	2.98	1.93	2.85	(1.66, 4.56)	783	3.38
Colangelo R	697	16	2.30	1.94	2.19	(1.25, 3.55)	931	2.94
Damus P	459	5	1.09	1.66	1.21	(0.39, 2.83)	857	2.82
Davison M J	250	8	3.20	2.04	2.89	(1.25, 5.70)	291	5.39

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. Francis, continued								
Durban L	25	0	0.00	1.31	0.00	(0.00,20.71)	37	6.29
Fernandez H A	385	11	2.86	2.20	2.40	(1.19, 4.29)	458	3.50
Lamendola C	588	12	2.04	1.96	1.93	(1.00, 3.37)	801	2.81
Robinson N	609	12	1.97	1.52	2.40	(1.24, 4.20)	893	3.58
Taylor J	653	12	1.84	1.88	1.80	(0.93, 3.15)	1079	2.27
Total	4237	93	2.19	1.87	2.17	(1.75, 2.66)	6130	3.06
St. Josephs								
Marvasti M	414	2	0.48	1.92	0.46 **	(0.05, 1.68)	650	0.59 **
Nazem A	519	4	0.77	2.17	0.66 **	(0.18, 1.68)	689	1.27 **
Rosenberg J	502	8	1.59	1.64	1.79	(0.77, 3.53)	807	2.57
Zhou Z	313	4	1.28	2.03	1.16	(0.31, 2.98)	384	1.90
Total	1748	18	1.03	1.94	0.98 **	(0.58, 1.55)	2530	1.63 **
St. Lukes-Roosevelt								
Derose J J	236	5	2.12	1.88	2.09	(0.67, 4.87)	368	3.20
#Safavi A	13	3	23.08	1.98	21.60 *	(4.34,63.10)	20	24.83 *
Swistel D	355	6	1.69	2.29	1.37	(0.50, 2.97)	546	2.14
All Others	3	0	0.00	1.67	0.00	(0.00,100.0)	5	0.00
Total	607	14	2.31	2.12	2.01	(1.10, 3.38)	939	2.97
St. Peters								
#Bennett E	278	1	0.36	1.49	0.44	(0.01, 2.48)	512	1.55 **
##Canavan T	376	2	0.53	1.43	0.69	(0.08, 2.48)	437	1.12
Dal Col R	459	5	1.09	1.10	1.83	(0.59, 4.26)	663	1.67
##Miller S	1	0	0.00	0.64	0.00	(0.00,100.0)	1	0.00
#Saifi J	433	3	0.69	1.81	0.71	(0.14, 2.07)	635	1.82 **
#Sardella G	73	1	1.37	1.98	1.28	(0.02, 7.11)	98	4.56
Total	1620	12	0.74	1.48	0.93 **	(0.48, 1.62)	2346	1.75 **
St. Vincents								
Lang S	377	6	1.59	1.98	1.49	(0.54, 3.24)	494	3.48
##Reddy R C	59	3	5.08	1.97	4.77	(0.96,13.95)	82	6.58
Shin Y T	370	6	1.62	2.36	1.27	(0.46, 2.76)	501	2.82
All Others	8	0	0.00	1.31	0.00	(0.00,64.67)	14	25.51 *
Total	814	15	1.84	2.15	1.59	(0.89, 2.62)	1091	3.65
Staten Island Univ- North								
McGinn J	1080	15	1.39	2.31	1.11 **	(0.62, 1.83)	1241	2.53
Molinaro P J	249	0	0.00	1.20	0.00	(0.00, 2.27)	326	2.21
Nabagiez J P	10	0	0.00	0.64	0.00	(0.00,100.0)	19	9.31
Rosell F M	223	1	0.45	1.03	0.80	(0.01, 4.48)	265	1.48
Total	1562	16	1.02	1.94	0.98 **	(0.56, 1.59)	1851	2.44

Table 5 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Strong Memorial								
#Alfieris G	3	0	0.00	1.42	0.00	(0.00,100.0)	4	0.00
Hicks G	342	4	1.17	1.81	1.20	(0.32, 3.06)	535	3.77
#Knight P	552	11	1.99	1.79	2.06	(1.03, 3.68)	929	3.99
Massey H	242	4	1.65	2.42	1.27	(0.34, 3.24)	323	2.66
All Others	1	0	0.00	0.74	0.00	(0.00,100.0)	1	0.00
Total	1140	19	1.67	1.93	1.60	(0.96, 2.50)	1792	3.65
United Health Services								
Quintos E	301	8	2.66	2.04	2.41	(1.04, 4.76)	356	3.56
Wong K	316	3	0.95	2.05	0.86	(0.17, 2.50)	408	2.18
Yousuf M	313	6	1.92	2.36	1.50	(0.55, 3.26)	414	3.26
Total	930	17	1.83	2.15	1.57	(0.91, 2.52)	1178	2.98
Univ. Hosp. - Stony Brook								
Bilfinger T	220	5	2.27	1.85	2.27	(0.73, 5.30)	269	3.30
Krukenkamp I	377	9	2.39	1.96	2.25	(1.03, 4.27)	543	3.84
McLarty A	180	4	2.22	1.88	2.18	(0.59, 5.59)	206	3.76
Seifert F	667	16	2.40	1.67	2.65	(1.51, 4.31)	820	4.54
All Others	37	1	2.70	1.95	2.57	(0.03,14.28)	45	3.23
Total	1481	35	2.36	1.81	2.42	(1.69, 3.37)	1883	4.02
Univ. Hosp. - Upstate								
#Alfieris G	2	0	0.00	2.35	0.00	(0.00,100.0)	9	0.00
#EL Amir N	69	2	2.90	2.35	2.28	(0.26, 8.24)	111	3.15
Fink GW	360	5	1.39	1.78	1.44	(0.46, 3.36)	490	2.35
Lutz C J	213	3	1.41	2.68	0.97	(0.20, 2.84)	310	2.33
Picone A	267	7	2.62	2.23	2.18	(0.87, 4.49)	404	4.15
All Others	93	3	3.23	3.81	1.56	(0.31, 4.57)	123	4.61
Total	1004	20	1.99	2.32	1.59	(0.97, 2.45)	1447	3.13
Univ. Hosp. of Brooklyn								
##Anderson J	16	1	6.25	1.87	6.16	(0.08,34.30)	23	2.76
#Brevetti G R	74	2	2.70	2.01	2.49	(0.28, 8.99)	110	4.31
Burack J H	77	3	3.90	1.72	4.18	(0.84,12.22)	95	7.20
#Genovesi M H	79	1	1.27	1.59	1.47	(0.02, 8.20)	89	6.40
#Jacobowitz I	3	0	0.00	1.09	0.00	(0.00,100.0)	5	0.00
Lowery R C	82	2	2.44	1.29	3.50	(0.39,12.64)	135	5.34
#Sabado M	5	0	0.00	2.63	0.00	(0.00,51.50)	10	0.00
All Others	7	1	14.29	0.69	38.28	(0.50,100.0)	7	65.50
Total	343	10	2.92	1.64	3.28	(1.57, 6.03)	474	5.30 *

Table 5 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Vassar Brothers								
Ciaburri D	249	0	0.00	2.12	0.00 **	(0.00, 1.29)	470	1.08 **
Zakow P	338	0	0.00	1.99	0.00 **	(0.00, 1.01)	424	0.00 **
Total	587	0	0.00	2.04	0.00 **	(0.00, 0.57)	894	0.64 **
Weill Cornell-NYP								
##Brodman R	69	1	1.45	1.46	1.84	(0.02,10.23)	86	1.37
#Chen J M	.	.	.	.	.	(. , .)	1	0.00
Girardi L	605	4	0.66	1.51	0.81	(0.22, 2.07)	974	1.66 **
Isom O	66	1	1.52	0.80	3.50	(0.05,19.50)	220	2.81
#Ko W	111	3	2.70	2.10	2.38	(0.48, 6.94)	173	4.71
Krieger K	441	8	1.81	1.63	2.06	(0.89, 4.06)	845	2.87
#Lee L Y	207	2	0.97	2.40	0.75	(0.08, 2.69)	290	2.77
##Mack CA	52	3	5.77	1.92	5.56	(1.12,16.25)	67	10.17 *
##Tortolani A	313	2	0.64	2.09	0.56	(0.06, 2.04)	439	1.97
All Others	5	1	20.00	3.54	10.45	(0.14,58.14)	5	17.88
Total	1869	25	1.34	1.76	1.41	(0.91, 2.08)	3100	2.64
Westchester Medical Center								
##Anderson J	3	0	0.00	0.19	0.00	(0.00,100.0)	4	0.00
Axelrod H	268	6	2.24	2.38	1.74	(0.64, 3.79)	318	2.85
Fleisher A	284	10	3.52	2.03	3.20	(1.53, 5.89)	361	5.15
#Fuzesi L	30	2	6.67	1.48	8.33	(0.94,30.08)	36	10.48
Moggio R	197	3	1.52	1.80	1.56	(0.31, 4.56)	281	4.27
Sarabu M	493	7	1.42	1.73	1.52	(0.61, 3.13)	664	2.16
Zias E	341	7	2.05	2.00	1.90	(0.76, 3.91)	432	2.73
All Others	97	2	2.06	1.49	2.56	(0.29, 9.25)	139	3.06
Total	1713	37	2.16	1.92	2.08	(1.46, 2.86)	2235	3.28
Winthrop Univ. Hosp.								
Blucher M L	170	6	3.53	1.91	3.42	(1.25, 7.45)	202	5.72
#Hartman A	63	1	1.59	2.61	1.13	(0.01, 6.27)	140	2.44
Kofsky E	377	15	3.98	2.26	3.25	(1.82, 5.36)	501	4.66
Kokotes W J	147	0	0.00	2.73	0.00 **	(0.00, 1.69)	209	1.05 **
Schubach S	381	3	0.79	1.72	0.84	(0.17, 2.47)	583	2.06
All Others	131	2	1.53	2.47	1.14	(0.13, 4.12)	178	2.52
Total	1269	27	2.13	2.15	1.83	(1.21, 2.67)	1813	3.10
Statewide Total	44403	821	1.85	1.85	1.85		64712	3.16

Table 6: Summary Information for Surgeons Practicing at More than One Hospital, 2002-2004

	Isolated CABG					Isolated CABG, or Valve or Valve/CABG		
	No of			EMR	RAMR	95% CI for RAMR	Cases	RAMR
	Cases	Deaths	OMR					
Aldridge J	289	7	2.42	1.62	2.77	(1.11, 5.71)	329	3.80
Buffalo General	1	0	0.00	1.33	0.00	(0.00,100.0)	1	0.00
Erie County	7	0	0.00	1.18	0.00	(0.00,82.06)	11	0.00
Millard Fillmore	281	7	2.49	1.63	2.83	(1.13, 5.83)	317	4.06
Alfieris G	5	0	0.00	1.79	0.00	(0.00,75.72)	13	0.00
Strong Memorial	3	0	0.00	1.42	0.00	(0.00,100.0)	4	0.00
Univ. Hosp. - Upstate	2	0	0.00	2.35	0.00	(0.00,100.0)	9	0.00
Anderson J	38	3	7.89	2.05	7.13	(1.43,20.85)	50	5.04
Maimonides	19	2	10.53	2.48	7.84	(0.88,28.30)	23	8.75
Univ. Hosp. of Brooklyn	16	1	6.25	1.87	6.16	(0.08,34.30)	23	2.76
Westchester Medical Ctr	3	0	0.00	0.19	0.00	(0.00,100.0)	4	0.00
Ashraf M	639	6	0.94	1.35	1.29	(0.47, 2.81)	781	2.15
Buffalo General	14	0	0.00	0.89	0.00	(0.00,54.60)	14	0.00
Erie County	37	0	0.00	1.69	0.00	(0.00,10.88)	50	2.97
Millard Fillmore	588	6	1.02	1.34	1.41	(0.52, 3.08)	717	2.10
Bennett E	279	1	0.36	1.49	0.44	(0.01, 2.47)	513	1.55 **
Champlain Valley	1	0	0.00	0.15	0.00	(0.00,100.0)	1	0.00
St. Peters	278	1	0.36	1.49	0.44	(0.01, 2.48)	512	1.55 **
Brevetti G R	81	2	2.47	2.02	2.26	(0.25, 8.17)	121	3.93
Maimonides	7	0	0.00	2.12	0.00	(0.00,45.64)	11	0.00
Univ. Hosp. of Brooklyn	74	2	2.70	2.01	2.49	(0.28, 8.99)	110	4.31
Brodman R	237	5	2.11	1.48	2.64	(0.85, 6.17)	304	4.68
Buffalo General	119	3	2.52	1.41	3.30	(0.66, 9.63)	164	6.20
Millard Fillmore	49	1	2.04	1.65	2.29	(0.03,12.72)	54	5.99
Weill Cornell-NYP	69	1	1.45	1.46	1.84	(0.02,10.23)	86	1.37
Camacho M	214	7	3.27	1.83	3.30	(1.32, 6.80)	308	6.19 *
Montefiore - Einstein	1	0	0.00	2.74	0.00	(0.00,100.0)	9	0.00
Montefiore - Moses	80	0	0.00	1.63	0.00	(0.00, 5.19)	107	1.33
North Shore	133	7	5.26	1.95	5.00 *	(2.00,10.30)	192	8.31 *
Canavan T	450	2	0.44	1.41	0.58	(0.07, 2.10)	516	1.29
Albany Medical Center	73	0	0.00	1.29	0.00	(0.00, 7.22)	78	2.46
Ellis Hospital	1	0	0.00	3.74	0.00	(0.00,100.0)	1	0.00
St. Peters	376	2	0.53	1.43	0.69	(0.08, 2.48)	437	1.12
Chen J M	2	0	0.00	0.54	0.00	(0.00,100.0)	6	16.75
Columbia Presbyterian-NYP	2	0	0.00	0.54	0.00	(0.00,100.0)	5	17.87
Weill Cornell-NYP	.	.	.	.	.	(. , .)	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
Ciuffo G B	52	1	1.92	3.53	1.01	(0.01, 5.61)	101	2.26
Bellevue	2	0	0.00	1.56	0.00	(0.00,100.0)	3	0.00
NYU Hospitals Center	50	1	2.00	3.60	1.03	(0.01, 5.71)	98	2.29
Datta S	254	4	1.57	1.75	1.67	(0.45, 4.27)	271	3.03
Erie County	248	4	1.61	1.76	1.69	(0.46, 4.33)	265	3.07
Millard Fillmore	6	0	0.00	1.10	0.00	(0.00,100.0)	6	0.00
El Amir N	172	2	1.16	1.81	1.19	(0.13, 4.30)	263	3.72
St. Elizabeth	103	0	0.00	1.44	0.00	(0.00, 4.57)	152	4.39
Univ. Hosp. - Upstate	69	2	2.90	2.35	2.28	(0.26, 8.24)	111	3.15
Esposito R	511	12	2.35	2.16	2.01	(1.04, 3.51)	737	2.70
NYU Hospitals Center	59	2	3.39	1.64	3.82	(0.43,13.79)	92	5.72
North Shore	452	10	2.21	2.23	1.84	(0.88, 3.38)	645	2.34
Frymus M	359	10	2.79	1.62	3.18	(1.52, 5.84)	468	5.86 *
Montefiore - Einstein	357	10	2.80	1.62	3.19	(1.53, 5.87)	466	5.88 *
Montefiore - Moses	2	0	0.00	1.43	0.00	(0.00,100.0)	2	0.00
Fuzesi L	51	2	3.92	1.75	4.15	(0.47,15.00)	64	4.88
Albany Medical Center	21	0	0.00	2.13	0.00	(0.00,15.19)	28	0.00
Westchester Medical Ctr	30	2	6.67	1.48	8.33	(0.94,30.08)	36	10.48
Garcia J P	140	7	5.00	1.63	5.68 *	(2.28,11.70)	191	10.25 *
Montefiore - Einstein	9	1	11.11	5.58	3.68	(0.05,20.49)	21	7.43
Montefiore - Moses	131	6	4.58	1.36	6.24 *	(2.28,13.59)	170	11.02 *
Genovesi M H	151	9	5.96	2.12	5.19 *	(2.37, 9.86)	173	8.30 *
Maimonides	72	8	11.11	2.71	7.58 *	(3.27,14.94)	84	9.56 *
Univ. Hosp. of Brooklyn	79	1	1.27	1.59	1.47	(0.02, 8.20)	89	6.40
Gold J	106	0	0.00	1.11	0.00	(0.00, 5.77)	155	1.75
Montefiore - Einstein	43	0	0.00	0.77	0.00	(0.00,20.57)	64	2.22
Montefiore - Moses	63	0	0.00	1.34	0.00	(0.00, 8.03)	91	1.44
Grossi E	63	5	7.94	3.38	4.34	(1.40,10.12)	117	7.46 *
Bellevue	8	0	0.00	0.69	0.00	(0.00,100.0)	13	0.00
NYU Hospitals Center	55	5	9.09	3.77	4.45	(1.43,10.39)	104	7.60 *
Hartman A	340	3	0.88	1.97	0.83	(0.17, 2.42)	761	2.76
North Shore	277	2	0.72	1.83	0.73	(0.08, 2.64)	621	2.87
Winthrop Univ. Hosp.	63	1	1.59	2.61	1.13	(0.01, 6.27)	140	2.44
Jacobowitz I	668	22	3.29	2.54	2.39	(1.50, 3.63)	948	4.08
Maimonides	665	22	3.31	2.55	2.40	(1.50, 3.63)	943	4.09
Univ. Hosp. of Brooklyn	3	0	0.00	1.09	0.00	(0.00,100.0)	5	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
Jennings L	148	1	0.68	1.63	0.77	(0.01, 4.28)	155	1.24
Erie County	.	.	.	.	.	(. , .)	1	0.00
Millard Fillmore	148	1	0.68	1.63	0.77	(0.01, 4.28)	154	1.25
Karamanoukian H L	244	12	4.92	1.74	5.22 *	(2.69, 9.12)	256	9.06 *
Buffalo General	244	12	4.92	1.74	5.22 *	(2.69, 9.12)	255	9.14 *
Erie County	.	.	.	.	.	(. , .)	1	0.00
Kelley J	387	10	2.58	2.14	2.23	(1.07, 4.10)	511	4.02
Albany Medical Center	16	0	0.00	1.70	0.00	(0.00,24.95)	19	0.00
St. Elizabeth	371	10	2.70	2.16	2.31	(1.10, 4.24)	492	4.11
Knight P	552	11	1.99	1.79	2.06	(1.03, 3.68)	931	4.10
Rochester General	.	.	.	.	.	(. , .)	2	9.49
Strong Memorial	552	11	1.99	1.79	2.06	(1.03, 3.68)	929	3.99
Ko W	579	10	1.73	1.73	1.84	(0.88, 3.39)	736	3.44
NY Hospital - Queens	468	7	1.50	1.64	1.68	(0.67, 3.47)	563	2.87
Weill Cornell-NYP	111	3	2.70	2.10	2.38	(0.48, 6.94)	173	4.71
Lee L Y	225	2	0.89	2.31	0.71	(0.08, 2.57)	311	2.69
NY Methodist Hospital	18	0	0.00	1.36	0.00	(0.00,27.63)	21	0.00
Weill Cornell-NYP	207	2	0.97	2.40	0.75	(0.08, 2.69)	290	2.77
Lewin A	385	15	3.90	1.48	4.88 *	(2.73, 8.05)	389	8.16 *
Buffalo General	384	15	3.91	1.48	4.88 *	(2.73, 8.06)	388	8.17 *
Millard Fillmore	1	0	0.00	0.15	0.00	(0.00,100.0)	1	0.00
Mack CA	55	3	5.45	1.84	5.47	(1.10,15.99)	70	10.09 *
NY Hospital - Queens	2	0	0.00	0.65	0.00	(0.00,100.0)	2	0.00
NY Methodist Hospital	1	0	0.00	0.30	0.00	(0.00,100.0)	1	0.00
Weill Cornell-NYP	52	3	5.77	1.92	5.56	(1.12,16.25)	67	10.17 *
Miller S	438	6	1.37	1.62	1.56	(0.57, 3.40)	573	1.83
Albany Medical Center	436	6	1.38	1.62	1.57	(0.57, 3.42)	571	1.84
Ellis Hospital	1	0	0.00	1.93	0.00	(0.00,100.0)	1	0.00
St. Peters	1	0	0.00	0.64	0.00	(0.00,100.0)	1	0.00
Plestis K A	400	5	1.25	1.65	1.40	(0.45, 3.27)	637	2.35
Montefiore - Einstein	292	4	1.37	1.66	1.53	(0.41, 3.92)	486	2.42
Montefiore - Moses	108	1	0.93	1.63	1.05	(0.01, 5.85)	151	2.12
Raza S	283	9	3.18	1.67	3.53	(1.61, 6.70)	332	4.64
Buffalo General	199	6	3.02	1.66	3.36	(1.23, 7.32)	225	4.08
Erie County	60	2	3.33	1.84	3.35	(0.38,12.09)	80	5.37
Mercy Hospital	24	1	4.17	1.32	5.84	(0.08,32.48)	27	7.86

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
Reddy R C	143	3	2.10	1.78	2.17	(0.44, 6.35)	219	3.79
Lenox Hill	83	0	0.00	1.66	0.00	(0.00, 4.91)	136	2.32
Maimonides	1	0	0.00	0.84	0.00	(0.00,100.0)	1	0.00
St. Vincents	59	3	5.08	1.97	4.77	(0.96,13.95)	82	6.58
Ribakove G	168	3	1.79	2.07	1.59	(0.32, 4.66)	368	3.53
Bellevue	39	0	0.00	1.71	0.00	(0.00,10.16)	111	6.26
NYU Hospitals Center	129	3	2.33	2.18	1.97	(0.40, 5.76)	257	2.80
Sabado M	91	4	4.40	3.21	2.53	(0.68, 6.49)	134	4.64
Maimonides	86	4	4.65	3.24	2.65	(0.71, 6.80)	124	4.88
Univ. Hosp. of Brooklyn	5	0	0.00	2.63	0.00	(0.00,51.50)	10	0.00
Safavi A	19	3	15.79	1.56	18.67 *	(3.75,54.56)	29	21.32 *
Lenox Hill	6	0	0.00	0.67	0.00	(0.00,100.0)	9	0.00
St. Lukes-Roosevelt	13	3	23.08	1.98	21.60 *	(4.34,63.10)	20	24.83 *
Saifi J	435	3	0.69	1.80	0.71	(0.14, 2.06)	638	1.81 **
Ellis Hospital	2	0	0.00	0.61	0.00	(0.00,100.0)	3	0.00
St. Peters	433	3	0.69	1.81	0.71	(0.14, 2.07)	635	1.82 **
Sardella G	469	10	2.13	1.59	2.48	(1.19, 4.56)	618	3.31
Albany Medical Center	396	9	2.27	1.52	2.77	(1.26, 5.25)	520	3.03
St. Peters	73	1	1.37	1.98	1.28	(0.02, 7.11)	98	4.56
Schwartz C F	111	1	0.90	1.02	1.63	(0.02, 9.05)	144	2.58
Bellevue	97	1	1.03	0.86	2.20	(0.03,12.26)	123	2.10
NYU Hospitals Center	14	0	0.00	2.13	0.00	(0.00,22.75)	21	3.35
Singh C	247	6	2.43	1.57	2.87	(1.05, 6.24)	306	4.64
Ellis Hospital	21	0	0.00	1.39	0.00	(0.00,23.19)	28	0.00
St. Elizabeth	226	6	2.65	1.58	3.10	(1.13, 6.75)	278	5.07
Tortolani A	466	3	0.64	1.94	0.61 **	(0.12, 1.79)	621	1.73
NY Hospital - Queens	83	0	0.00	1.93	0.00	(0.00, 4.22)	98	0.00
NY Methodist Hospital	70	1	1.43	1.25	2.11	(0.03,11.73)	84	2.53
Weill Cornell-NYP	313	2	0.64	2.09	0.56	(0.06, 2.04)	439	1.97
Vatsia S	336	6	1.79	1.91	1.73	(0.63, 3.77)	480	3.03
LIJ Medical Center	1	0	0.00	2.26	0.00	(0.00,100.0)	1	0.00
North Shore	335	6	1.79	1.91	1.74	(0.63, 3.78)	479	3.04
Zervos M	119	1	0.84	0.85	1.82	(0.02,10.11)	136	2.34
Bellevue	116	1	0.86	0.82	1.93	(0.03,10.76)	133	2.45
NYU Hospitals Center	3	0	0.00	2.02	0.00	(0.00,100.0)	3	0.00

SURGEON AND HOSPITAL VOLUMES FOR TOTAL ADULT CARDIAC SURGERY, 2002-2004

Table 7 presents, for each hospital and for each surgeon performing at least 200 cardiac operations in any hospital in 2002 – 2004 and/or performing one or more cardiac operations in each of the years 2002 – 2004, the total number of isolated CABG surgeries, the total number of Valve or Valve/CABG operations, the total number of other cardiac operations, and total cardiac operations. As in Table 5, results for surgeons not meeting the above criteria are grouped together in an “All Others” category.

Isolated CABG volumes include patients who undergo bypass of one or more of the coronary arteries with no other major heart surgery during the same admission.

Valve or Valve/CABG volumes include the total number of cases for the eight Valve or Valve/CABG groups that were identified in Table 4. Other cardiac surgery includes cardiac procedures not represented by isolated CABG or Valve or Valve/CABG operations and includes, but is not limited to: repairs of congenital conditions, heart transplants, aneurysm repairs, ventricular reconstruction, and ventricular assist device insertions. Total cardiac surgery is the sum of the previous three columns and includes any 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, 2002-2004

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Albany Medical Center				
Britton L	398	145	48	591
Canavan T	73	5	1	79
Canver C	160	54	59	273
Devejian N	0	9	28	37
Fuzesi L	21	7	1	29
Kelley J	16	3	8	27
Miller S	436	135	18	589
Sardella G	396	124	24	544
All Others	83	28	13	124
Total	1583	510	200	2293
Arnot-Ogden				
Curiale S V	160	34	5	199
Nast E	246	59	9	314
All Others	1	1	0	2
Total	407	94	14	515
Bellevue				
Ciuffo G B	2	1	1	4
Grossi E	8	5	1	14
Ribakove G	39	72	17	128
Schwartz C F	97	26	8	131

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Bellevue, continued				
Zervos M	116	17	24	157
All Others	48	19	12	79
Total	310	140	63	513
Beth Israel				
Geller C M	98	27	8	133
Harris L	238	53	3	294
Hoffman D	162	26	8	196
Stelzer P	37	219	163	419
Tranbaugh R	449	173	25	647
Total	984	498	207	1689
Buffalo General				
Aldridge J	1	0	0	1
Ashraf M	14	0	0	14
Brodman R	119	45	5	169
Grosner G	741	377	48	1166
Karamanoukian H L	244	11	19	274
Lewin A	384	4	7	395
Raza S	199	26	26	251
All Others	12	0	5	17
Total	1714	463	110	2287
Champlain Valley				
Bennett E	1	0	0	1
Total	1	0	0	1
Childrens - Buffalo				
All Physicians	0	0	1	1
Total	0	0	1	1
Columbia Presbyterian-NYP				
Argenziano M	114	82	111	307
Chen J M	2	3	24	29
Esrig B	3	2	11	16
Mosca R S	1	10	42	53
Naka Y	227	141	200	568
Oz M	451	471	105	1027
Quaegebeur J	0	8	76	84
Rose E	26	31	12	69
Smith C	380	449	147	976
All Others	110	66	179	355
Total	1314	1263	907	3484

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Ellis Hospital				
Afifi A	367	81	11	459
Canavan T	1	0	0	1
Depan H	312	236	60	608
Miller S	1	0	0	1
Reich H	347	89	7	443
Saifi J	2	1	1	4
Singh C	21	7	0	28
All Others	4	0	1	5
Total	1055	414	80	1549
Erie County				
Aldridge J	7	4	0	11
Ashraf M	37	13	1	51
Bell-Thomson J	444	167	53	664
Datta S	248	17	41	306
Jennings L	0	1	0	1
Karamanoukian H L	0	1	1	2
Raza S	60	20	11	91
All Others	3	1	2	6
Total	799	224	109	1132
LIJ Medical Center				
Graver L	411	353	83	847
Palazzo R	358	162	20	540
Vatsia S	1	0	5	6
All Others	116	42	33	191
Total	886	557	141	1584
Lenox Hill				
Fonger J D	62	21	4	87
Loulmet D F	21	215	30	266
McCabe J	20	7	7	34
Patel N C	234	80	17	331
Patel N U	213	34	5	252
Reddy R C	83	53	24	160
Safavi A	6	3	0	9
Subramanian V	731	237	58	1026
All Others	200	189	70	459
Total	1570	839	215	2624
Maimonides				
Abrol S	186	47	49	282
Acinapura A	27	9	2	38
Anderson J	19	4	4	27

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
<i>Maimonides, continued</i>				
Brevetti G R	7	4	1	12
Cunningham J N	192	56	18	266
Genovesi M H	72	12	5	89
Jacobowitz I	665	278	73	1016
LaPunzina C S	5	0	0	5
Reddy R C	1	0	0	1
Sabado M	86	38	12	136
Vaynblat M	281	62	16	359
Zisbrod Z	281	70	16	367
All Others	5	2	3	10
Total	1827	582	199	2608
Mary Imogene Bassett Hosp.				
All Physicians	161	38	9	208
Total	161	38	9	208
Mercy Hospital				
Carlson R E	253	23	10	286
Downing S W	278	41	34	353
Raza S	24	3	6	33
All Others	1	0	5	6
Total	556	67	55	678
Millard Fillmore				
Aldridge J	281	36	21	338
Ashraf M	588	129	19	736
Brodman R	49	5	1	55
Datta S	6	0	0	6
Jennings L	148	6	0	154
Lewin A	1	0	0	1
All Others	4	2	2	8
Total	1077	178	43	1298
Montefiore - Einstein				
Camacho M	1	8	0	9
Frymus M	357	109	24	490
Garcia J P	9	12	2	23
Gold J	43	21	7	71
Plestis K A	292	194	138	624
Total	702	344	171	1217
Montefiore - Moses				
Attai L	244	96	10	350
Camacho M	80	27	4	111
Crooke G	10	5	6	21

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Montefiore - Moses, continued				
Frymus M	2	0	1	3
Garcia J P	131	39	69	239
Gold J	63	28	14	105
Merav A	237	107	14	358
Plestis K A	108	43	18	169
Total	875	345	136	1356
Mount Sinai				
Adams DH	110	347	79	536
Aklog L	199	76	18	293
Filsoufi F	106	53	15	174
Galla J	26	22	44	92
Griep R	4	24	170	198
Lansman S	171	80	79	330
Nguyen K	0	1	18	19
Spielvogel D	225	93	221	539
All Others	0	0	10	10
Total	841	696	654	2191
NYU Hospitals Center				
Ciuffo G B	50	48	20	118
Colvin S	42	717	96	855
Culliford A	239	223	52	514
Esposito R	59	33	1	93
Galloway A	130	355	61	546
Grossi E	55	49	19	123
Ribakove G	129	128	41	298
Schwartz C F	14	7	9	30
Zervos M	3	0	2	5
All Others	0	0	2	2
Total	721	1560	303	2584
New York Hospital - Queens				
Aronis M	225	73	10	308
Ko W	468	95	50	613
Mack CA	2	0	0	2
Tortolani A	83	15	3	101
All Others	23	9	1	33
Total	801	192	64	1057
New York Methodist Hospital				
Lee L Y	18	3	7	28
Mack CA	1	0	0	1
Tortolani A	70	14	2	86
Total	89	17	9	115

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
North Shore				
Camacho M	133	59	12	204
Esposito R	452	193	24	669
Hall M	479	241	21	741
Hartman A	277	344	74	695
Pogo G	495	268	56	819
Vatsia S	335	144	41	520
All Others	127	61	19	207
Total	2298	1310	247	3855
Rochester General				
Cheeran D	740	308	82	1130
Green G R	393	80	36	509
Kirshner R	658	383	75	1116
Knight P	0	2	0	2
Total	1791	773	193	2757
St. Elizabeth				
El Amir N	103	49	13	165
Joyce F	365	190	26	581
Kelley J	371	121	37	529
Singh C	226	52	5	283
All Others	52	14	2	68
Total	1117	426	83	1626
St. Francis				
Bercow N	571	212	44	827
Colangelo R	697	234	16	947
Damus P	459	398	49	906
Davison M J	250	41	3	294
Durban L	25	12	6	43
Fernandez H A	385	73	11	469
Lamendola C	588	213	17	818
Robinson N	609	284	37	930
Taylor J	653	426	29	1108
Total	4237	1893	212	6342
St. Josephs				
Marvasti M	414	236	48	698
Nazem A	519	170	29	718
Rosenberg J	502	305	125	932
Zhou Z	313	71	13	397
All Others	0	0	1	1
Total	1748	782	216	2746

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
St. Lukes-Roosevelt				
Derose J J	236	132	56	424
Safavi A	13	7	2	22
Swistel D	355	191	39	585
All Others	3	2	1	6
Total	607	332	98	1037
St. Peters				
Bennett E	278	234	55	567
Canavan T	376	61	4	441
Dal Col R	459	204	31	694
Miller S	1	0	0	1
Saifi J	433	202	27	662
Sardella G	73	25	2	100
All Others	0	0	6	6
Total	1620	726	125	2471
St. Vincents				
Lang S	377	117	32	526
Reddy R C	59	23	7	89
Shin Y T	370	131	37	538
All Others	8	6	1	15
Total	814	277	77	1168
Staten Island Univ- North				
McGinn J	1080	161	21	1262
Molinaro P J	249	77	4	330
Nabagiez J P	10	9	2	21
Rosell F M	223	42	17	282
Total	1562	289	44	1895
Strong Memorial				
Alfieris G	3	1	37	41
Hicks G	342	193	65	600
Knight P	552	377	156	1085
Massey H	242	81	109	432
All Others	1	0	1	2
Total	1140	652	368	2160
United Health Services				
Quintos E	301	55	12	368
Wong K	316	92	23	431
Yousuf M	313	101	27	441
Total	930	248	62	1240

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Univ. Hosp. - Stony Brook				
Bilfinger T	220	49	26	295
Krukenkamp I	377	166	52	595
McLarty A	180	26	32	238
Seifert F	667	153	36	856
All Others	37	8	20	65
Total	1481	402	166	2049
Univ. Hosp. - Upstate				
Alfieris G	2	7	29	38
El Amir N	69	42	17	128
Fink GW	360	130	51	541
Lutz C J	213	97	31	341
Picone A	267	137	26	430
All Others	93	30	13	136
Total	1004	443	167	1614
Univ. Hosp. of Brooklyn				
Anderson J	16	7	5	28
Brevetti G R	74	36	8	118
Burack J H	77	18	6	101
Genovesi M H	79	10	2	91
Jacobowitz I	3	2	1	6
Lowery R C	82	53	9	144
Sabado M	5	5	1	11
All Others	7	0	0	7
Total	343	131	32	506
Vassar Brothers				
Ciaburri D	249	221	21	491
Zakow P	338	86	19	443
All Others	0	0	2	2
Total	587	307	42	936
Weill Cornell-NYP				
Brodman R	69	17	3	89
Chen J M	0	1	3	4
Girardi L	605	369	531	1505
Isom O	66	154	28	248
Ko W	111	62	10	183
Krieger K	441	404	29	874
Lee L Y	207	83	17	307
Mack CA	52	15	8	75
Tortolani A	313	126	15	454
All Others	5	0	13	18
Total	1869	1231	657	3757

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Westchester Medical Center				
Anderson J	3	1	2	6
Axelrod H	268	50	19	337
Fleisher A	284	77	52	413
Fuzesi L	30	6	29	65
Moggio R	197	84	21	302
Sarabu M	493	171	68	732
Zias E	341	91	67	499
All Others	97	42	48	187
Total	1713	522	306	2541
Winthrop Univ. Hosp.				
Blucher M L	170	32	10	212
Hartman A	63	77	7	147
Kofsky E	377	124	9	510
Kokotes W J	147	62	11	220
Schubach S	381	202	20	603
All Others	131	47	21	199
Total	1269	544	78	1891
Statewide Total	44403	20309	6863	71575

Criteria Used in Reporting Significant Risk Factors (2004)

Based on Documentation in Medical Records

Patient Risk Factor	Definitions
<p>Hemodynamic State</p> <ul style="list-style-type: none"> • Unstable • Shock 	<p>Determined just prior to surgery.</p> <p>Patient requires pharmacologic or mechanical support to maintain blood pressure or cardiac output.</p> <p>Acute hypotension (systolic blood pressure < 80 mmHg) or low cardiac index (< 2.0 liters/min/m²), despite pharmacologic or mechanical support.</p>
<p>Comorbidities</p> <ul style="list-style-type: none"> • COPD • Peripheral Vascular Disease • Renal Failure, Creatinine • Renal Failure Requiring Dialysis 	<p>Patients who require chronic (longer than three months) bronchodilator therapy to avoid disability from obstructive airway disease, have forced expiratory volume in one second of less than 75% of the predicted value or less than 1.25 liters, or have a room air pO₂ <60 or a pCO₂ >50.</p> <p>Angiographic demonstration of at least 50% narrowing in a major Aortoiliac or Femoral/Popliteal vessel, previous surgery for such disease, absent femoral or pedal pulses, or the inability to insert a catheter or intra-aortic balloon due to iliac aneurysm or obstruction of the aortiliac or femoral arteries.</p> <p>Highest pre-operative creatinine during the hospital admission was in the indicated range.</p> <p>The patient is on chronic peritoneal or hemodialysis.</p>
<p>Ventricular Function</p> <ul style="list-style-type: none"> • Ejection Fraction • Previous MI, less than 1 day • Previous MI, 1 day or more 	<p>Value of the ejection fraction taken closest to the procedure. When a calculated measure is unavailable the ejection fraction should be estimated visually from the ventriculogram or by echocardiography. Intraoperative direct observation of the heart is not an adequate basis for a visual estimate of the ejection fraction. If no ejection fraction is reported, the ejection fraction is considered “normal” for purposes of analysis and is classified with the reference category.</p> <p>One or more myocardial infarctions (MI) less than 1 day before surgery.</p> <p>One or more myocardial infarctions (MI) 1 or more days before surgery.</p>
<p>Previous Open Heart Operations</p>	<p>Open heart surgery previous to the hospitalization. For the purpose of this reporting system, minimally invasive procedures are considered open heart surgery.</p>

MEDICAL TERMINOLOGY

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

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

angioplasty - also known as percutaneous transluminal coronary angioplasty (PTCA) or percutaneous coronary intervention (PCI). In this procedure, a balloon catheter is threaded up to the site of blockage in an artery in the heart, and is then inflated to push arterial plaque against the wall of the artery to create a wider channel in the artery. Other procedures or devices are frequently used in conjunction with or in place of the balloon catheter to remove plaque. In particular, stents are used for most patients, and devices such as rotoblators and ultrasound are sometimes used.

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

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

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

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

cardiac catheterization - also known as coronary angiography - a procedure for diagnosing the condition of the heart and the arteries connecting to it. A thin tube threaded through an artery to the heart releases a

dye, which allows doctors to observe blockages with an X-ray camera. This procedure is generally required before coronary bypass surgery.

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

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

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

incompetent valve- a valve that does not close tightly

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

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

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

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

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

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

stenotic valve- a valve that does not open fully

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

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

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

Appendix 1 2002-2004 Risk Factors For Isolated CABG In-Hospital Mortality

The significant pre-procedural risk factors for in-hospital mortality following isolated CABG in the 2002-2004 time period are presented in the table that follows.

Roughly speaking, the odds ratio for a risk factor represents the number of times more likely a patient with that risk factor is of dying in the hospital during or after CABG than a patient without the risk factor, all other risk factors being the same. For example, the odds ratio for the risk factor COPD is 1.971. This means that a patient with COPD is approximately 1.971 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, hemodynamic state, ejection fraction, previous MI and renal failure, there are only two possibilities – having the risk factor or not having it. For example, a patient either has COPD or does not have it. Hemodynamic state is interpreted in the same manner as described for Table 1. Since renal failure is expressed in terms of renal failure with dialysis and without dialysis, the odds ratios are relative to patients with no renal failure.

Previous MI is subdivided into 4 groups: occurring less than 6 hours prior to surgery; occurring 6-23 hours prior to surgery; occurring 1-14 days prior to surgery; and no MI within 14 days prior to the procedure. The last range is referred to as the reference category. The odds ratios for the Previous MI ranges listed below are relative to patients who have not had a previous MI

within 14 days prior to the procedure.

Ejection fraction, which is the percentage of blood in the heart's left ventricle that is expelled when it contracts (with more denoting a healthier heart), is subdivided into four ranges (<20%, 20-29%, 30-39% and 40% or more). The last range 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 between 20% and 29% is about 2.750 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 55 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 1.068 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 55 or under have roughly the same odds of dying in the hospital if their risk factors are identical.

The sum of binary risk factors squared is merely the square of the number of risk factors in Appendix 1 that a patient has (except age) and is used to improve the ability of the model to predict mortality.

Appendix 1: Multivariable risk factor equation for isolated CABG in-hospital deaths in NYS, 2002-2004.

Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
Demographic				
Age: Number of years greater than 55	—	0.0655	<.0001	1.068
Female Gender	28.28	0.7539	<.0001	2.125
Hemodynamic State				
Hemodynamically Stable	98.09	---Reference---		1.000
Unstable	1.57	1.0959	<.0001	2.992
Shock	0.34	2.4827	<.0001	11.973
Ventricular Function				
Ejection Fraction				
Ejection Fraction \geq 40%	78.24	---Reference---		1.000
Ejection Fraction < 20 %	1.98	1.4659	<.0001	4.332
Ejection Fraction 20-29 %	6.91	1.0117	<.0001	2.750
Ejection Fraction 30-39 %	12.87	0.6198	<.0001	1.859
Previous MI				
No Previous MI within 14 days	76.27	---Reference---		1.000
Previous MI < 6 hours	0.75	1.7706	<.0001	5.875
Previous MI 6 - 23 hours	1.08	0.9251	0.0004	2.522
Previous MI 1 - 14 days	21.90	0.7141	<.0001	2.042
Comorbidities				
Cerebrovascular Disease	18.68	0.5484	<.0001	1.730
COPD	17.15	0.6783	<.0001	1.971
Diabetes	35.12	0.4439	<.0001	1.559
Extensively Calcified Ascending Aorta	5.50	0.6369	<.0001	1.891
Peripheral Vascular Disease	10.92	0.8651	<.0001	2.375
Renal Failure				
No Renal Failure	96.22	---Reference---		1.000
Renal Failure, Creatinine > 2.5 mg/dl	1.93	1.0871	<.0001	2.966
Renal Failure Requiring Dialysis	1.85	1.8985	<.0001	6.676
Previous Open Heart Operations	4.52	1.3663	<.0001	3.921
Sum of Binary Risk Factors Squared	—	-0.0356	0.0022	0.965

Intercept = -6.4728

C Statistic = 0.815

Appendix 2 2002-2004 Risk Factors For Valve Surgery In-Hospital Mortality

The significant pre-procedural risk factors for in-hospital mortality following valve surgery in the 2002-2004 time period are presented in the table that follows.

Roughly speaking, the odds ratio for a risk factor represents the number of times more likely a patient with that risk factor is of dying in the hospital during or after valve 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 1.865. This means that a patient with COPD is approximately 1.865 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 1.662 times as likely to die in the hospital during or after surgery as a patient with aortic valve replacement surgery, all other significant risk factors being the same.

For all other risk factors in the table except age, hemodynamic state and renal failure there are only two possibilities – having the risk factor or not having it. For example, a patient either has COPD or does not have it. Hemodynamic state and renal failure are interpreted in the same way as previously described.

The interpretation for age is similar to that described in Appendix 1. In this case, the odds ratio for age roughly represents the number of times more likely a patient who is over age 60 is to die in the hospital than another patient who is one year younger with all the other significant risk factors the same.

Appendix 2: Multivariable risk factor equation for valve surgery in-hospital deaths in NYS, 2002-2004.

Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
Demographic				
Age: Number of years greater than 60	—	0.0611	<.0001	1.063
Type of Valve Surgery				
Aortic Valve Replacement	46.35	----Reference----		1.000
Mitral Valve Replacement	19.19	0.5079	<.0001	1.662
Mitral Valve Repair	18.03	-0.2231	0.2779	0.800
Multiple Valve Repair/Replacement	16.43	1.0172	<.0001	2.766
Hemodynamic State				
Hemodynamically Stable	98.56	----Reference----		1.000
Unstable	1.14	1.2667	<.0001	3.549
Shock	0.30	2.0491	<.0001	7.761
Comorbidities				
COPD	17.86	0.6233	<.0001	1.865
Diabetes	16.15	0.4593	<.0001	1.583
Endocarditis	5.41	0.9642	<.0001	2.623
Extensively Calcified Ascending Aorta	5.64	0.6572	<.0001	1.929
Renal Failure				
No Renal Failure	94.82	----Reference----		1.000
Renal Failure, Creatinine > 2.5 mg/dl	2.34	0.9253	<.0001	2.523
Renal Failure Requiring Dialysis	2.84	1.4746	<.0001	4.369
Previous Open Heart Operations	18.70	0.6708	<.0001	1.956
Intercept = -4.8736				
C Statistic = 0.802				

Appendix 3 2002-2004 Risk Factors For Valve and CABG Surgery In-Hospital Mortality

The significant pre-procedural risk factors for in-hospital mortality following valve and CABG surgery in the 2002-2004 time period are presented in the table that follows.

Roughly speaking, the odds ratio for a risk factor represents the number of times more likely a patient with that risk factor is of dying in the hospital during or after valve and CABG surgery than a patient without the risk factor, all other risk factors being the same. For example, the odds ratio for the risk factor Cerebrovascular Disease is 1.336. This means that a patient with Cerebrovascular Disease is approximately 1.336 times as likely to die in the hospital during or after undergoing valve and CABG surgery as a patient without Cerebrovascular Disease who has the same other significant risk factors.

The odds ratio for type of valve with CABG surgery represents the number of times more likely a patient with a specific valve with CABG surgery has of dying in the hospital during or after that particular surgery than a patient who has had aortic valve repair or replacement and CABG surgery, all other risk factors being the same. For example, a patient who has a mitral valve replacement and CABG surgery is 2.378 times as likely to die in the hospital during or after surgery as a patient with aortic valve repair or replacement and CABG surgery, all other significant risk factors being the same.

For all other risk factors in the table except age, body surface area, renal failure, hemodynamic state, and

previous MI, there are only two possibilities – having the risk factor or not having it. For example, a patient either has Cerebrovascular Disease or does not have it. The risk factors for renal failure and hemodynamic state are interpreted in the same manner as in Appendix 1.

The interpretation for age is similar to that described in Appendix 1. In this case, the odds ratio for age roughly represents the number of times more likely a patient who is over age 65 is to die in the hospital than another patient who is one year younger with all the other significant risk factors the same.

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 0.326 times the odds for someone with a body surface area one unit smaller, all other risk factors being the same.

Previous MI is subdivided into five groups (occurring less than 6 hours prior to the procedure, 6-23 hours prior to the procedure, 1-20 days prior to the procedure, 21 or more days prior to the procedure, and no MI prior to the procedure). The last range is referred to as the reference category. The odds ratios for the Previous MI ranges listed are relative to patients who have not had an MI prior to the procedure.

Appendix 3: Multivariable risk factor equation for valve and CABG surgery in-hospital deaths in NYS, 2002-2004.

Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
Demographic				
Age: Number of years greater than 65	—	0.0545	<.0001	1.056
Body surface area		-1.1207	<.0001	0.326
Type of Valve (with CABG)				
Aortic Valve Repair/Replacement	52.83	----Reference----		1.000
Mitral Valve Replacement	15.80	0.8663	<.0001	2.378
Mitral Valve Repair	21.71	0.6416	<.0001	1.899
Multiple Valve Repair/Replacement	9.66	1.2048	<.0001	3.336
Ventricular Function				
No Previous MI	60.58	----Reference----		1.000
Previous MI < 6 hours	0.47	1.4899	0.0002	4.436
Previous MI 6 - 23 hours	0.69	1.2353	0.0002	3.439
Previous MI 1 - 20 days	15.04	0.5057	<.0001	1.658
Previous MI 21 days or more	23.22	0.2853	0.0044	1.330
Hemodynamic State				
Hemodynamically Stable	96.94	----Reference----		1.000
Unstable	2.30	0.4790	0.0183	1.615
Shock	0.76	1.7680	<.0001	5.859
Comorbidities				
Cerebrovascular Disease	22.26	0.2898	0.0013	1.336
COPD	23.70	0.3091	0.0006	1.362
Diabetes	29.74	0.3555	<.0001	1.427
Endocarditis	1.25	0.7480	0.0042	2.113
Extensively Calcified Ascending Aorta	9.89	0.5325	<.0001	1.703
Renal Failure				
No Renal Failure	94.36	----Reference----		1.000
Renal Failure, Creatinine > 2.5 mg/dl	2.83	0.4977	0.0080	1.645
Renal Failure Requiring Dialysis	2.81	1.0886	<.0001	2.970
Previous Open Heart Operations	8.97	0.8707	<.0001	2.388
Intercept = -2.0786				
C Statistic = 0.755				

NEW YORK STATE CARDIAC SURGERY CENTERS

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

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

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

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

Buffalo General Hospital
100 High Street
Buffalo, New York 14203

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

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

Ellis Hospital
1101 Nott Street
Schenectady, New York 12308

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

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

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

Maimonides Medical Center
4802 Tenth Avenue
Brooklyn, New York 11219

Mary Imogene Bassett Healthcare
Atwell Road
Cooperstown, NY 13326

Mercy Hospital
565 Abbot Road
Buffalo, New York 14220

Millard Fillmore Hospital
3 Gates Circle
Buffalo, New York 14209

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

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

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

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

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

New York Methodist Hospital
506 Sixth Street
Brooklyn, NY 11215

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

Rochester General Hospital
1425 Portland Avenue
Rochester, New York 14621

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

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

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

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

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

SVCMC - St. Vincent's Manhattan
Center of NY
153 West 11th Street
New York, New York 10011

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

Strong Memorial Hospital
601 Elmwood Avenue
Rochester, New York 14642

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

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

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

University Hospital SUNY Health
Sciences Center
750 East Adams Street
Syracuse, New York 13210

Vassar Brother's Medical Center
45 Reade Place
Poughkeepsie, NY 12601

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

Westchester Medical Center
Grasslands Road
Valhalla, New York 10595

Winthrop University Hospital
259 First Street
Mineola, New York 11501

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George E. Pataki, Governor

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