

**ADULT
CARDIAC
SURGERY**

**in
New York State**

2003 – 2005

Members of the New York State Cardiac Advisory Committee

Chair

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Executive Director of Academic Affairs
St. Joseph's Health System
Atlanta, GA

Vice Chair

Gary Walford, M.D.
Director, Cardiac Catheterization Laboratory
St. Joseph's Hospital
Syracuse, NY

Members

George Alfieris, M.D.
Associate Professor of Surgery
Strong Memorial Hospital
Chief of Pediatric Cardiopulmonary Surgery
SUNY-Upstate Medical University
Rochester and Syracuse, NY

Frederick Bierman, M.D.
Director of Pediatric Cardiology
North Shore-LIJ Health System
New Hyde Park, NY

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Professor of Clinical Surgery
NYU Medical Center
New York, NY

Michael H. Gewitz, M.D.
Chief, Pediatric Cardiology
Westchester Medical Center
Director of Pediatrics
New York Medical College
Valhalla, NY

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Dean of the College of Medicine
The University of Toledo, Toledo, OH

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Public Health Consultant

Robert Higgins, M.D.
Mary & John Bent Chairman
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Rush University
Chicago, IL

David R. Holmes Jr., M.D.
Professor of Medicine
Director, Cardiac Catheterization Laboratory
Mayo Clinic, Rochester, MN

Robert Jones, M.D.
Mary & Deryl Hart Professor of Surgery
Duke University Medical Center, Durham, NC

Stanley Katz, M.D.
Chief, Division of Cardiology
North Shore - LIJ Health System
Manhasset, NY

Thomas J. Kulik, M.D.
Director, Pediatric Cardiology
Cincinnati Children's Hospital Medical Center
Cincinnati, OH

John J. Lamberti, Jr., M.D.
Director, Pediatric Cardiac Surgery
Children's Hospital of San Diego
San Diego, CA

Tia Powell, M.D.
Executive Director, New York State
Task Force on Life and the Law
New York State Department of Health
New York, NY

Samin K. Sharma, M.D.
Director, Cardiac Catheterization Laboratory
Mt. Sinai Hospital, New York, NY

Craig Smith, M.D.
Chief, Division of Cardiothoracic Surgery
New York Presbyterian Hospital - Columbia
New York, NY

Deborah Whalen, R.N.C.S., M.B.A., A.N.P.
Clinical Service Manager
Division of Cardiology
Boston Medical Center
Boston, MA

Roberta Williams, M.D.
Vice President for Pediatrics and
Academic Affairs at Childrens Hospital - LA
Professor and Chair of Pediatrics at
Keck School of Medicine at USC
Los Angeles, CA

Consultant

Edward L. Hannan, Ph.D.
Distinguished Professor
Department of Health Policy,
Management & Behavior
Associate Dean for Research
University at Albany, School of Public Health

Program Administrator

Paula M. Waselauskas, R.N., M.S.N.
Cardiac Services Program
NYS Department of Health

Cardiac Surgery Reporting System Subcommittee

Members & Consultants

Robert Jones, M.D. (*Chair*)

Mary & Deryl Hart Professor of Surgery
Duke University Medical Center

George Alfieris, M.D.

Associate Professor of Surgery
Strong Memorial Hospital
Chief of Pediatric Cardiopulmonary Surgery
SUNY-Health Science Center

Alfred T. Culliford, M.D.

Professor of Clinical Surgery
NYU Medical Center

Jeffrey P. Gold, M.D.

Provost and Executive VP for Health Affairs
Dean of the College of Medicine
The University of Toledo

Edward L. Hannan, Ph.D.

Distinguished Professor
Department of Health Policy,
Management & Behavior
Associate Dean for Research
University at Albany, School of Public Health

Robert Higgins, M.D.

Mary & John Bent Chairman
Professor of Surgery
Rush University

Craig Smith, M.D.

Chief, Division of Cardiothoracic Surgery
New York Presbyterian Hospital - Columbia

Staff to CSRS Analysis Workgroup

Paula M. Waselauskas, R.N., M.S.N.

Administrator, Cardiac Services Program
New York State Department of Health

Kimberly S. Cozzens, M.A.

Cardiac Initiatives Research Manager
Cardiac Services Program

Karen C. Keller-Ullrich, RN

Clinical Investigator
Cardiac Services Program

Rosemary Lombardo, M.S.

CSRS Coordinator
Cardiac Services Program

Michael J. Racz, Ph.D.

Research Scientist
Department of Health Policy,
Management & Behavior
University at Albany, School of Public Health
Cardiac Services Program
New York State Department of Health

Chuntao Wu, M.D., Ph.D.

Research Scientist
Cardiac Services Program

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INTRODUCTION

The information contained in this booklet is intended for health care providers, patients and families of patients who are considering cardiac surgery. It provides data on risk factors associated with 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 15 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 report includes information on mortality outside the hospital but within 30 days following surgery. 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 2005. 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 adult 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 2005 are included in the one-year results for coronary artery bypass surgery. Since 30-day follow-up data for patients residing outside New York State is not available beyond December 31, 2005, non-NYS residents undergoing surgery during December 2005 are excluded from all analyses in this report. This accounts for 89 cases. All patients, residing inside or outside New York State, undergoing isolated CABG and/or valve surgery who were discharged between January 1, 2003 and

December 31, 2005 are included in the three-year results, except those non-NYS residents with surgery in December 2005.

Isolated CABG surgery represented 59.48% of all adult cardiac surgery for the three-year period covered by this report. Valve or combined valve/CABG surgery represented 30.38% 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 2003 through 2005.

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 analyses in this report base 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.

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.

In addition, deaths that occur after hospital discharge but within 30 days of surgery are counted in the risk-adjusted mortality analyses. This is 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.

Data on deaths occurring after discharge from the hospital are made available by the National Center for Health Statistics. More information on this data source can be obtained from <http://www.cdc.gov/nchs/ndi.htm>.

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 of 2.07% (in-hospital/30-day mortality in 2005) to obtain the provider's risk-adjusted rate. For the three year period 2003-2005, the ratio is multiplied by 2.14% (in-hospital/30-day mortality rate) for isolated CABG patients or 6.26% (in-hospital/30-day 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

2005 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 2005 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 1.829. This means that a patient who has COPD prior to surgery is approximately 1.829 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 60, 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 60 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 66 years old has a chance of dying that is approximately 1.078 times the chance that a patient 65 years old undergoing CABG has of in-hospital/30-

day mortality. All patients age 60 and younger have roughly the same odds of dying in the hospital or after discharge but within 30 days if their other risk factors are identical.

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 2.642 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 4.519 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 four groups: occurring less than 6 hours prior to surgery, 6 to 23 hours prior, 1 to 7 days prior, and no MI within 7 days 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 within 7 days 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 dialysis and no creatinine greater than 2.0 mg/dl prior to surgery.

Table 1: Multivariable risk factor equation for CABG in-hospital/30-day deaths in New York State in 2005.

Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
Demographic				
Age: Number of years greater than 60	—	0.0749	<.0001	1.078
Female Gender	27.55	0.5935	<.0001	1.810
Hemodynamic State				
Hemodynamically Stable	98.66	----Reference----		1.000
Unstable	1.08	0.9716	0.0035	2.642
Shock	0.26	1.9027	0.0001	6.704
Ventricular Function				
Ejection Fraction				
Ejection Fraction > 40%	79.39	----Reference----		1.000
Ejection Fraction < 20%	2.03	1.5083	<.0001	4.519
Ejection Fraction 20-39%	18.58	0.6938	<.0001	2.001
Previous MI				
No Previous MI within 7 days	81.67	----Reference----		1.000
Previous MI less than 6 hours	0.97	1.1799	0.0047	3.254
Previous MI 6 – 23 hours	1.42	1.1714	0.0006	3.227
Previous MI 1 – 7 days	15.94	0.4403	0.0057	1.553
Comorbidities				
COPD	17.63	0.6039	<.0001	1.829
Diabetes Requiring Medication	35.26	0.4441	0.0011	1.559
Extensive Aortic Atherosclerosis	7.01	0.7480	<.0001	2.113
Renal Failure				
No Renal Failure	94.73	----Reference----		1.000
Renal Failure, Creatinine > 2.0 mg/dl	3.25	0.6508	0.0127	1.917
Renal Failure, Dialysis	2.02	1.8869	<.0001	6.599
Previous Open Heart Operations	3.58	0.9626	<.0001	2.618
Intercept = -5.9230				
C Statistic = 0.814				

2005 HOSPITAL OUTCOMES FOR CABG SURGERY

Table 2 and Figure 1 present the CABG surgery results for the 39 hospitals performing this operation in New York during the year 2005. The table contains, for each hospital, the number of isolated CABG operations (CABG operations with no other major heart surgery) for patients discharged in 2005, 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 12,146 CABG procedures performed at the 39 hospitals was 2.07%. Observed in-hospital/30-day mortality rates ranged from 0.00% to 4.62%. The range of expected mortality rates, which measure patient severity of illness, was 0.97% to 2.97%.

The risk-adjusted mortality rates, which are used to measure performance, ranged from 0.00% to 5.34%. One hospital (University Hospital-SUNY Upstate) had a risk-adjusted mortality rate that was significantly

higher than the statewide rate. No hospitals had risk-adjusted mortality rates that were significantly lower than the statewide rate.

The 2005 in-hospital/30-day mortality rate of 2.07% for isolated CABG is slightly less than the 2.09% reported for 2004. Prior to 2004, the analyses were based on only in-hospital mortality.

The observed in-hospital mortality rate for 2005 isolated CABG discharges (not shown in Table 2) was 1.56% for all 12,146 patients included in the analysis.

Figures 1 and 2 provide a visual representation of the data displayed in Tables 2 and 3. For each hospital, the black dot represents the risk-adjusted mortality rate (RAMR) and the gray bar represents the confidence interval, or potential statistical error, for the RAMR. The black vertical line is the New York State in-hospital/30-day mortality rate. For any hospital where the gray bar crosses the state average line, the RAMR is not statistically different from the state as a whole. Hospitals that are statistical outliers will have gray bars (confidence intervals) that are either entirely above or entirely below the line for the statewide rate.

2003 - 2005 HOSPITAL OUTCOMES FOR VALVE SURGERY

Table 3 and Figure 2 present the combined Valve Only and Valve/CABG surgery results for the 39 hospitals performing these operations in New York during the years 2003-2005. The table contains, for each hospital, the number of combined Valve Only and Valve/CABG operations resulting in 2003-2005 discharges, the number of in-hospital/30-day 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/30-day mortality rate for the 20,627 combined Valve Only and Valve/CABG procedures performed at the 39 hospitals was 6.26%. Observed mortality rates ranged from 2.77% to 16.67%. The range of expected mortality rates, which measure patient severity of illness, was 2.07% to 9.10%.

The risk-adjusted mortality rates, which are used to measure performance, ranged from 3.26% to 50.47%. Three hospitals (Maimonides Medical Center, St.

Elizabeth Medical Center and University Hospital of Brooklyn) had risk-adjusted mortality rates that were significantly higher than the statewide rate. Three hospitals (Albany Medical Center, St. Joseph's Hospital and Vassar Brothers Medical Center) had significantly lower risk-adjusted rates than the State.

Table 4 presents valve procedures performed at the 39 cardiac surgery hospitals in New York during 2003-2005. 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 2003-2005 discharges. In addition to the hospital volumes, the rate of in-hospital/30-day 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.

Since the 2003-2005 valve surgery analysis is based on in-hospital/30-day mortality, the associated mortality rates cannot be compared directly to previous NYS publications. The observed in-hospital mortality rate for 2003-2005 valve surgeries (not shown in Table 3) is 5.59% for the 20,627 patients included in this analysis.

Note on Hospitals Not Performing Cardiac Surgery During Entire 2003-2005 Period

Several hospitals began performing cardiac surgery during the 2003 - 2005 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 Immogene 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 2.14% for isolated CABG patients in 2003-2005 or 6.26% for Valve or Valve/CABG patients in 2003-2005).

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, 2005 Discharges (Listed Alphabetically by Hospital)

Hospital	Cases	Deaths	OMR	EMR	RAMR	95% CI for RAMR
Albany Medical Center	467	6	1.28	1.74	1.53	(0.56, 3.33)
Arnot Ogden Med Ctr	88	2	2.27	2.18	2.16	(0.24, 7.81)
Bellevue Hospital Ctr	104	1	0.96	1.32	1.52	(0.02, 8.44)
Beth Israel Med Ctr	300	6	2.00	2.04	2.03	(0.74, 4.42)
Buffalo General Hosp	418	11	2.63	1.76	3.11	(1.55, 5.56)
Champ.Valley Phys Hosp	86	1	1.16	0.97	2.49	(0.03,13.87)
Ellis Hospital	289	5	1.73	1.57	2.29	(0.74, 5.34)
Erie County Med Ctr	228	7	3.07	2.02	3.16	(1.26, 6.50)
LIJ Medical Center	223	2	0.90	2.43	0.77	(0.09, 2.77)
Lenox Hill Hospital	454	9	1.98	2.07	1.98	(0.90, 3.76)
M. I. Bassett Hospital	70	0	0.00	1.49	0.00	(0.00, 7.31)
Maimonides Medical Ctr	402	11	2.74	2.17	2.62	(1.30, 4.68)
Mercy Hospital	219	5	2.28	2.27	2.08	(0.67, 4.86)
Millard Fillmore Hosp	307	6	1.95	1.83	2.21	(0.81, 4.82)
Montefiore - Einstein	119	2	1.68	1.65	2.12	(0.24, 7.64)
Montefiore - Moses	266	7	2.63	1.87	2.92	(1.17, 6.03)
Mount Sinai Hospital	348	5	1.44	1.93	1.55	(0.50, 3.61)
NY Hospital - Queens	225	6	2.67	2.33	2.38	(0.87, 5.18)
NY Methodist Hospital	124	1	0.81	1.93	0.87	(0.01, 4.83)
NYP- Columbia Presby.	393	9	2.29	1.47	3.23	(1.48, 6.14)
NYP- Weill Cornell	410	9	2.20	2.12	2.15	(0.98, 4.08)
NYU Hospitals Center	154	6	3.90	2.48	3.27	(1.19, 7.11)
North Shore Univ Hosp	683	15	2.20	2.29	1.99	(1.11, 3.28)
Rochester General Hosp	514	10	1.95	2.97	1.36	(0.65, 2.50)
SVCMC- St. Vincents	231	2	0.87	2.22	0.81	(0.09, 2.93)
St. Elizabeth Med Ctr	266	5	1.88	1.90	2.05	(0.66, 4.79)
St. Francis Hospital	1006	16	1.59	1.87	1.76	(1.01, 2.86)
St. Josephs Hospital	493	8	1.62	2.10	1.60	(0.69, 3.16)
St. Lukes at St. Lukes	166	3	1.81	2.94	1.28	(0.26, 3.73)
St. Peters Hospital	399	8	2.01	1.77	2.35	(1.01, 4.64)
Staten Island Univ Hosp	480	11	2.29	2.38	2.00	(1.00, 3.58)
Strong Memorial Hosp	371	4	1.08	2.11	1.06	(0.29, 2.72)
United Health Services	242	8	3.31	2.50	2.74	(1.18, 5.41)
Univ.Hosp-Brooklyn	73	2	2.74	1.39	4.10	(0.46,14.79)
Univ.Hosp-SUNY Upstate	238	11	4.62	1.79	5.34 *	(2.66, 9.56)
Univ.Hosp-Stony Brook	336	8	2.38	1.91	2.59	(1.11, 5.09)
Vassar Bros. Med Ctr	198	4	2.02	1.93	2.18	(0.59, 5.57)
Westchester Med Ctr	409	12	2.93	2.56	2.38	(1.23, 4.15)
Winthrop Univ. Hosp	347	8	2.31	2.58	1.86	(0.80, 3.66)
Statewide Total	12146	252	2.07	2.07	2.07	

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

Figure 1: In-Hospital/30-Day Risk-Adjusted Mortality Rates for Isolated CABG in New York State, 2005 Discharges

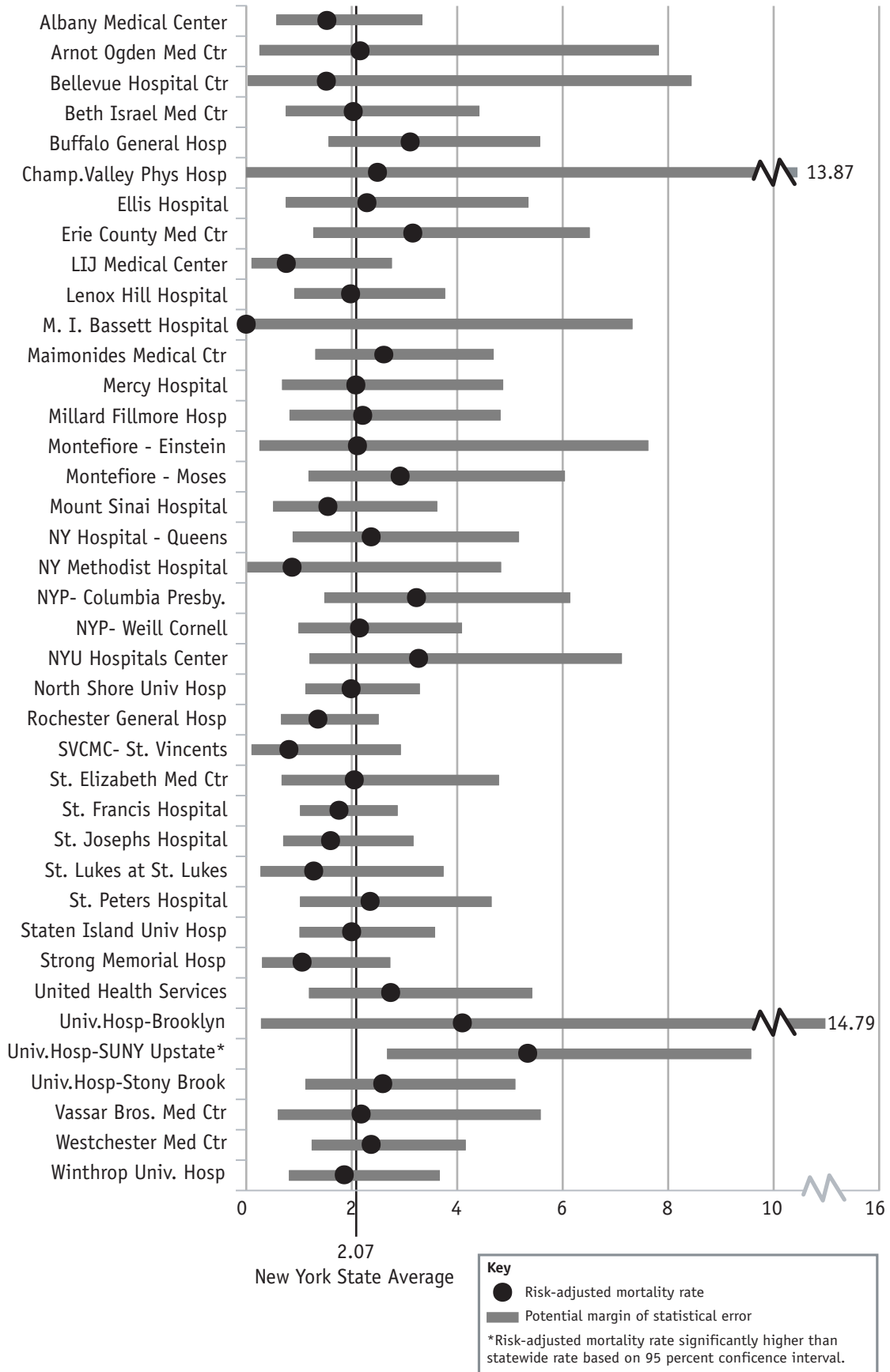


Table 3: Observed, Expected, and Risk-Adjusted In-Hospital/30-Day Mortality Rates for Valve or Valve/CABG Surgery in New York State, 2003-2005 Discharges.

Hospital	Cases	Deaths	OMR	EMR	RAMR	95% CI for RAMR
Albany Medical Center	505	14	2.77	5.33	3.26 **	(1.78, 5.47)
Arnot Ogden Med Ctr	93	3	3.23	4.54	4.45	(0.89,13.01)
Bellevue Hospital Ctr	157	9	5.73	3.26	11.00	(5.02,20.89)
Beth Israel Med Ctr	497	33	6.64	7.07	5.88	(4.05, 8.26)
Buffalo General Hosp	464	19	4.09	5.27	4.87	(2.93, 7.60)
Champ.Valley Phys Hosp	6	1	16.67	2.07	50.47	(0.66,100.0)
Ellis Hospital	397	15	3.78	5.08	4.66	(2.60, 7.68)
Erie County Med Ctr	255	13	5.10	5.16	6.19	(3.29,10.58)
LIJ Medical Center	572	57	9.97	9.10	6.86	(5.19, 8.89)
Lenox Hill Hospital	830	61	7.35	6.11	7.54	(5.77, 9.68)
M. I. Bassett Hospital	58	3	5.17	3.50	9.26	(1.86,27.05)
Maimonides Medical Ctr	514	56	10.89	7.75	8.81 *	(6.66,11.44)
Mercy Hospital	77	9	11.69	7.72	9.48	(4.33,18.01)
Millard Fillmore Hosp	174	8	4.60	3.77	7.64	(3.29,15.05)
Montefiore - Einstein	328	26	7.93	6.09	8.15	(5.32,11.94)
Montefiore - Moses	339	27	7.96	6.23	8.00	(5.27,11.64)
Mount Sinai Hospital	882	44	4.99	5.67	5.51	(4.00, 7.39)
NY Hospital - Queens	202	10	4.95	4.74	6.54	(3.13,12.02)
NY Methodist Hospital	60	4	6.67	5.47	7.64	(2.05,19.55)
NYP- Columbia Presby.	1481	72	4.86	4.83	6.30	(4.93, 7.93)
NYP- Weill Cornell	1202	69	5.74	5.61	6.41	(4.98, 8.11)
NYU Hospitals Center	1550	95	6.13	5.16	7.43	(6.01, 9.09)
North Shore Univ Hosp	1385	92	6.64	7.46	5.58	(4.50, 6.84)
Rochester General Hosp	796	54	6.78	7.26	5.85	(4.40, 7.64)
SVCMC- St. Vincents	274	20	7.30	6.78	6.74	(4.11,10.41)
St. Elizabeth Med Ctr	454	52	11.45	7.17	10.00 *	(7.47,13.12)
St. Francis Hospital	1767	100	5.66	6.49	5.46	(4.44, 6.64)
St. Josephs Hospital	782	31	3.96	6.75	3.68 **	(2.50, 5.22)
St. Lukes at St. Lukes	370	18	4.86	6.54	4.66	(2.76, 7.36)
St. Peters Hospital	726	36	4.96	5.97	5.21	(3.65, 7.21)
Staten Island UnivHosp	276	25	9.06	6.68	8.50	(5.50,12.54)
Strong Memorial Hosp	632	44	6.96	6.20	7.04	(5.11, 9.45)
United Health Services	256	19	7.42	6.66	6.98	(4.20,10.89)
Univ.Hosp-Brooklyn	149	16	10.74	4.72	14.26 *	(8.14,23.15)
Univ.Hosp-SUNY Upstate	431	29	6.73	6.68	6.31	(4.23, 9.07)
Univ.Hosp-Stony Brook	418	33	7.89	6.93	7.14	(4.91,10.02)
Vassar Bros. Med Ctr	321	12	3.74	7.10	3.30 **	(1.70, 5.76)
Westchester Med Ctr	487	29	5.95	6.66	5.60	(3.75, 8.04)
Winthrop Univ. Hosp	460	34	7.39	8.83	5.24	(3.63, 7.33)
Total	20627	1292	6.26	6.26	6.26	

* 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.

Figure 2: In-Hospital/30-Day Risk Adjusted Mortality Rates for Valve or Valve/CABG Surgery in New York State, 2003-2005 Discharges

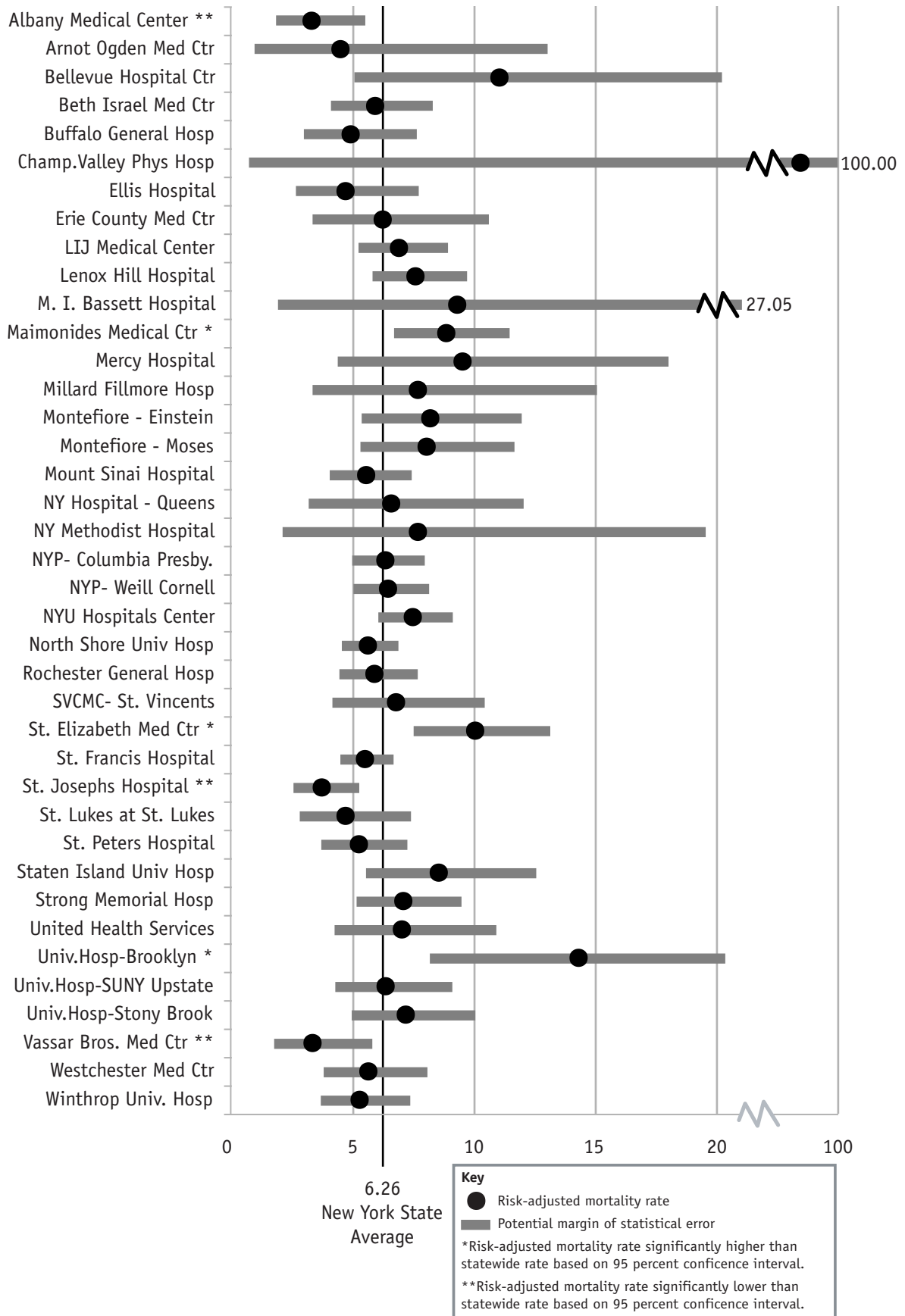


Table 4: Hospital Volume for Valve Procedures in New York State, 2003-2005 Discharges

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	127	171	54	23	31	46	34	19	505
Arnot Ogden Med Ctr	38	26	6	4	6	10	1	2	93
Bellevue Hospital Ctr	48	5	33	8	11	15	33	4	157
Beth Israel Med Ctr	69	102	61	47	37	66	80	35	497
Buffalo General Hosp	127	123	40	25	36	87	15	11	464
Champ.Valley Phys Hosp	3	1	1	0	0	0	0	1	6
Ellis Hospital	116	120	35	18	47	35	15	11	397
Erie County Med Ctr	83	57	30	20	14	8	30	13	255
LIJ Medical Center	92	127	102	77	29	51	57	37	572
Lenox Hill Hospital	161	117	72	53	146	122	116	43	830
M. I. Bassett Hospital	21	22	6	3	2	1	1	2	58
Maimonides Medical Ctr	136	113	67	31	27	61	51	28	514
Mercy Hospital	15	29	4	3	2	14	7	3	77
Millard Fillmore Hosp	53	68	6	7	15	15	5	5	174
Montefiore - Einstein	63	48	56	42	31	38	39	11	328
Montefiore - Moses	75	76	49	41	18	28	38	14	339
Mount Sinai Hospital	141	123	43	12	192	94	223	54	882
NY Hospital - Queens	67	48	36	9	12	8	14	8	202
NY Methodist Hospital	10	15	11	4	5	2	9	4	60
NYP- Columbia Presby.	397	254	171	80	268	117	150	44	1481
NYP- Weill Cornell	361	238	150	85	111	49	154	54	1202
NYU Hospitals Center	538	143	146	19	457	89	135	23	1550
North Shore Univ Hosp	409	324	190	91	87	97	133	54	1385
Rochester General Hosp	245	229	77	44	58	79	43	21	796
SVCMC- St. Vincents	83	62	30	17	15	29	28	10	274
St. Elizabeth Med Ctr	85	121	29	31	23	76	43	46	454
St. Francis Hospital	496	490	145	94	130	146	172	94	1767
St. Josephs Hospital	204	229	64	71	56	55	58	45	782
St. Lukes at St. Lukes	53	68	55	22	52	48	38	34	370
St. Peters Hospital	206	212	55	28	53	70	62	40	726
Staten Island UnivHosp	53	97	41	40	12	13	14	6	276
Strong Memorial Hosp	170	150	71	41	78	36	61	25	632
United Health Services	58	107	31	26	7	9	12	6	256
Univ.Hosp-Brooklyn	26	12	28	12	14	20	29	8	149
Univ.Hosp-SUNY Upstate	108	95	35	16	54	52	47	24	431
Univ.Hosp-Stony Brook	108	112	40	26	21	55	39	17	418
Vassar Bros. Med Ctr	68	64	43	40	22	50	21	13	321
Westchester Med Ctr	169	146	36	39	21	36	29	11	487
Winthrop Univ. Hosp	111	147	38	41	22	57	20	24	460
Total	5393	4691	2187	1290	2222	1884	2056	904	20627
State-wide Mortality Rate (%)	3.86	5.65	5.85	13.49	1.76	8.01	9.10	15.49	6.26

2003 – 2005 HOSPITAL AND SURGEON OUTCOMES

Table 5 provides the number of Isolated CABG operations, number of CABG patients who died in the hospital or after discharge but within 30 days of surgery, 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 2003-2005. 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 2003-2005 for each of the 39 hospitals performing these operations during the time period. 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 2003-2005, (b) performed at least one cardiac

operation in each of the years 2003-2005. 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 2003-2005 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/30-Day Mortality Rates by Surgeon for Isolated CABG and Valve Surgery (done in combination with or without CABG), in NYS, 2003 - 2005

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
STATEWIDE TOTAL	40429	864	2.14	2.14	2.14		61056	3.53
Albany Medical Center								
Britton L	387	7	1.81	1.64	2.36	(0.94, 4.86)	531	3.43
Devejian N	.	.	.	.	.	(. . .)	4	22.07
#Fuzesi L	148	0	0.00	2.29	0.00	(0.00, 2.32)	174	0.69
Miller S	386	8	2.07	1.79	2.47	(1.06, 4.87)	543	2.38
Sardella G	434	5	1.15	1.77	1.39	(0.45, 3.26)	584	1.91
All Others	94	1	1.06	2.14	1.06	(0.01, 5.92)	118	1.04
Total	1449	21	1.45	1.82	1.71	(1.06, 2.61)	1954	2.32**
Arnot Ogden Med Ctr								
Curiale S V	131	0	0.00	1.72	0.00	(0.00, 3.47)	161	1.91
Nast E	212	6	2.83	2.36	2.56	(0.94, 5.58)	275	3.18
Total	343	6	1.75	2.12	1.77	(0.65, 3.84)	436	2.77

Table 5 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Bellevue Hospital Ctr								
##Ciuffo G B	2	0	0.00	2.17	0.00	(0.00,100.0)	3	0.00
#Grau J B	97	1	1.03	1.31	1.69	(0.02, 9.38)	140	1.48
#Ribakove G	46	0	0.00	2.21	0.00	(0.00, 7.72)	107	7.11
#Schwartz C F	124	2	1.61	1.34	2.58	(0.29, 9.31)	169	4.61
#Zervos M	66	1	1.52	1.33	2.44	(0.03,13.58)	73	3.51
All Others	1	0	0.00	2.87	0.00	(0.00,100.0)	1	0.00
Total	336	4	1.19	1.46	1.75	(0.47, 4.48)	493	4.58
Beth Israel Med Ctr								
Geller C M	68	0	0.00	1.37	0.00	(0.00, 8.40)	90	1.51
Harris L	188	6	3.19	2.04	3.34	(1.22, 7.28)	227	4.53
Hoffman D	143	3	2.10	2.15	2.08	(0.42, 6.09)	169	4.36
Stelzer P	42	1	2.38	1.84	2.76	(0.04,15.37)	275	3.16
Tranbaugh R	463	7	1.51	1.94	1.66	(0.67, 3.42)	640	3.08
Total	904	17	1.88	1.95	2.06	(1.20, 3.30)	1401	3.35
Buffalo General Hosp								
##Ashraf M	11	0	0.00	1.54	0.00	(0.00,46.40)	12	0.00
##Brodman R	120	4	3.33	1.70	4.20	(1.13,10.74)	166	7.14
Grosner G	766	10	1.31	2.07	1.35	(0.65, 2.48)	1156	2.23 **
Karamanoukian H L	190	9	4.74	1.88	5.40 *	(2.46,10.25)	200	8.38 *
#Lewin A	330	9	2.73	1.48	3.93	(1.79, 7.45)	337	6.21
##Raza S	50	3	6.00	2.45	5.24	(1.05,15.31)	59	6.29
All Others	2	0	0.00	0.50	0.00	(0.00,100.0)	3	0.00
Total	1469	35	2.38	1.89	2.69	(1.88, 3.75)	1933	3.65
Champ.Valley Phys Hosp								
#Bennett E	14	1	7.14	1.24	12.31	(0.16,68.48)	17	16.81
#Dal Col R	1	0	0.00	0.46	0.00	(0.00,100.0)	1	0.00
#Depan H	1	0	0.00	1.52	0.00	(0.00,100.0)	1	0.00
##Saifi J	4	0	0.00	0.79	0.00	(0.00,100.0)	4	0.00
All Others	67	0	0.00	1.07	0.00	(0.00,10.96)	70	4.40
Total	87	1	1.15	1.08	2.27	(0.03,12.64)	93	6.63
Ellis Hospital								
Afi A	208	3	1.44	1.24	2.48	(0.50, 7.25)	262	4.45
#Depan H	286	4	1.40	2.03	1.47	(0.40, 3.76)	515	2.18
Reich H	308	4	1.30	1.68	1.65	(0.44, 4.23)	392	2.18
##Saifi J	1	0	0.00	1.26	0.00	(0.00,100.0)	1	0.00
#Singh C	146	4	2.74	1.74	3.37	(0.91, 8.63)	176	6.22
Total	949	15	1.58	1.70	1.99	(1.11, 3.28)	1346	2.92

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
Erie County Med Ctr								
#Aldridge J	8	0	0.00	1.33	0.00	(0.00,73.64)	12	0.00
##Ashraf M	52	1	1.92	1.82	2.25	(0.03,12.53)	66	4.81
Bell-Thomson J	447	8	1.79	1.95	1.97	(0.85, 3.87)	644	3.24
#Datta S	186	6	3.23	2.00	3.45	(1.26, 7.51)	204	5.67
#Jennings L	.	.	.	.	.	(. . .)	1	0.00
##Raza S	64	3	4.69	2.00	5.01	(1.01,14.64)	85	6.99
All Others	1	0	0.00	4.47	0.00	(0.00,100.0)	1	0.00
Total	758	18	2.37	1.95	2.60	(1.54, 4.11)	1013	3.92
LIJ Medical Center								
Graver L	346	5	1.45	2.85	1.08	(0.35, 2.53)	682	3.34
Manetta F	159	2	1.26	2.38	1.13	(0.13, 4.07)	235	4.26
Palazzo R	314	5	1.59	2.31	1.47	(0.47, 3.43)	473	2.95
Parnell V	.	.	.	.	.	(. . .)	1	0.00
Total	819	12	1.47	2.55	1.23	(0.63, 2.14)	1391	3.34
Lenox Hill Hospital								
Fonger J D	28	1	3.57	2.09	3.66	(0.05,20.34)	40	7.74
Loulmet D F	35	0	0.00	1.81	0.00	(0.00,12.35)	341	2.36
Patel N C	370	7	1.89	2.20	1.84	(0.74, 3.79)	515	3.76
Patel N U	207	0	0.00	1.62	0.00	(0.00, 2.33)	253	3.83
#Reddy R C	138	3	2.17	2.15	2.16	(0.43, 6.30)	215	2.24
Subramanian V	541	15	2.77	2.66	2.23	(1.25, 3.68)	752	4.77
Tolis G	51	3	5.88	2.14	5.87	(1.18,17.14)	77	6.49
All Others	12	0	0.00	0.98	0.00	(0.00,66.94)	19	8.07
Total	1382	29	2.10	2.26	1.98	(1.33, 2.85)	2212	3.88
M. I. Bassett Hospital								
Lancey R A	135	2	1.48	2.01	1.58	(0.18, 5.69)	172	1.77
All Others	96	2	2.08	1.53	2.91	(0.33,10.52)	117	7.98
Total	231	4	1.73	1.81	2.04	(0.55, 5.24)	289	3.98
Maimonides Medical Ctr								
Abrol S	183	5	2.73	3.00	1.95	(0.63, 4.54)	238	3.69
Acinapura A	11	0	0.00	1.43	0.00	(0.00,49.98)	13	0.00
#Brevetti G R	3	0	0.00	1.61	0.00	(0.00,100.0)	6	0.00
Cunningham J N	165	3	1.82	1.94	2.01	(0.40, 5.86)	219	4.90
#Genovesi M H	56	5	8.93	2.54	7.51 *	(2.42,17.52)	66	8.49
Jacobowitz I	556	22	3.96	2.57	3.29	(2.06, 4.98)	798	5.43 *
Sabado M	58	2	3.45	2.48	2.97	(0.33,10.74)	76	4.33
Vaynblat M	268	4	1.49	2.52	1.27	(0.34, 3.24)	342	3.73

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 Medical Ctr, continued								
Zisbrod Z	196	7	3.57	2.31	3.30	(1.32, 6.79)	247	3.95
All Others	29	0	0.00	1.27	0.00	(0.00,21.26)	34	7.68
Total	1525	48	3.15	2.47	2.72	(2.01, 3.61)	2039	4.74 *
Mercy Hospital								
Carlson R E	297	12	4.04	1.98	4.37 *	(2.25, 7.63)	323	6.99 *
Downing S W	340	6	1.76	2.27	1.66	(0.61, 3.61)	388	3.56
##Raza S	24	3	12.50	1.68	15.86 *	(3.19,46.33)	27	21.85 *
All Others	1	0	0.00	1.25	0.00	(0.00,100.0)	1	0.00
Total	662	21	3.17	2.12	3.20	(1.98, 4.89)	739	5.31 *
Millard Fillmore Hosp								
#Aldridge J	229	9	3.93	1.87	4.50	(2.05, 8.54)	253	7.57 *
##Ashraf M	545	8	1.47	1.76	1.78	(0.77, 3.52)	682	2.73
##Brodman R	55	2	3.64	1.99	3.90	(0.44,14.06)	61	7.16
#Datta S	6	0	0.00	1.46	0.00	(0.00,89.35)	6	0.00
#Jennings L	80	1	1.25	1.61	1.66	(0.02, 9.24)	84	2.53
#Lewin A	1	0	0.00	0.22	0.00	(0.00,100.0)	1	0.00
All Others	12	0	0.00	1.33	0.00	(0.00,49.28)	15	13.30
Total	928	20	2.16	1.78	2.59	(1.58, 4.00)	1102	4.29
Montefiore - Einstein								
#Attai L	2	0	0.00	3.72	0.00	(0.00,100.0)	3	0.00
##Camacho M	.	.	.	.	.	(. . .)	1	0.00
#Frymus M	218	11	5.05	1.80	6.00 *	(2.99,10.74)	290	9.54 *
#Garcia J P	9	0	0.00	1.56	0.00	(0.00,55.96)	19	6.18
#Merav A	9	2	22.22	2.26	20.99 *	(2.36,75.77)	11	21.79
##Plestis K A	228	4	1.75	1.81	2.07	(0.56, 5.31)	430	2.67
All Others	72	0	0.00	1.61	0.00	(0.00, 6.77)	112	3.78
Total	538	17	3.16	1.79	3.78 *	(2.20, 6.05)	866	5.13 *
Montefiore - Moses								
#Attai L	220	2	0.91	1.62	1.20	(0.13, 4.34)	321	3.33
##Camacho M	3	0	0.00	1.38	0.00	(0.00,100.0)	4	0.00
#Crooke G	10	0	0.00	0.95	0.00	(0.00,82.11)	15	0.00
#Frymus M	2	0	0.00	1.80	0.00	(0.00,100.0)	2	0.00
#Garcia J P	125	5	4.00	1.27	6.71 *	(2.16,15.67)	158	9.39 *
#Merav A	224	5	2.23	2.11	2.26	(0.73, 5.28)	321	3.94
##Plestis K A	100	2	2.00	1.94	2.20	(0.25, 7.96)	135	4.02
All Others	157	3	1.91	1.90	2.14	(0.43, 6.27)	224	4.20
Total	841	17	2.02	1.78	2.43	(1.41, 3.88)	1180	4.30

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
Mount Sinai Hospital								
Adams DH	58	0	0.00	1.17	0.00	(0.00,11.51)	493	3.23
Aklog L	172	1	0.58	2.47	0.50	(0.01, 2.80)	269	3.45
Filsoufi F	131	2	1.53	1.42	2.29	(0.26, 8.28)	221	2.15
Griep R	4	0	0.00	3.21	0.00	(0.00,61.00)	44	1.54
#Lansman S	132	1	0.76	1.69	0.96	(0.01, 5.34)	191	2.94
Nguyen K	.	.	.	.	.	(. , .)	1	0.00
##Plestis K A	12	0	0.00	1.62	0.00	(0.00,40.33)	29	2.57
#Sarabu M	113	1	0.88	1.88	1.00	(0.01, 5.58)	149	0.91
#Spielvogel D	140	6	4.29	2.36	3.88	(1.42, 8.44)	197	4.04
#Zias E	125	2	1.60	1.71	2.00	(0.22, 7.22)	171	3.25
All Others	1	1	100.00	20.38	10.49	(0.14,58.35)	5	8.06
Total	888	14	1.58	1.93	1.75	(0.95, 2.93)	1770	3.05
NY Hospital - Queens								
#Ko W	411	11	2.68	2.20	2.60	(1.30, 4.66)	510	3.86
##Mack CA	12	0	0.00	1.51	0.00	(0.00,43.30)	15	13.63
##Tortolani A	44	0	0.00	2.21	0.00	(0.00, 8.06)	55	0.00
All Others	247	10	4.05	1.88	4.60 *	(2.20, 8.46)	336	5.95
Total	714	21	2.94	2.08	3.03	(1.87, 4.63)	916	4.48
NY Methodist Hospital								
#Lee L Y	65	0	0.00	2.07	0.00	(0.00, 5.84)	82	0.00
##Mack CA	1	0	0.00	0.42	0.00	(0.00,100.0)	1	0.00
##Tortolani A	147	3	2.04	1.86	2.34	(0.47, 6.84)	190	4.93
Total	213	3	1.41	1.92	1.57	(0.32, 4.59)	273	3.36
NYP- Columbia Presby.								
Argenziano M	124	3	2.42	1.82	2.83	(0.57, 8.28)	255	3.45
#Chen J M	1	0	0.00	0.43	0.00	(0.00,100.0)	4	19.00
Esrig B	1	0	0.00	0.33	0.00	(0.00,100.0)	2	0.00
Mosca R S	1	0	0.00	0.40	0.00	(0.00,100.0)	6	22.17
Naka Y	216	5	2.31	2.21	2.23	(0.72, 5.21)	385	3.73
Oz M	346	2	0.58	1.61	0.77	(0.09, 2.76)	874	2.91
#Quaegebeur J	.	.	.	.	.	(. , .)	9	0.00
Rose E	19	0	0.00	0.80	0.00	(0.00,51.79)	41	0.00
Smith C	334	5	1.50	1.31	2.45	(0.79, 5.72)	840	3.38
Stewart A S	108	1	0.93	2.31	0.86	(0.01, 4.78)	190	3.60
All Others	35	1	2.86	2.36	2.59	(0.03,14.38)	60	5.41
Total	1185	17	1.43	1.73	1.78	(1.03, 2.84)	2666	3.41

Table 5 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
NYP- Weill Cornell								
##Brodman R	.	.	.	.	.	(. . .)	1	0.00
#Chen J M	.	.	.	.	.	(. . .)	1	0.00
Girardi L	509	6	1.18	1.94	1.30	(0.47, 2.83)	915	2.67
Isom O	49	1	2.04	0.98	4.44	(0.06,24.72)	159	3.70
#Ko W	98	2	2.04	2.38	1.83	(0.21, 6.62)	151	5.62
Krieger K	389	12	3.08	2.00	3.29	(1.70, 5.75)	797	3.63
#Lee L Y	200	6	3.00	2.89	2.22	(0.81, 4.82)	292	4.85
##Mack CA	34	1	2.94	2.10	2.99	(0.04,16.63)	51	8.61
##Tortolani A	256	2	0.78	2.47	0.68	(0.08, 2.44)	370	1.87
All Others	1	0	0.00	0.71	0.00	(0.00,100.0)	1	0.00
Total	1536	30	1.95	2.17	1.92	(1.30, 2.75)	2738	3.47
NYU Hospitals Center								
##Ciuffo G B	60	2	3.33	3.05	2.34	(0.26, 8.43)	126	3.38
Colvin S	48	0	0.00	1.79	0.00	(0.00, 9.14)	741	4.39
#Crooke G	1	0	0.00	1.38	0.00	(0.00,100.0)	1	0.00
Culliford A	192	4	2.08	2.11	2.11	(0.57, 5.40)	405	4.39
#Esposito R	.	.	.	.	.	(. . .)	1	29.59
Galloway A	111	3	2.70	1.93	2.99	(0.60, 8.74)	485	3.36
#Grau J B	.	.	.	.	.	(. . .)	4	15.72
Grossi E	27	2	7.41	5.41	2.93	(0.33,10.57)	66	7.55
#Ribakove G	106	3	2.83	2.73	2.22	(0.45, 6.47)	252	3.15
#Schwartz C F	21	0	0.00	3.08	0.00	(0.00,12.13)	35	2.42
#Zervos M	2	0	0.00	0.58	0.00	(0.00,100.0)	2	0.00
Total	568	14	2.46	2.45	2.15	(1.17, 3.61)	2118	4.10
North Shore Univ Hosp								
##Camacho M	152	7	4.61	2.28	4.31	(1.73, 8.88)	219	8.10 *
#Esposito R	562	14	2.49	2.47	2.16	(1.18, 3.62)	803	3.12
Hall M	401	11	2.74	2.54	2.31	(1.15, 4.12)	628	3.51
Hartman A	306	2	0.65	2.19	0.64	(0.07, 2.30)	750	1.75 **
Kalimi R	157	6	3.82	2.27	3.60	(1.32, 7.85)	214	4.79
Pogo G	360	11	3.06	2.27	2.88	(1.44, 5.15)	572	4.27
Vatsia S	302	6	1.99	2.42	1.76	(0.64, 3.82)	435	2.85
All Others	13	0	0.00	1.19	0.00	(0.00,50.83)	17	0.00
Total	2253	57	2.53	2.37	2.28	(1.73, 2.95)	3638	3.36

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
Rochester General Hosp								
Cheeran D	679	10	1.47	2.39	1.32	(0.63, 2.42)	969	3.03
#Green G R	431	13	3.02	2.65	2.44	(1.30, 4.17)	538	3.73
Kirshner R	640	17	2.66	3.06	1.85	(1.08, 2.97)	1039	3.03
All Others	11	0	0.00	1.80	0.00	(0.00,39.68)	11	0.00
Total	1761	40	2.27	2.69	1.80	(1.29, 2.45)	2557	3.15
SVCMC- St. Vincents								
##Ciuffo G B	16	1	6.25	4.22	3.16	(0.04,17.61)	32	8.63
Lang S	372	5	1.34	2.21	1.30	(0.42, 3.03)	499	3.18
#Reddy R C	.	.	.	.	.	(. . .)	1	0.00
Shin Y T	333	5	1.50	2.44	1.32	(0.42, 3.07)	462	2.51
All Others	2	0	0.00	0.77	0.00	(0.00,100.0)	3	0.00
Total	723	11	1.52	2.36	1.38	(0.69, 2.47)	997	3.07
St. Elizabeth Med Ctr								
#El Amir N	158	3	1.90	1.79	2.27	(0.46, 6.64)	239	5.29
Joyce F	298	6	2.01	2.04	2.11	(0.77, 4.59)	488	5.10
Kelley J	327	11	3.36	2.25	3.19	(1.59, 5.71)	465	5.05
#Singh C	169	5	2.96	1.98	3.20	(1.03, 7.47)	214	6.00
Total	952	25	2.63	2.06	2.73	(1.76, 4.02)	1406	5.21 *
St. Francis Hospital								
Bercow N	462	10	2.16	2.07	2.23	(1.07, 4.11)	672	3.36
Colangelo R	640	12	1.88	2.23	1.80	(0.93, 3.14)	848	2.69
Damus P	386	5	1.30	1.91	1.45	(0.47, 3.38)	705	3.41
Davison M J	142	6	4.23	2.44	3.70	(1.35, 8.04)	167	6.77
Durban L	19	1	5.26	1.58	7.13	(0.09,39.68)	30	8.79
Fernandez H A	345	6	1.74	1.80	2.07	(0.76, 4.51)	423	2.46
Lamendola C	483	15	3.11	2.16	3.07	(1.72, 5.07)	693	3.70
Robinson N	565	8	1.42	1.64	1.85	(0.80, 3.65)	872	3.99
Taylor J	609	12	1.97	2.15	1.96	(1.01, 3.42)	1008	2.54
Total	3651	75	2.05	2.03	2.17	(1.70, 2.72)	5418	3.28
St. Josephs Hospital								
#Green G R	7	0	0.00	3.32	0.00	(0.00,33.75)	8	0.00
Marvasti M	334	3	0.90	2.16	0.89	(0.18, 2.60)	596	1.23 **
Nazem A	496	8	1.61	2.36	1.46	(0.63, 2.87)	665	2.23
Rosenberg J	379	8	2.11	1.91	2.36	(1.01, 4.64)	625	3.02
Zhou Z	411	9	2.19	2.25	2.08	(0.95, 3.96)	515	3.17
Total	1627	28	1.72	2.19	1.68	(1.12, 2.43)	2409	2.36 **

Table 5 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
St. Lukes at St. Lukes								
Derose J J	222	5	2.25	2.39	2.01	(0.65, 4.69)	361	3.68
Swistel D	308	6	1.95	2.84	1.47	(0.54, 3.19)	525	2.14
All Others	13	2	15.38	2.73	12.06	(1.35,43.55)	27	6.07
Total	543	13	2.39	2.65	1.93	(1.03, 3.30)	913	2.83
St. Peters Hospital								
#Bennett E	222	3	1.35	1.67	1.72	(0.35, 5.04)	440	2.60
Canavan T	411	2	0.49	1.84	0.57 **	(0.06, 2.05)	485	0.91 **
#Dal Col R	365	7	1.92	1.41	2.91	(1.16, 5.99)	607	4.14
##Saifi J	401	5	1.25	2.14	1.25	(0.40, 2.91)	593	2.77
Total	1399	17	1.22	1.79	1.45	(0.85, 2.33)	2125	2.74
Staten Island Univ Hosp								
McGinn J	1054	25	2.37	2.75	1.84	(1.19, 2.72)	1215	3.42
Molinaro P J	220	1	0.45	1.65	0.59	(0.01, 3.27)	288	3.26
Nabagiez J P	16	0	0.00	0.74	0.00	(0.00,66.31)	27	14.18
Rosell F M	255	2	0.78	1.47	1.14	(0.13, 4.11)	291	2.56
Total	1545	28	1.81	2.36	1.64	(1.09, 2.37)	1821	3.41
Strong Memorial Hosp								
Hicks G	342	4	1.17	2.00	1.25	(0.34, 3.20)	502	4.25
Knight P	573	12	2.09	2.01	2.23	(1.15, 3.90)	977	3.36
Massey H	244	4	1.64	2.28	1.53	(0.41, 3.93)	312	3.24
Total	1159	20	1.73	2.06	1.79	(1.09, 2.76)	1791	3.58
United Health Services								
Quintos E	266	9	3.38	2.40	3.01	(1.37, 5.71)	325	4.37
Wong K	303	4	1.32	2.29	1.23	(0.33, 3.16)	402	2.59
Yousuf M	281	7	2.49	2.78	1.92	(0.77, 3.95)	379	3.87
Total	850	20	2.35	2.48	2.02	(1.24, 3.13)	1106	3.61
Univ.Hosp-Brooklyn								
#Brevetti G R	50	2	4.00	2.95	2.90	(0.33,10.47)	86	3.85
Burack J H	48	3	6.25	2.38	5.61	(1.13,16.40)	67	8.44
#Genovesi M H	97	2	2.06	1.91	2.31	(0.26, 8.32)	111	7.42
Lowery R C	104	5	4.81	1.69	6.08	(1.96,14.20)	184	8.86 *
Total	299	12	4.01	2.08	4.12	(2.13, 7.20)	448	7.46 *

Table 5 continued

	Isolated CABG						Isolated CABG, or Valve or Valve/CABG	
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Univ.Hosp-SUNY Upstate								
Alfieris G	.	.	.	.	.	(. . .)	3	0.00
#El Amir N	10	2	20.00	7.14	5.98	(0.67,21.61)	18	8.09
Fink GW	329	8	2.43	2.00	2.60	(1.12, 5.12)	478	3.24
Lutz C J	295	8	2.71	2.57	2.25	(0.97, 4.44)	430	3.14
Picone A	219	11	5.02	2.02	5.31 *	(2.65, 9.51)	349	5.73 *
All Others	25	0	0.00	5.52	0.00	(0.00, 5.68)	31	5.54
Total	878	29	3.30	2.36	3.00	(2.01, 4.30)	1309	4.14
Univ.Hosp-Stony Brook								
Bilfinger T	184	9	4.89	2.38	4.40	(2.01, 8.35)	237	5.70
Krukenkamp I	326	11	3.37	2.29	3.15	(1.57, 5.64)	484	4.67
McLarty A	150	3	2.00	2.37	1.81	(0.36, 5.28)	178	3.45
#Quaegebeur J	.	.	.	.	.	(. . .)	1	0.00
Seifert F	619	17	2.75	1.91	3.08	(1.79, 4.93)	797	4.41
Total	1279	40	3.13	2.13	3.15 *	(2.25, 4.28)	1697	4.59 *
Vassar Bros. Med Ctr								
Ciaburri D	244	2	0.82	2.13	0.82	(0.09, 2.97)	450	2.33
Zakow P	324	7	2.16	2.25	2.05	(0.82, 4.23)	439	1.86 **
Total	568	9	1.58	2.20	1.54	(0.70, 2.93)	889	2.10 **
Westchester Med Ctr								
Fleisher A	300	16	5.33	2.52	4.52 *	(2.58, 7.35)	385	6.15 *
#Fuzesi L	30	2	6.67	1.63	8.75	(0.98,31.60)	36	10.44
#Lansman S	112	3	2.68	2.43	2.36	(0.47, 6.89)	147	2.19
#Sarabu M	363	6	1.65	2.03	1.74	(0.64, 3.80)	491	2.22
#Spielvogel D	104	0	0.00	2.54	0.00	(0.00, 2.97)	145	1.99
#Zias E	253	4	1.58	2.39	1.41	(0.38, 3.62)	321	2.24
All Others	359	7	1.95	1.85	2.25	(0.90, 4.64)	483	4.48
Total	1521	38	2.50	2.20	2.43	(1.72, 3.33)	2008	3.59
Winthrop Univ. Hosp								
Goncalves J A	160	3	1.88	3.04	1.32	(0.26, 3.85)	215	2.34
Kofsky E	336	11	3.27	2.47	2.83	(1.41, 5.07)	437	4.49
Kokotes W J	214	3	1.40	2.95	1.02	(0.20, 2.97)	323	2.33
Schubach S	328	0	0.00	2.05	0.00 **	(0.00, 1.16)	511	0.95 **
All Others	58	1	1.72	1.94	1.90	(0.02,10.58)	70	5.80
Total	1096	18	1.64	2.49	1.41	(0.83, 2.22)	1556	2.70
Statewide Total	40429	864	2.14	2.14	2.14		61056	3.53

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

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

Table 6: Summary Information for Surgeons Practicing at More than One Hospital, 2003-2005

	Isolated CABG					Isolated CABG, or Valve or Valve/CABG		
	Cases	No of Deaths	OMR	EMR	RAMR	95% CI for RAMR	Cases	RAMR
Aldridge J	237	9	3.80	1.85	4.39	(2.00, 8.33)	265	7.07 *
Erie County Med Ctr	8	0	0.00	1.33	0.00	(0.00,73.64)	12	0.00
Millard Fillmore Hosp	229	9	3.93	1.87	4.50	(2.05, 8.54)	253	7.57 *
Ashraf M	608	9	1.48	1.76	1.80	(0.82, 3.41)	760	2.89
Buffalo General Hosp	11	0	0.00	1.54	0.00	(0.00,46.40)	12	0.00
Erie County Med Ctr	52	1	1.92	1.82	2.25	(0.03,12.53)	66	4.81
Millard Fillmore Hosp	545	8	1.47	1.76	1.78	(0.77, 3.52)	682	2.73
Attai L	222	2	0.90	1.64	1.18	(0.13, 4.25)	324	3.26
Montefiore - Einstein	2	0	0.00	3.72	0.00	(0.00,100.0)	3	0.00
Montefiore - Moses	220	2	0.91	1.62	1.20	(0.13, 4.34)	321	3.33
Bennett E	236	4	1.69	1.65	2.20	(0.59, 5.62)	457	2.80
Champ.Valley Phys Hosp	14	1	7.14	1.24	12.31	(0.16,68.48)	17	16.81
St. Peters Hospital	222	3	1.35	1.67	1.72	(0.35, 5.04)	440	2.60
Brevetti G R	53	2	3.77	2.87	2.81	(0.32,10.14)	92	3.57
Maimonides Medical Ctr	3	0	0.00	1.61	0.00	(0.00,100.0)	6	0.00
Univ.Hosp-Brooklyn	50	2	4.00	2.95	2.90	(0.33,10.47)	86	3.85
Brodman R	175	6	3.43	1.79	4.09	(1.49, 8.90)	228	7.10 *
Buffalo General Hosp	120	4	3.33	1.70	4.20	(1.13,10.74)	166	7.14
Millard Fillmore Hosp	55	2	3.64	1.99	3.90	(0.44,14.06)	61	7.16
NYP- Weill Cornell	.	.	.	.	.	(. . .)	1	0.00
Camacho M	155	7	4.52	2.27	4.26	(1.71, 8.77)	224	8.02 *
Montefiore - Einstein	.	.	.	.	.	(. . .)	1	0.00
Montefiore - Moses	3	0	0.00	1.38	0.00	(0.00,100.0)	4	0.00
North Shore Univ Hosp	152	7	4.61	2.28	4.31	(1.73, 8.88)	219	8.10 *
Chen J M	1	0	0.00	0.43	0.00	(0.00,100.0)	5	17.74
NYP- Columbia Presby.	1	0	0.00	0.43	0.00	(0.00,100.0)	4	19.00
NYP- Weill Cornell	.	.	.	.	.	(. . .)	1	0.00
Ciuffo G B	78	3	3.85	3.27	2.52	(0.51, 7.35)	161	4.59
Bellevue Hospital Ctr	2	0	0.00	2.17	0.00	(0.00,100.0)	3	0.00
NYU Hospitals Center	60	2	3.33	3.05	2.34	(0.26, 8.43)	126	3.38
SVMC- St. Vincents	16	1	6.25	4.22	3.16	(0.04,17.61)	32	8.63
Crooke G	11	0	0.00	0.99	0.00	(0.00,71.75)	16	0.00
Montefiore - Moses	10	0	0.00	0.95	0.00	(0.00,82.11)	15	0.00
NYU Hospitals Center	1	0	0.00	1.38	0.00	(0.00,100.0)	1	0.00
Dal Col R	366	7	1.91	1.41	2.90	(1.16, 5.98)	608	4.13
Champ.Valley Phys Hosp	1	0	0.00	0.46	0.00	(0.00,100.0)	1	0.00
St. Peters Hospital	365	7	1.92	1.41	2.91	(1.16, 5.99)	607	4.14

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
Datta S	192	6	3.13	1.98	3.37	(1.23, 7.34)	210	5.55
Erie County Med Ctr	186	6	3.23	2.00	3.45	(1.26, 7.51)	204	5.67
Millard Fillmore Hosp	6	0	0.00	1.46	0.00	(0.00,89.35)	6	0.00
Depan H	287	4	1.39	2.03	1.47	(0.39, 3.75)	516	2.18
Champ.Valley Phys Hosp	1	0	0.00	1.52	0.00	(0.00,100.0)	1	0.00
Ellis Hospital	286	4	1.40	2.03	1.47	(0.40, 3.76)	515	2.18
El Amir N	168	5	2.98	2.10	3.02	(0.97, 7.05)	257	5.68
St. Elizabeth Med Ctr	158	3	1.90	1.79	2.27	(0.46, 6.64)	239	5.29
Univ.Hosp-SUNY Upstate	10	2	20.00	7.14	5.98	(0.67,21.61)	18	8.09
Esposito R	562	14	2.49	2.47	2.16	(1.18, 3.62)	804	3.21
NYU Hospitals Center	.	.	.	.	.	(. . .)	1	29.59
North Shore Univ Hosp	562	14	2.49	2.47	2.16	(1.18, 3.62)	803	3.12
Frymus M	220	11	5.00	1.80	5.94 *	(2.96,10.64)	292	9.50 *
Montefiore - Einstein	218	11	5.05	1.80	6.00 *	(2.99,10.74)	290	9.54 *
Montefiore - Moses	2	0	0.00	1.80	0.00	(0.00,100.0)	2	0.00
Fuzesi L	178	2	1.12	2.18	1.10	(0.12, 3.99)	210	2.30
Albany Medical Center	148	0	0.00	2.29	0.00	(0.00, 2.32)	174	0.69
Westchester Med Ctr	30	2	6.67	1.63	8.75	(0.98,31.60)	36	10.44
Garcia J P	134	5	3.73	1.29	6.17	(1.99,14.40)	177	8.93 *
Montefiore - Einstein	9	0	0.00	1.56	0.00	(0.00,55.96)	19	6.18
Montefiore - Moses	125	5	4.00	1.27	6.71 *	(2.16,15.67)	158	9.39 *
Genovesi M H	153	7	4.58	2.14	4.56	(1.83, 9.40)	177	7.92 *
Maimonides Medical Ctr	56	5	8.93	2.54	7.51 *	(2.42,17.52)	66	8.49
Univ.Hosp-Brooklyn	97	2	2.06	1.91	2.31	(0.26, 8.32)	111	7.42
Grau J B	97	1	1.03	1.31	1.69	(0.02, 9.38)	144	2.71
Bellevue Hospital Ctr	97	1	1.03	1.31	1.69	(0.02, 9.38)	140	1.48
NYU Hospitals Center	.	.	.	.	.	(. . .)	4	15.72
Green G R	438	13	2.97	2.66	2.39	(1.27, 4.08)	546	3.67
Rochester General Hosp	431	13	3.02	2.65	2.44	(1.30, 4.17)	538	3.73
St. Josephs Hospital	7	0	0.00	3.32	0.00	(0.00,33.75)	8	0.00
Jennings L	80	1	1.25	1.61	1.66	(0.02, 9.24)	85	2.49
Erie County Med Ctr	.	.	.	.	.	(. . .)	1	0.00
Millard Fillmore Hosp	80	1	1.25	1.61	1.66	(0.02, 9.24)	84	2.53
Ko W	509	13	2.55	2.23	2.44	(1.30, 4.18)	661	4.38
NY Hospital - Queens	411	11	2.68	2.20	2.60	(1.30, 4.66)	510	3.86
NYP- Weill Cornell	98	2	2.04	2.38	1.83	(0.21, 6.62)	151	5.62
Lansman S	244	4	1.64	2.03	1.73	(0.46, 4.42)	338	2.64
Mount Sinai Hospital	132	1	0.76	1.69	0.96	(0.01, 5.34)	191	2.94
Westchester Med Ctr	112	3	2.68	2.43	2.36	(0.47, 6.89)	147	2.19

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
Lee L Y	265	6	2.26	2.69	1.80	(0.66, 3.91)	374	4.12
NY Methodist Hospital	65	0	0.00	2.07	0.00	(0.00, 5.84)	82	0.00
NYP- Weill Cornell	200	6	3.00	2.89	2.22	(0.81, 4.82)	292	4.85
Lewin A	331	9	2.72	1.48	3.92	(1.79, 7.45)	338	6.21
Buffalo General Hosp	330	9	2.73	1.48	3.93	(1.79, 7.45)	337	6.21
Millard Fillmore Hosp	1	0	0.00	0.22	0.00	(0.00,100.0)	1	0.00
Mack CA	47	1	2.13	1.91	2.37	(0.03,13.21)	67	9.16
NY Hospital - Queens	12	0	0.00	1.51	0.00	(0.00,43.30)	15	13.63
NY Methodist Hospital	1	0	0.00	0.42	0.00	(0.00,100.0)	1	0.00
NYP- Weill Cornell	34	1	2.94	2.10	2.99	(0.04,16.63)	51	8.61
Merav A	233	7	3.00	2.12	3.03	(1.22, 6.25)	332	4.42
Montefiore - Einstein	9	2	22.22	2.26	20.99 *	(2.36,75.77)	11	21.79
Montefiore - Moses	224	5	2.23	2.11	2.26	(0.73, 5.28)	321	3.94
Plestis K A	340	6	1.76	1.84	2.05	(0.75, 4.46)	594	2.94
Montefiore - Einstein	228	4	1.75	1.81	2.07	(0.56, 5.31)	430	2.67
Montefiore - Moses	100	2	2.00	1.94	2.20	(0.25, 7.96)	135	4.02
Mount Sinai Hospital	12	0	0.00	1.62	0.00	(0.00,40.33)	29	2.57
Quaegebeur J	.	.	.	.	.	(. . .)	10	0.00
NYP- Columbia Presby.	.	.	.	.	.	(. . .)	9	0.00
Univ.Hosp-Stony Brook	.	.	.	.	.	(. . .)	1	0.00
Raza S	138	9	6.52	2.11	6.62 *	(3.02,12.56)	171	8.43 *
Buffalo General Hosp	50	3	6.00	2.45	5.24	(1.05,15.31)	59	6.29
Erie County Med Ctr	64	3	4.69	2.00	5.01	(1.01,14.64)	85	6.99
Mercy Hospital	24	3	12.50	1.68	15.86 *	(3.19,46.33)	27	21.85 *
Reddy R C	138	3	2.17	2.15	2.16	(0.43, 6.30)	216	2.23
Lenox Hill Hospital	138	3	2.17	2.15	2.16	(0.43, 6.30)	215	2.24
SVCMC- St. Vincents	.	.	.	.	.	(. . .)	1	0.00
Ribakove G	152	3	1.97	2.57	1.64	(0.33, 4.79)	359	4.09
Bellevue Hospital Ctr	46	0	0.00	2.21	0.00	(0.00, 7.72)	107	7.11
NYU Hospitals Center	106	3	2.83	2.73	2.22	(0.45, 6.47)	252	3.15
Saifi J	406	5	1.23	2.12	1.24	(0.40, 2.89)	598	2.77
Champ.Valley Phys Hosp	4	0	0.00	0.79	0.00	(0.00,100.0)	4	0.00
Ellis Hospital	1	0	0.00	1.26	0.00	(0.00,100.0)	1	0.00
St. Peters Hospital	401	5	1.25	2.14	1.25	(0.40, 2.91)	593	2.77
Sarabu M	476	7	1.47	1.99	1.58	(0.63, 3.25)	640	1.97 **
Mount Sinai Hospital	113	1	0.88	1.88	1.00	(0.01, 5.58)	149	0.91
Westchester Med Ctr	363	6	1.65	2.03	1.74	(0.64, 3.80)	491	2.22

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
Schwartz C F	145	2	1.38	1.59	1.85	(0.21, 6.70)	204	3.91
Bellevue Hospital Ctr	124	2	1.61	1.34	2.58	(0.29, 9.31)	169	4.61
NYU Hospitals Center	21	0	0.00	3.08	0.00	(0.00,12.13)	35	2.42
Singh C	315	9	2.86	1.87	3.27	(1.49, 6.21)	390	6.09 *
Ellis Hospital	146	4	2.74	1.74	3.37	(0.91, 8.63)	176	6.22
St. Elizabeth Med Ctr	169	5	2.96	1.98	3.20	(1.03, 7.47)	214	6.00
Spielvogel D	244	6	2.46	2.44	2.16	(0.79, 4.69)	342	3.21
Mount Sinai Hospital	140	6	4.29	2.36	3.88	(1.42, 8.44)	197	4.04
Westchester Med Ctr	104	0	0.00	2.54	0.00	(0.00, 2.97)	145	1.99
Tortolani A	447	5	1.12	2.25	1.06	(0.34, 2.48)	615	2.50
NY Hospital - Queens	44	0	0.00	2.21	0.00	(0.00, 8.06)	55	0.00
NY Methodist Hospital	147	3	2.04	1.86	2.34	(0.47, 6.84)	190	4.93
NYP- Weill Cornell	256	2	0.78	2.47	0.68	(0.08, 2.44)	370	1.87
Zervos M	68	1	1.47	1.30	2.41	(0.03,13.41)	75	3.47
Bellevue Hospital Ctr	66	1	1.52	1.33	2.44	(0.03,13.58)	73	3.51
NYU Hospitals Center	2	0	0.00	0.58	0.00	(0.00,100.0)	2	0.00
Zias E	378	6	1.59	2.17	1.57	(0.57, 3.41)	492	2.53
Mount Sinai Hospital	125	2	1.60	1.71	2.00	(0.22, 7.22)	171	3.25
Westchester Med Ctr	253	4	1.58	2.39	1.41	(0.38, 3.62)	321	2.24

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

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

SURGEON AND HOSPITAL VOLUMES FOR TOTAL ADULT CARDIAC SURGERY, 2003-2005

Table 7 presents, for each hospital and for each surgeon performing at least 200 cardiac operations in any hospital in 2003 – 2005 and/or performing one or more cardiac operations in each of the years 2003 – 2005, 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.

Please note that the data presented in Table 7 includes all reported cardiac surgery cases. Cases excluded from reporting in the risk-adjusted mortality analyses, including those Non-NYS residents with surgery in December of 2005, are included in this table. For this reason, the hospital and surgeon volumes presented here differ slightly from those presented in previous tables.

Table 7: Surgeon and Hospital Volume for Isolated CABG, Valve or Valve/CABG, Other Cardiac Surgery, and Total Adult Cardiac Surgery, 2003-2005

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Albany Medical Center				
Britton L	387	144	45	576
Devejian N	0	4	22	26
Fuzesi L	148	26	13	187
Miller S	386	157	20	563
Sardella G	435	151	29	615
All Others	94	24	34	152
Total	1450	506	163	2119
Arnot Ogden Med Ctr				
Curiale S V	132	30	2	164
Nast E	212	63	12	287
Total	344	93	14	451
Bellevue Hospital Ctr				
Ciuffo G B	2	1	2	5
Grau J B	97	43	16	156
Ribakove G	46	61	13	120
Schwartz C F	124	45	15	184
Zervos M	66	7	10	83
All Others	1	0	1	2
Total	336	157	57	550

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Beth Israel Med Ctr				
Geller C M	68	22	5	95
Harris L	188	39	4	231
Hoffman D	143	26	6	175
Stelzer P	42	234	163	439
Tranbaugh R	464	177	19	660
Total	905	498	197	1600
Buffalo General Hosp				
Ashraf M	11	1	1	13
Brodman R	120	46	5	171
Grosner G	766	390	50	1206
Karamanoukian H L	190	10	22	222
Lewin A	330	7	8	345
Raza S	50	9	9	68
All Others	2	1	8	11
Total	1469	464	103	2036
Champ.Valley Phys Hosp				
Bennett E	14	3	0	17
Dal Col R	1	0	0	1
Depan H	1	0	0	1
Saifi J	4	0	0	4
All Others	67	3	1	71
Total	87	6	1	94
Childrens Hospital				
All Physicians	0	0	1	1
Total	0	0	1	1
Ellis Hospital				
Afifi A	208	54	6	268
Depan H	286	229	54	569
Reich H	308	84	8	400
Saifi J	1	0	1	2
Singh C	146	30	5	181
Total	949	397	74	1420
Erie County Med Ctr				
Aldridge J	8	4	0	12
Ashraf M	52	14	1	67
Bell-Thomson J	447	197	67	711
Datta S	186	18	52	256
Jennings L	0	1	0	1

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Erie County Med Ctr continued				
Raza S	64	21	12	97
All Others	1	0	1	2
Total	758	255	133	1146
LIJ Medical Center				
Graver L	346	336	96	778
Manetta F	159	76	22	257
Palazzo R	314	159	23	496
Parnell V	0	1	18	19
All Others	0	0	6	6
Total	819	572	165	1556
Lenox Hill Hospital				
Fonger J D	28	12	3	43
Loulmet D F	35	306	37	378
Patel N C	372	145	27	544
Patel N U	209	46	8	263
Reddy R C	140	77	30	247
Subramanian V	543	211	50	804
Tolis G	51	26	55	132
All Others	12	7	2	21
Total	1390	830	212	2432
M. I. Bassett Hospital				
Lancey R A	135	37	6	178
All Others	96	21	7	124
Total	231	58	13	302
Maimonides Medical Ctr				
Abrol S	183	56	64	303
Acinapura A	11	2	1	14
Brevetti G R	3	3	1	7
Cunningham J N	165	54	16	235
Genovesi M H	56	10	4	70
Jacobowitz I	556	242	58	856
Sabado M	58	18	8	84
Vaynblat M	268	74	27	369
Zisbrod Z	196	51	8	255
All Others	29	5	2	36
Total	1525	515	189	2229
Mercy Hospital				
Carlson R E	297	26	13	336
Downing S W	340	48	43	431

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
<i>Mercy Hospital continued</i>				
Raza S	24	3	6	33
All Others	1	0	1	2
Total	662	77	63	802
Millard Fillmore Hosp				
Aldridge J	229	24	28	281
Ashraf M	545	137	18	700
Brodman R	55	6	1	62
Datta S	6	0	0	6
Jennings L	80	4	0	84
Lewin A	1	0	0	1
All Others	12	3	1	16
Total	928	174	48	1150
Montefiore - Einstein				
Attai L	2	1	2	5
Camacho M	0	1	0	1
Frymus M	218	72	11	301
Garcia J P	9	10	2	21
Merav A	9	2	0	11
Plestis K A	228	202	128	558
All Others	72	40	11	123
Total	538	328	154	1020
Montefiore - Moses				
Attai L	220	101	12	333
Camacho M	3	1	1	5
Crooke G	10	5	5	20
Frymus M	2	0	0	2
Garcia J P	125	33	56	214
Merav A	224	99	12	335
Plestis K A	100	35	15	150
All Others	157	67	30	254
Total	841	341	131	1313
Mount Sinai Hospital				
Adams DH	58	437	92	587
Aklog L	173	97	24	294
Filsoufi F	131	90	21	242
Griep R	4	40	234	278
Lansman S	132	59	49	240
Nguyen K	0	1	22	23
Plestis K A	12	17	38	67
Sarabu M	113	36	5	154

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Mount Sinai Hospital continued				
Spielvogel D	140	57	169	366
Zias E	125	46	16	187
All Others	1	4	26	31
Total	889	884	696	2469
NY Hospital - Queens				
Ko W	411	99	47	557
Mack CA	12	3	2	17
Tortolani A	44	11	1	56
All Others	247	89	14	350
Total	714	202	64	980
NY Methodist Hospital				
Lee L Y	65	17	27	109
Mack CA	1	0	0	1
Tortolani A	147	43	3	193
Total	213	60	30	303
NYP- Columbia Presby.				
Argenziano M	126	134	116	376
Chen J M	1	3	27	31
Esrig B	1	1	4	6
Mosca R S	1	5	43	49
Naka Y	217	169	204	590
Oz M	348	535	82	965
Quaagebeur J	0	10	83	93
Rose E	19	22	5	46
Smith C	335	511	112	958
Stewart A S	109	85	135	329
All Others	35	25	146	206
Total	1192	1500	957	3649
NYP- Weill Cornell				
Brodman R	0	1	0	1
Chen J M	0	1	5	6
Girardi L	510	408	550	1468
Isom O	49	111	11	171
Ko W	98	53	11	162
Krieger K	389	409	29	827
Lee L Y	200	92	19	311
Mack CA	34	17	5	56
Tortolani A	256	114	11	381
All Others	1	0	3	4
Total	1537	1206	644	3387

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
NYU Hospitals Center				
Ciuffo G B	60	66	25	151
Colvin S	48	695	103	846
Crooke G	1	0	0	1
Culliford A	193	214	44	451
Esposito R	0	1	0	1
Galloway A	111	377	68	556
Grau J B	0	4	2	6
Grossi E	27	39	19	85
Ribakove G	106	148	37	291
Schwartz C F	21	14	12	47
Zervos M	2	0	2	4
Total	569	1558	312	2439
North Shore Univ Hosp				
Camacho M	152	67	17	236
Esposito R	562	241	31	834
Hall M	401	227	23	651
Hartman A	306	444	99	849
Kalimi R	157	57	17	231
Pogo G	360	212	52	624
Vatsia S	302	133	34	469
All Others	13	4	5	22
Total	2253	1385	278	3916
Rochester General Hosp				
Cheeran D	679	290	85	1054
Green G R	431	107	37	575
Kirshner R	640	399	68	1107
All Others	11	0	0	11
Total	1761	796	190	2747
SVCMC- St. Vincents				
Ciuffo G B	16	16	2	34
Lang S	373	127	35	535
Reddy R C	0	1	0	1
Shin Y T	334	129	38	501
All Others	2	1	6	9
Total	725	274	81	1080
St. Elizabeth Med Ctr				
El Amir N	158	81	27	266
Joyce F	298	190	22	510
Kelley J	327	138	31	496
Singh C	169	45	4	218
Total	952	454	84	1490

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
St. Francis Hospital				
Bercow N	462	210	33	705
Colangelo R	641	208	18	867
Damus P	386	319	41	746
Davison M J	142	25	1	168
Durban L	19	11	5	35
Fernandez H A	345	78	17	440
Lamendola C	483	210	21	714
Robinson N	565	307	45	917
Taylor J	609	399	39	1047
Total	3652	1767	220	5639
St. Josephs Hospital				
Green G R	7	1	1	9
Marvasti M	334	262	54	650
Nazem A	496	169	31	696
Rosenberg J	379	246	92	717
Zhou Z	411	104	20	535
All Others	0	0	2	2
Total	1627	782	200	2609
St. Lukes at St. Lukes				
Derose J J	222	139	75	436
Swistel D	310	217	38	565
All Others	13	14	7	34
Total	545	370	120	1035
St. Peters Hospital				
Bennett E	222	218	62	502
Canavan T	411	74	5	490
Dal Col R	365	242	39	646
Saifi J	401	192	30	623
All Others	0	0	1	1
Total	1399	726	137	2262
Staten Island Univ Hosp				
McGinn J	1054	161	18	1233
Molinaro P J	220	68	5	293
Nabagiez J P	16	11	4	31
Rosell F M	255	36	20	311
Total	1545	276	47	1868

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Strong Memorial Hosp				
Hicks G	342	160	69	571
Knight P	573	405	148	1126
Massey H	244	68	127	439
All Others	0	0	30	30
Total	1159	633	374	2166
United Health Services				
Quintos E	266	59	12	337
Wong K	303	99	14	416
Yousuf M	281	98	28	407
Total	850	256	54	1160
Univ.Hosp-Brooklyn				
Brevetti G R	50	36	9	95
Burack J H	49	19	6	74
Genovesi M H	97	15	1	113
Lowery R C	104	80	18	202
Total	300	150	34	484
Univ.Hosp-SUNY Upstate				
Alfieris G	0	3	30	33
El Amir N	10	8	4	22
Fink GW	329	149	57	535
Lutz C J	295	135	31	461
Picone A	219	130	28	377
All Others	25	6	6	37
Total	878	431	156	1465
Univ.Hosp-Stony Brook				
Bilfinger T	184	53	30	267
Krukenkamp I	326	159	41	526
McLarty A	150	28	32	210
Quaagebeur J	0	1	2	3
Seifert F	619	178	26	823
Total	1279	419	131	1829
Vassar Bros. Med Ctr				
Ciaburri D	244	206	24	474
Zakow P	324	115	22	461
Total	568	321	46	935

Table 7 continued

	Isolated CABG	Valve or Valve/CABG	Other Cardiac Surgery	Total Cardiac Surgery
Westchester Med Ctr				
Fleisher A	300	85	40	425
Fuzesi L	30	6	20	56
Lansman S	113	35	4	152
Sarabu M	363	128	44	535
Spielvogel D	105	41	28	174
Zias E	253	68	38	359
All Others	359	124	67	550
Total	1523	487	241	2251
Winthrop Univ. Hosp				
Goncalves J A	160	55	33	248
Kofsky E	336	101	12	449
Kokotes W J	215	109	18	342
Schubach S	329	183	15	527
All Others	58	12	3	73
Total	1098	460	81	1639
Statewide Total	40460	20668	6895	68023

Criteria Used in Reporting Significant Risk Factors (2005)

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 • Diabetes Requiring Medication • Extensive Aortic Atherosclerosis • 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>The patient is receiving either oral hypoglycemics or insulin prior to hospital admission.</p> <p>Ascending, transverse, and/or descending aortic atherosclerosis marked by either extensive calcification or luminal atheroma such that the intended surgical procedure is altered.</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 	<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) in the specified time period prior to 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 muscle, 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 2003-2005 Risk Factors For Isolated CABG In-Hospital/30-Day Mortality

The significant pre-procedural risk factors for in-hospital mortality following isolated CABG in the 2003-2005 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 1.904. This means that a patient with COPD is approximately 1.904 times as likely to die in the hospital during or after undergoing CABG or after discharge but within 30 days 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 5 groups: occurring less than 6 hours prior to surgery; occurring 6-23 hours prior to surgery; occurring 1-7 days prior to surgery; occurring 8-14 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 above 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 less than 20% is about 3.738 times as likely to die in the hospital or after discharge but within 30 days 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 or after discharge but within 30 days that is approximately 1.065 times the chance that a 62 year-old patient undergoing CABG surgery has of dying in the hospital or after discharge but within 30 days, all other risk factors being the same. All patients age 55 or under have roughly the same odds of dying in the hospital or after discharge but within 30 days 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/30-day deaths in NYS, 2003-2005.

Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
Demographic				
Age: Number of years greater than 55	—	0.0631	<.0001	1.065
Female Gender	27.90	0.6089	<.0001	1.838
Hemodynamic State				
Hemodynamically Stable		---Reference---		1.000
Unstable	1.67	0.9880	<.0001	2.686
Shock	0.26	2.3858	<.0001	10.868
Ventricular Function				
Ejection Fraction				
Ejection Fraction \geq 40%	78.71	---Reference---		1.000
Ejection Fraction < 20 %	2.01	1.3185	<.0001	3.738
Ejection Fraction 20-29 %	6.83	0.7727	<.0001	2.166
Ejection Fraction 30-39 %	12.45	0.6036	<.0001	1.829
Previous MI				
No Previous MI within 14 days	76.27	---Reference---		1.000
Previous MI < 6 hours	0.84	1.2575	<.0001	3.517
Previous MI 6 - 23 hours	1.24	0.7708	0.0018	2.161
Previous MI 1 - 7 days	17.26	0.5486	<.0001	1.731
Previous MI 8 - 14 days	4.39	0.5470	0.0003	1.728
Comorbidities				
Cerebrovascular Disease	18.64	0.4188	<.0001	1.520
COPD	17.55	0.6442	<.0001	1.904
Diabetes Requiring Medication	35.26	0.5560	<.0001	1.744
Extensive Aortic Atherosclerosis	6.22	0.5926	<.0001	1.809
Peripheral Vascular Disease	11.23	0.6589	<.0001	1.933
Renal Failure				
No Renal Failure	96.19	---Reference---		1.000
Renal Failure, Creatinine > 2.5 mg/dl	1.82	1.0822	<.0001	2.951
Renal Failure Requiring Dialysis	1.99	1.7899	<.0001	5.989
Previous Open Heart Operations	4.07	1.1247	<.0001	3.079
Sum of Binary Risk Factors Squared	—	-0.0256	0.0241	0.975

Intercept = -6.1019

C Statistic = 0.791

Appendix 2 2003-2005 Risk Factors For Valve Surgery In-Hospital/30-Day Mortality

The significant pre-procedural risk factors for in-hospital mortality following valve surgery in the 2003-2005 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 or after discharge but within 30 days 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 1.771. This means that a patient with COPD is approximately 1.771 times as likely to die in the hospital during or after undergoing valve surgery or after discharge but within 30 days 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 is of dying in the hospital during or after that particular surgery or after discharge but

within 30 days 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 1.505 times as likely to die in the hospital during or after surgery or after discharge but within 30 days 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 ejection fraction 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, age and ejection fraction are interpreted in the way as previously described.

In this model Renal Failure includes patients with either pre-operative creatinine greater than 2.5 mg/dl or pre-operative dialysis. The odds ratio compares these patients to those without renal failure.

Appendix 2: Multivariable risk factor equation for valve surgery in-hospital/30 day deaths in NYS, 2003-2005.

Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
Demographic				
Age: number of years greater than 55	—	0.0508	<.0001	1.052
Female Gender	49.22	0.4149	<.0001	1.514
Type of Valve Surgery				
Aortic Valve Replacement	45.48	----Reference----		1.000
Mitral Valve Replacement	18.44	0.4087	0.0011	1.505
Mitral Valve Repair	18.74	-0.1876	0.3042	0.829
Multiple Valve Repair/Replacement	17.34	0.8375	<.0001	2.311
Hemodynamic State				
Hemodynamically Stable	98.73	----Reference----		1.000
Unstable	1.04	1.0909	<.0001	2.977
Shock	0.24	2.0814	<.0001	8.015
Ventricular Function				
Ejection Fraction				
Ejection Fraction \geq 40%	83.50	----Reference----		1.000
Ejection Fraction < 30 %	7.36	0.7095	<.0001	2.033
Ejection Fraction 30-39 %	9.14	0.4695	0.0005	1.599
Comorbidities				
COPD	17.31	0.5717	<.0001	1.771
Diabetes Requiring Medication	16.29	0.4476	<.0001	1.564
Endocarditis	5.29	1.0730	<.0001	2.924
Extensive Aortic Atherosclerosis	6.44	0.4866	0.0005	1.627
Peripheral Vascular Disease	5.30	0.4396	0.0023	1.552
Renal Failure	4.60	1.1661	<.0001	3.209
Previous Open Heart Operations	18.71	0.5433	<.0001	1.722
Intercept = -5.0830				
C Statistic = 0.796				

Appendix 3 2003-2005 Risk Factors For Valve and CABG Surgery In-Hospital/30-Day Mortality

The significant pre-procedural risk factors for in-hospital/30-day mortality following valve and CABG surgery in the 2003-2005 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 or after discharge but within 30 days 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 1.367. This means that a patient with Cerebrovascular Disease is approximately 1.367 times as likely to die in the hospital during or after undergoing valve and CABG surgery or after discharge but within 30 days 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 is to die in the hospital during or after that particular surgery or after discharge but within 30 days 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 2.364 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, ejection fraction, 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 ejection fraction 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 or after discharge but within 30 days 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 or after discharge but within 30 days is only 0.523 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 three groups (occurring less than 24 hours prior to the procedure, 1-20 days prior to the procedure, and no MI within 20 days 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 within 20 days prior to the procedure.

Appendix 3: Multivariable risk factor equation for valve and CABG surgery in-hospital/30-day deaths in NYS, 2003-2005.

Patient Risk Factor	Prevalence (%)	Logistic Regression		
		Coefficient	P-Value	Odds Ratio
Demographic				
Age: Number of years greater than 65	—	0.0630	<.0001	1.065
Body Surface Area	—	-0.6481	0.0010	0.523
Female Gender	38.39	0.2675	0.0044	1.307
Type of Valve (with CABG)				
Aortic Valve Replacement	53.50	----Reference----		1.000
Mitral Valve Replacement	14.71	0.8603	<.0001	2.364
Mitral Valve Repair	21.48	0.3190	0.0065	1.376
Multiple Valve Repair/Replacement	10.31	0.9956	<.0001	2.706
Ventricular Function				
Ejection Fraction				
Ejection Fraction ≥ 40%	69.56	----Reference----		1.000
Ejection Fraction < 20 %	4.12	0.8027	<.0001	2.232
Ejection Fraction 20-29 %	11.06	0.5790	<.0001	1.784
Ejection Fraction 30-39 %	15.26	0.5691	<.0001	1.767
Previous MI				
No Previous MI within 20 days	84.19	----Reference----		1.000
Previous MI < 24 hours	1.08	1.5424	<.0001	4.676
Previous MI 1 - 20 days	14.72	0.3021	0.0039	1.353
Hemodynamic State				
Shock	0.65	1.1502	0.0005	3.159
Comorbidities				
Cerebrovascular Disease	22.33	0.3124	0.0005	1.367
COPD	23.47	0.3619	<.0001	1.436
Diabetes Requiring Medication	29.51	0.3503	<.0001	1.420
Endocarditis	1.48	0.9218	0.0002	2.514
Extensive Aortic Atherosclerosis	10.87	0.4911	<.0001	1.634
Hepatic Failure	0.11	1.9663	0.0038	7.144
Renal Failure				
No Renal Failure	94.21	----Reference----		1.000
Renal Failure, Creatinine > 2.5 mg/dl	2.71	0.5640	0.0034	1.758
Renal Failure Requiring Dialysis	3.08	1.2270	<.0001	3.411
Previous Open Heart Operations	8.86	0.7748	<.0001	2.170
Intercept = -3.1644				
C Statistic = 0.759				

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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