

Cardiac Surgery

in 2000
in New Jersey

Technical Report



James E. McGreevey
Governor



Clifford R. Lutz, M.D.
Commissioner

October, 2003

Message From The Commissioner

We are pleased to present Cardiac Surgery in New Jersey, the state's fifth consumer report on coronary artery bypass graft surgery. This report summarizes the results of an analysis of mortality for patients of the New Jersey hospitals performing bypass surgery in 2000.

In facing bypass surgery, patients and their families usually have questions and concerns. We hope this guide answers some of these questions, and helps patients discuss concerns and treatment options with their physicians.

The Department has worked closely with the Cardiovascular Health Advisory Panel (CHAP) to bring consumers and providers the best possible data on cardiac surgery outcomes. This report reflects a change in methodology to capture deaths after hospital discharge. It also provides information on the total number of cardiac surgeries physicians perform, including but not limited to bypass surgeries. These changes were discussed with the CHAP, which includes physicians who specialize in cardiac medicine and surgery. I would like to thank the panel members for their ongoing efforts to support quality improvement in cardiac services in New Jersey.

Clifton R. Lacy, M.D.
Commissioner

New Jersey's Cardiovascular Health Advisory Panel (CHAP)

Charles Dennis, MD, FACC - Chairman of the CHAP

Chairman, Department of Cardiovascular Diseases
Deborah Heart and Lung Center

Devendra K. Amin, MD, FACP, FCCP
Medical Director
Warren Hospital Cardiac Catheterization Lab

Fred Auerson, MD, FACC, FSCAI
The Heart Group, PA
Millburn, New Jersey

Anthony J. DelRossi, MD
Head, Division of Cardiothoracic Surgery
Cooper Hospital/University Medical Center

Barry C. Esrig, MD, FACS, FACC, FCCP
Chief, Division of Cardiothoracic Surgery
University of Medicine and Dentistry NJ
University Hospital

Brian G. Firth, MD, PhD, FACC
Vice President, Medical Affairs and Health
Economics Worldwide
Cordis Corporation

Veronica F. Gilligan, MS, SPHR
HR Consultant

Mary Jo Goodman, RN, MBA
Director, Cardiac and Critical Care Services
Somerset Medical Center

David V. Habif, Jr., MD
Vice Chairman, HCAB
Tenafly, New Jersey

Michael B. Kesselbrenner, MD, FACC, FACP
Garden State Cardiology
Paramus, New Jersey

Austin H. Kutscher, Jr., MD, FACC
Director of Cardiac Rehabilitation
Hunterdon Medical Center
Flemington, New Jersey

Glenn Laub, MD
Chairman, Dept. of Cardiothoracic Surgery
St. Francis Medical Center

Donald Liss, MD
Senior Medical Director
Aetna

Grant V. S. Parr, MD, FACS, FACC, FCCP
Chairman of Cardiovascular Surgery
Atlantic Health Systems

Milton Prystowsky, MD, FAAP, FACC
Public Health Council Member
Nutley, New Jersey

Vincent Spagnuolo, Jr., MD, FACC
Larchmont Medical Center
Mt. Laurel, New Jersey

William Tansey, III, MD, FACC, FACP
Summit Medical Group, PA
Short Hills, New Jersey

Barbara J. Taptich, RN, MA
Project Leader, Learning & Development
Johnson & Johnson Health Care Systems

Edward Tetelman, Esq.
Acting Public Guardian
Department of Health and Senior Services

Rita Watson, MD, FACC
Monmouth Cardiology Associates
Long Branch, New Jersey

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Section 1.

Introduction

This is a report on the quality of care provided by hospitals and surgeons performing bypass surgery in New Jersey. It is the fifth in a series of reports providing useful information on quality of cardiac surgical care. The mortality or death rates of the bypass surgery patients provide one measure of the quality of surgical care provided by surgeons and hospitals. The rates are adjusted statistically by factors based on the health condition of patients before the surgery.

This report provides hospitals and surgeons that perform isolated coronary artery bypass graft (CABG) surgery (simply called bypass surgery) with information to increase their understanding of the risk factors related to mortality for potential bypass surgery patients. Such information encourages them to examine their surgical procedures and make changes to improve the quality of bypass surgery in New Jersey. The report also is for patients and families of patients facing the possibility of coronary artery bypass graft surgery.

Organization of this report

The report is divided into five main sections. After this introductory section, Section 2 provides some background information on bypass surgery as a treatment for coronary artery disease. Section 3 describes the data collection process and gives an account of the audits and checks for data accuracy. Section 4 presents the methods to identify the significant before-surgery health factors and adjust the mortality estimates. Section 5 presents the results of the analysis in three parts:

- (1) Comparisons of risk-adjusted patient mortality for hospitals to the state average in 2000;
- (2) Comparisons of the risk-adjusted patient mortality for surgeons to the state in 2000; and
- (3) Comparisons of the statewide risk-adjusted patient mortality for each year in 1994-2000 to the average for the period.

Section 2.

Background

Coronary artery disease and bypass surgery

According to the American Heart Association, nearly 2600 Americans die of cardiovascular disease (CVD) each day, an average of one death every 33 seconds. CVD is the single largest killer of Americans, and the most common form of CVD is coronary artery disease.

Coronary artery disease is a chronic disease brought about when fat and cholesterol gradually deposit in the lining of blood vessels that supply the heart. The heart muscle works continuously and needs an adequate flow of blood to supply it with nutrients. Over time, the fat deposits may harden and partially block the blood vessels, causing a reduction in blood flow to the heart. This can lead to chest pains called angina, which are warning signs for heart attacks (myocardial infarction). A heart attack occurs when one or more vessels carrying blood to the heart muscle are totally blocked.

The two most common procedures for the treatment of coronary artery disease are Coronary Artery Bypass Graft (CABG) surgery and percutaneous transluminal coronary angioplasty (PTCA). Despite recent large increases in the number of PTCA procedures performed, for many coronary artery disease patients, bypass surgery remains the treatment of choice. So, for many people, useful information on this surgical operation could be indispensable. This report aims at fulfilling some of that need.

In bypass surgery, the surgeon uses a healthy blood vessel from another part of the body to create an alternate path or graft for blood to flow to the heart, bypassing the blockage caused by the disease. That allows oxygen-rich blood to flow freely to nourish the heart muscle. Surgeons often create one, two, three, or sometimes more grafts for patients, depending on how many blood vessels (and their main branches) are blocked.

Public disclosure and quality improvement

Four states, including New Jersey, have issued reports on bypass surgery outcomes for hospitals, and sometimes surgeons. New York first published a bypass surgery report card in 1990, presenting 1989 data, and currently also publishes a report card on angioplasty. Pennsylvania has published several cardiac report cards starting with 1990 data. California has published several report cards with the most recent using 1999 data. In 1997, New Jersey began reporting on patient mortality for bypass surgery hospitals and surgeons using 1994 and 1995 data. The experience from these states is that these disclosures have contributed to the setting up of many hospital quality improvement initiatives and significant reductions in bypass surgery mortality in these states. In New Jersey, mortality was reduced substantially between 1994 and 2000. In this report, we present the results from an analysis confirming a downward trend in mortality.

Section 3.

Bypass surgery data used for this report

For the analysis in this report we used data on all adult patients in New Jersey who underwent bypass surgery with no other major surgery during the same admission. These are often called isolated bypass surgery. As in previous years, the data also includes that from bypass surgery using the newer minimally invasive methods first performed in New Jersey in 1996.

The last report “Cardiac Surgery in New Jersey, 1999” estimated risk-adjusted mortality for hospitals using 1999 data. That was the most current complete data available for analysis at the time. The current report presents risk-adjusted mortality for hospitals and surgeons using 2000 data, the most recent complete audited data available for analysis.

All licensed cardiac surgery centers in New Jersey submit data on adult bypass patients to the Department on a quarterly basis. The data includes patient demographics, patient health history before bypass surgery, and whether the patient died in the hospital. The 2000 data includes submissions from 15 licensed cardiac surgery centers. Two other currently licensed cardiac surgery facilities are not included in this report. They are: Englewood Hospital and Medical Center, which was licensed in July 2000, and Atlantic City Medical Center which was licensed in August 2001. These newer cardiac surgery centers will be included in future reports when they have a full calendar year of data to report.

The Department sets the criteria for collecting the data and checks the data using traditional quality checking procedures. Independent external teams of medical chart reviewers also audit and verify the accuracy of the data against the actual clinical records at each hospital. If discrepancies are found

between the data submitted and the clinical records, hospitals provide corroborating documentation or revise their data. The Department also verifies the data submitted using other data sets, to confirm that all bypass surgical operations and all deaths from bypass surgery were reported.

Hospitals and surgeons are not penalized for operating on high risk patients

Great care is taken to ensure that this report card does not discourage surgeons from operating on patients who are extremely ill. Cardiac surgeons and hospitals in New Jersey have been advised that treating extremely ill patients will not be counted in the calculation of their mortality rates. Hospitals are encouraged to submit the clinical data on such patients for review and possible exclusion from the analysis. Members of the Department’s clinical panel (part of the CHAP) review the clinical data on such patients (with all identifying information removed) and recommend which patients should be excluded from the report. Additionally, the analysis adjusts for the before-surgery health condition of patients. Hospitals and surgeons should, therefore, not have any disincentives to treat extremely ill patients.

Change in defining mortality

The Department, after discussion with the CHAP, has decided to change the way mortality is currently defined for the purposes of the Department’s cardiac surgery performance report. Previously, the Department defined patient death for this report as in-hospital death before discharge from hospital after isolated coronary artery bypass graft (CABG) surgery. As a result, patients who died after being discharged home or to post-acute care facilities were not counted for purposes of calculating mortality rates. However, concerns have been raised about potential “gaming” of outcomes through discharge practices.

Therefore, beginning with this report, the Department is including deaths up to thirty days post surgery or deaths occurring during the hospitalization in which the surgery was performed even after 30 days of the procedure. Deaths occurring within thirty days after surgery, but post-discharge, have been identified by matching patients in the Department's open heart data base with the state's official death records.

Using the new definition of mortality, the Department has also recalculated the statewide mortality rate for the prior years, in order to facilitate trend analysis. Appendix A shows the results. No hospital-specific results i.e.- significantly above or below the mean - changed for prior years under the new methodology.

Section 4.

Identifying the factors affecting patients' risk of death

Observed patient mortality for a hospital or surgeon is estimated as the number of patients who died in the hospital during or after surgery, or patients who died after discharge but within 30 days post surgery, divided by the total number of patients who underwent the surgery.

Unfortunately, this observed patient mortality is not a complete measure of the quality of care provided by a hospital or a surgeon because it does not account for how sick the patients were before surgery. If one hospital had considerably sicker patients than another hospital, it would be expected that its mortality rate would be somewhat higher. So it would not be fair to evaluate surgeons and hospitals performing bypass surgery solely on the basis of the number of their patients that died.

Even though bypass surgery patients' risk of dying may depend on the surgical care they receive, it may also depend on their health condition before the bypass surgery. For instance, an 85 year-old man who has diabetes and lung disease is at a higher risk of dying, when undergoing this surgery, than a 50 year-old man with no history of chronic disease or cardiac surgery.

To undertake an evenhanded analysis of the quality of surgical care provided by surgeons and hospitals performing bypass surgery, the Department uses a method that adjusts the observed patient death rates estimated for each surgeon and each hospital by risk factors based on each patient's before-surgery health condition. This method gives hospitals and surgeons who operate on less healthy patients "extra credit." Such hospitals and surgeons are not at a disadvantage when the outcome of the surgical care they provide is presented next to that by other hospitals and surgeons. Additionally, as stated earlier,

extremely high risk patients, where the probability of death is very high, may, with the concurrence of the clinical review panel, be excluded from the calculation.

The risk adjustment method uses logistic regression techniques to assess the average risk of bypass surgery for all patients based on the key elements of the health history and experience of patients who have undergone bypass surgery in the same period. So it takes into account both the outcome of bypass surgery, estimated by the number of patients who died, and a measure of how sick their patients were before surgery.

Assessing patient risk rates

A model which includes all the before-surgery factors was used to determine which health factors were important in predicting whether a patient will die or not after a bypass surgery. The important risk factors identified from the method are presented in Table 1. The Table includes the list of risk factors, estimates of the coefficients for each significant risk factor, an indication of the level of statistical significance (p-values), and the odds ratios for each factor. It lists only the risk factors that were statistically significant in predicting mortality with p-values of 0.05 or smaller.

The odds ratios are derived from the coefficients, and are used to compare the relative importance of the risk factors in predicting mortality from bypass surgery. For each of the age groups identified in Table 1, the odds ratio represents the number of times more likely that a patient in that age group is to die when compared to a patient who is below 70 years old. The below 70 year-old group is our reference group. So, for example, the Table shows that a patient between 80 and 84 years old has odds of dying in the hospital during or after bypass that are almost three times (2.847) the odds of a patient who is less than 70 years old. This is based on the assumption that both patients have the same set of other risk factors presented in the table.

Table 1
Risk Factors Identified for Isolated Bypass Surgery Operative Deaths* (2000).

Patient Risk Factors identified	Proportion of patients(%)	Logistic Regression Results		
		Coefficient	P-Value	Odds Ratio
Demographic factors				
Age 70 - 74	17.7	0.5289	0.0076	1.697
Age 75 - 79	14.9	0.8415	<.0001	2.320
Age 80 - 84	7.1	1.0461	<.0001	2.847
Age 85 and Over	2.4	1.4086	<.0001	4.090
Medicaid or CHAMPUS	2.3	1.0090	0.0014	2.743
Health factors				
Diabetes	35.0	0.4676	0.0016	1.596
Congestive Heart Failure in the 2 weeks before surgery	17.4	0.6275	<.0001	1.873
Renal Failure with Dialysis	1.1	1.5259	<.0001	4.599
Renal Failure without Dialysis	4.1	0.4657	0.0487	1.593
Immunosuppressive Therapy	1.8	1.0885	0.0004	2.970
Left Main Disease	27.5	0.3935	0.0079	1.482
Lung Disease	10.2	0.5988	0.0009	1.820
Factors related to functioning of the heart				
Unstable Angina	44.9	0.3602	0.0155	1.434
Arrhythmia	9.2	0.5432	0.0031	1.721
Resuscitation	0.5	1.1527	0.0107	3.167
Ejection Fraction less than 30%	7.4	0.4980	0.0119	1.645
Other Factor				
Preoperative Intra Aortic Balloon Pump	7.6	0.6673	0.0008	1.949
Intercept		-5.2045		
C-Statistic		0.768		

SOURCE: New Jersey Department of Health and Senior Services.

*Operative Mortality includes: (1) all deaths occurring during the hospitalization in which the operation was performed, even after 30 days; and (2) those deaths occurring after discharge from the hospital, but within 30 days of the procedures.

Similarly, the odds of a patient with an ejection fraction that is less than 30 percent dying during or after bypass surgery are almost one and a half times (1.645) the odds of a patient with an ejection fraction that is 30 percent or greater. The 30 percent or greater ejection fraction group is our reference group in this case. Also, the odds of a patients with renal failure with dialysis dying in the hospital are more than four times (4.599) the odds of a patient with no renal failure. Patients with no renal failure are our reference group in this case.

For the other risk factors presented in the table, the odds ratio is the number of times more likely that a patient with the risk factor may die after surgery when compared to a patient without the risk factor, if the two patients are identical with respect to all the other risk factors presented in Table 1. For example, a patient who experienced congestive heart failure in the two weeks before bypass surgery has odds of dying during or after surgery that are almost twice (1.873) the odds of a patient who had no congestive heart failure.

Computing the risk-adjusted mortality rate

The risk factors identified and presented in Table 1 were combined to predict the probability of death for each patient. An estimate of the average patient risk of death for a specific hospital's or a surgeon's patients is obtained by summing the probabilities of dying for the patients and dividing by the number of patients operated on in that hospital or by that surgeon. That estimate is the predicted or expected mortality for the hospital or surgeon.

To assess the quality of care provided by each hospital or surgeon, we compared the observed patient mortality with what was expected or predicted based on the risk factors existing for the hospital's or surgeon's patients, i.e. the expected patient mortality. First, the observed patient mortality is divided by the expected mortality. If the resulting ratio is larger than one, the hospital or surgeon has a higher patient mortality than expected on the basis of their patient mix. If the ratio is smaller than one, the hospital or surgeon has a lower mortality than expected based on their patient mix. The ratio is then multiplied by

the statewide average patient mortality to produce the risk-adjusted patient mortality for the hospital or the surgeon.

The risk-adjusted mortality represents the best estimate, based on the associated statistical model of identified health risk factors, of what the hospital's or surgeon's patient mortality would have been if they had a mix of patients identical to the statewide mix. Thus, the risk-adjusted patient mortality has, to the extent possible, ironed out differences among hospitals and among surgeons, in the severity of illness of their patients.

The statistical methods used to predict mortality described above are tested to determine if they are sufficiently accurate in predicting death for all patients – for those who are severely ill prior to undergoing bypass surgery as well as those who are relatively healthy. In the analysis for this report, the tests confirmed that the model is reasonably accurate in predicting how patients of different risk levels will fare when undergoing bypass surgery.

Section 5.

Risk-adjusted patient mortality estimates

This section presents the results of our analysis including:

- (1) comparisons of risk-adjusted patient mortality for hospitals to the state average in 2000;
- (2) comparisons of the risk-adjusted patient mortality for surgeons to the state in 2000;
- (3) comparisons of the statewide risk-adjusted patient mortality for each year in 1994-2000 to the yearly average for the period.

The risk-adjusted mortality estimates are presented in percentage points. The results also include expected ranges of percentages representing the lowest and the highest mortality one would expect within 95 percent confidence intervals.

Risk-adjusted patient mortality for hospitals compared to the state average in 2000

The risk-adjusted patient mortality estimates from bypass surgery for each hospital in 2000 are presented in Table 2. The results compare each hospital's risk-adjusted patient mortality expressed in percentage points, with the statewide mortality.

Table 2
Comparing Hospitals' Patient Operative Mortality* from Bypass Surgery to State Average (2000)

Hospital	Number of Isolated CABG Operations	Patient Operative Deaths*	Observed Patient Mortality (%)	Expected Patient Mortality (%)	Risk Adjusted Patient Mortality (%)	95% Confidence Interval
Cooper Hospital/University Medical Center	219	7	3.20	3.41	2.51	(1.01, 5.17)
Deborah Heart and Lung Center	698	25	3.58	3.37	2.84	(1.84, 4.19)
General Hospital Center at Passaic	238	12	5.04	2.87	4.70	(2.42, 8.20)
Hackensack University Medical Center	835	17	2.04	2.59	2.11	(1.23, 3.37)
Jersey Shore Medical Center	601	7	1.16	2.14	1.45	(0.58, 3.00)
Morristown Memorial Hospital	1,098	17	1.55	2.04	2.03	(1.18, 3.25)
Newark Beth Israel Medical Center	340	9	2.65	2.67	2.66	(1.21, 5.04)
Our Lady of Lourdes Medical Center	788	24	3.05	2.67	3.05	(1.96, 4.54)
Robert Wood Johnson University Hospital	1,030	31	3.01	2.57	3.14	(2.13, 4.45)
St Barnabas Medical Center	264	5	1.89	2.96	1.71	(0.55, 3.99)
St Francis Medical Center	219	3	1.37	2.79	1.31	(0.26, 3.84)
St Joseph's Hospital and Medical Center	548	15	2.74	2.92	2.51	(1.40, 4.14)
St Michael's Medical Center	515	18	3.50	3.57	2.62	(1.55, 4.14)
UMDNJ University Hospital	176	12	6.82	2.77	6.59 HI	(3.40, 11.52)
Valley Hospital	651	18	2.76	2.38	3.11	(1.84, 4.91)
State Total (2000)	8,220	220	2.68	2.68	2.68	

SOURCE: New Jersey Department of Health and Senior Services.

*Operative Mortality includes: (1) all deaths occurring during the hospitalization in which the operation was performed, even after 30 days; and (2) those deaths occurring after discharge from the hospital, but within 30 days of the procedures.

HI - The risk-adjusted patient mortality is significantly higher than the state average mortality based on 95 percent confidence interval.

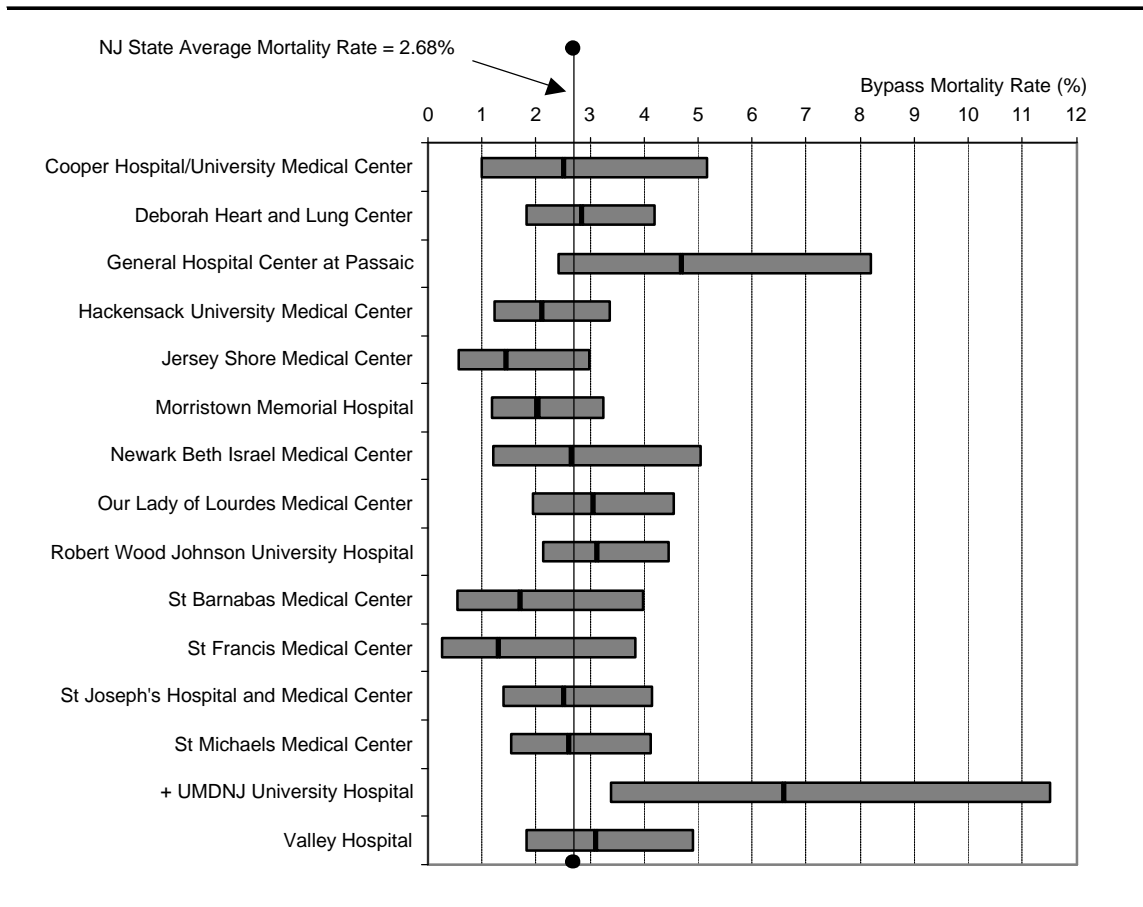
The observed operative mortality statewide in 2000 for bypass patients was 2.68 percent, based on 220 deaths out of 8,220 bypass operations performed.

As in previous reports, there was substantial variation in the observed patient mortality from bypass surgery across hospitals in 2000. It ranged from 1.16 percent in Jersey Shore Medical Center to 6.82 percent in University Hospital. Two hospitals had

patient mortality estimates above 4 percent and four had estimates below 2 percent. The remaining hospitals had estimates between 2 and 4 percent.

The overall mortality rate for the CABG operation performed at the 15 hospitals was 2.68 percent. The range in expected mortality rates, which measures the severity of illness, was 2.14 percent to 3.57 percent.

Figure 1
Comparing Risk-Adjusted Patient Operative Mortality Rate*
For Bypass Surgery in Hospitals to State Average (2000)



SOURCE: New Jersey Department of Health and Senior Services

*Operative Mortality includes: (1) all deaths occurring during the hospitalization in which the operation was performed, even after 30 days; and (2) those deaths occurring after discharge from the hospital, but within 30 days of the procedures.

+ - Risk-adjusted mortality rate significantly higher than the New Jersey mortality rate based on 95 percent confidence interval.

After adjusting for how sick the patients were before surgery at each hospital, we present the estimates of risk-adjusted patient mortality for each hospital in the sixth column of Table 2 and graphically in Figure 1. In the graph, the risk-adjusted mortality estimate is presented as a dark narrow bar in the middle of a broader shaded bar that represents the confidence interval around the estimate. The graph also presents a vertical line drawn to represent the state average patient mortality at 2.68 percent. This line is important because, as stated earlier, all risk-adjusted patient mortality estimates are meaningful only when compared to the statewide average mortality.

If a hospital's shaded bar crosses the state average vertical line, it means that the difference between the hospital's risk adjusted mortality and the state average was not statistically significant. If the whole of a hospital's shaded bar clearly falls to the left of the state average vertical line it means that the hospital's risk adjusted patient mortality was statistically lower than the state average. If the bar falls to the right of the state average vertical line it means that the hospital's risk adjusted mortality was statistically higher than the state average.

In 2000, the risk-adjusted mortality rate for most hospitals were not different from the state average. However, UMDNJ University Hospital had an estimate significantly higher than the state average.

Risk-adjusted patient mortality for surgeons compared to the state average for 2000

This report presents risk-adjusted patient mortality for surgeons in 2000. Due to differences in the definition of risk factors between the 1999 and 2000 data collection forms, we could not combine 1999 and 2000 data to achieve more cases per surgeon.

Risk-adjusted mortality rates were calculated for only those surgeons who performed a minimum of 100 bypass surgeries in 2000. Surgeons in each hospital who

performed less than 100 operations in 2000 were placed in one group categorized as “**All Others**” and risk-adjusted patient mortality was estimated for the group instead of the surgeons individually.

For previous cardiac surgery report cards, the Department has combined two years of data for surgeons in order to increase their case volume and permit reliable calculation of individual risk-adjusted mortality rates for more surgeons. That is not possible for this report, because in 2000 the Department moved to adopt the standardized data collection categories employed by the Society of Thoracic Surgeons in its national, voluntary cardiac surgery data collection efforts. The 2000 data cannot, therefore, be combined with the 1999 data. Starting with the 2001 cardiac surgery report, however, the Department will once again use two years' worth of data to generate the surgeons' risk-adjusted mortality rates.

In this section and in Table 3, the total number of open heart and CABG surgeries by surgeon is displayed, as well as the number of isolated CABG operative deaths for each surgeon. For surgeons with a minimum of 100 isolated CABG surgeries, mortality for 2000 in percentage points is also presented, and each surgeon's risk-adjusted patient mortality from bypass surgery is compared with the state average mortality estimate.

The state average mortality for bypass surgery patients in 2000 was 2.68 percent, based on 220 deaths out of 8,220 bypass operations performed. The table shows one surgeon who performed at least 100 bypass operations with the risk-adjusted patient mortality estimates significantly below the average state patient mortality. It also shows that surgeons grouped under All Others at UMDNJ University Hospital collectively had patient mortality rates that were significantly higher than the state average. As in the previous reports, the patient mortality estimates of the remaining surgeons were not statistically different from the state average.

Table 3
Patient Risk-Adjusted Operative Mortality* Rate for Surgeons (2000)

Hospital and Surgeon	Total Open Heart Procedures	Number of Isolated CABG Operations	Patient Operative Deaths*	Observed Patient Mortality(%)	Expected Patient Mortality(%)	Risk-Adjusted Patient Mortality (%)	95% Confidence Interval
Cooper Hospital/University Medical Center							
All Others (7)	371	219	7	3.20	3.41	2.51	(1.01, 5.17)
Antinori, Charles H.	58	42	2				
Cilley, Jonathan H.	84	39	2				
DelRossi, Anthony J.	36	7	0				
Heim, John	1	1	0				
Marra, Steven W.	94	63	3				
Simonetti, Vincent A.	94	66	0				
Villanueva, Dioscoro	4	1	0				
Total	371	219	7	3.20	3.41	2.51	(1.01, 5.17)
Deborah Heart and Lung Center							
Anderson, William A.	231	151	6	3.97	3.72	2.86	(1.05, 6.23)
Grosso, Michael++	202	107	5	4.67	3.99	3.13	(1.01, 7.32)
McGrath, Lynn B.	395	260	7	2.69	2.88	2.50	(1.00, 5.16)
Ng, Arthur	286	180	7	3.89	3.44	3.03	(1.21, 6.24)
Total	1114	698	25	3.58	3.37	2.84	(1.84, 4.19)
General Hospital Center at Passaic							
Goldenberg, Bruce	191	155	8	5.16	2.61	5.29	(2.28, 10.4)
All Others (4)	110	83	4	4.82	3.36	3.83	(1.03, 9.82)
Dejene, Brook	14	9	0				
Casale, Alfred++	59	46	4				
Kaushik, Raj	36	27	0				
Schechter, Mark++	1	1	0				
Total	301	238	12	5.04	2.87	4.70	(2.42, 8.20)
Hackensack University Medical Center							
Alexander, John	209	118	6	5.08	2.47	5.51	(2.01, 12.0)
Elmann, Elie	196	146	3	2.05	4.46	1.23	(0.25, 3.61)
Praeger, Peter I.	294	227	3	1.32	2.14	1.66	(0.33, 4.84)
Somberg, Eric D.	273	207	0	0.00	2.04	0.00 LO	(0.00, 2.33)
All Others (2)	186	137	5	3.65	2.28	4.28	(1.38, 9.99)
Brenner, William++	90	61	2				
McCullough, Jock	96	76	3				
Total	1158	835	17	2.04	2.59	2.11	(1.23, 3.37)
Jersey Shore Medical Center							
Greeley, Drew P.	210	159	1	0.63	1.92	0.88	(0.01, 4.88)
Johnson, David L.	237	184	2	1.09	2.34	1.24	(0.14, 4.48)
Neibart, Richard M.	226	161	3	1.86	2.17	2.30	(0.46, 6.72)
All Others (2)	115	97	1	1.03	2.09	1.32	(0.02, 7.36)
DeJene, Brook A.	63	58	1				
Osevala, Mark A.++	52	39	0				
Total	788	601	7	1.16	2.14	1.45	(0.58, 3.00)

SOURCE: New Jersey Department of Health and Senior Services.

*Operative Mortality includes: (1) all deaths occurring during the hospitalization in which the operation was performed, even after 30 days; and (2) those deaths occurring after discharge from the hospital, but within 30 days of the procedures.

LO - The risk-adjusted patient mortality is significantly lower than the state average mortality based on 95 percent confidence interval.

HI - The risk-adjusted patient mortality is significantly higher than the state average mortality based on 95 percent confidence interval.

+ - Surgeon no longer at facility.

++ - Surgeon no longer doing surgery in New Jersey.

Table 3 (Continued)
Patient Risk-Adjusted Operative Mortality* Rate for Surgeons (2000)

Hospital and Surgeon	Total Open Heart Procedures	Number of		Observed Patient Mortality(%)	Expected Patient Mortality(%)	Risk-Adjusted Patient Mortality (%)	95% Confidence Interval
		Isolated CABG Operations	Patient Operative Deaths*				
<i>Morristown Memorial Hospital</i>							
Brown, III, John	416	250	3	1.20	1.81	1.78	(0.36, 5.20)
Magovern, Christopher	282	228	3	1.32	2.23	1.58	(0.32, 4.61)
Parr, Grant Van	217	105	1	0.95	1.61	1.58	(0.02, 8.79)
Rodriguez, Alejandro	271	209	3	1.44	2.41	1.60	(0.32, 4.66)
Slater, James	247	214	4	1.87	1.87	2.68	(0.72, 6.86)
All Others (2)	103	92	3	3.26	2.28	3.82	(0.77, 11.2)
Banker, Michael+	102	91	3				
Goldenberg, Bruce	1	1	0				
Total	1536	1098	17	1.55	2.04	2.03	(1.18, 3.25)
<i>Newark Beth Israel Medical Center</i>							
Karanam, Ravindra	173	108	4	3.70	2.88	3.44	(0.93, 8.81)
Saunders, Craig R	163	103	1	0.97	2.42	1.07	(0.01, 5.98)
All Others (5)	235	129	4	3.10	2.69	3.09	(0.83, 7.91)
Fuzesi, Laszlo+	45	21	0				
Gielschinsky, Issac+	32	19	3				
Goldstein, Daniel J.	31	17	0				
Prendergast, Thomas	104	64	0				
Sardari, Frederic F.	23	8	1				
Total	571	340	9	2.65	2.67	2.66	(1.21, 5.04)
<i>Our Lady of Lourdes Medical Center</i>							
DiPaola, Douglas J.	174	130	5	3.85	2.83	3.63	(1.17, 8.48)
Kuchler, Joseph A.	190	134	4	2.99	2.74	2.92	(0.78, 7.46)
Luciano, Pasquale A.	146	130	3	2.31	3.00	2.06	(0.41, 6.01)
Nayar, Amrit	148	103	5	4.85	3.06	4.25	(1.37, 9.91)
Santaspirt, John S.+	156	118	3	2.54	1.69	4.02	(0.81, 11.7)
All Others (4)	229	173	4	2.31	2.68	2.31	(0.62, 5.92)
Eisen, Morris M.	99	71	3				
Heim, John	119	97	1				
Horsky, Timothy++	5	4	0				
Villanueva, Dioscoro	6	1	0				
Total	1043	788	24	3.05	2.67	3.05	(1.96, 4.54)
<i>Robert Wood Johnson University Hospital</i>							
Krause, Tyrone J.	772	575	16	2.78	2.78	2.68	(1.53, 4.35)
Scholz, Peter M.	229	111	3	2.70	2.17	3.34	(0.67, 9.75)
Scott, Gregory E.	266	212	7	3.30	2.38	3.71	(1.49, 7.65)
All Others (3)	206	132	5	3.79	2.28	4.45	(1.43, 10.4)
Anderson, Mark B.	16	15	0				
Spotnitz, Alan J.	111	70	2				
Vasseur, Bernard G.	79	47	3				
Total	1473	1030	31	3.01	2.57	3.14	(2.13, 4.45)

SOURCE: New Jersey Department of Health and Senior Services.

*Operative Mortality includes: (1) all deaths occurring during the hospitalization in which the operation was performed, even after 30 days; and (2) those deaths occurring after discharge from the hospital, but within 30 days of the procedures.

LO - The risk-adjusted patient mortality is significantly lower than the state average mortality based on 95 percent confidence interval.

HI - The risk-adjusted patient mortality is significantly higher than the state average mortality based on 95 percent confidence interval.

+ - Surgeon no longer at facility.

++ - Surgeon no longer doing surgery in New Jersey.

Table 3 (Continued)
Patient Risk-Adjusted Operative Mortality* Rate for Surgeons (2000)

Hospital and Surgeon	Total Open Heart Procedures	Number of		Observed Patient Mortality (%)	Expected Patient Mortality (%)	Risk-Adjusted Patient Mortality (%)	95% Confidence Interval
		Isolated CABG Operations	Patient Operative Deaths*				
St Barnabas Medical Center							
Sardari, Frederic F.	149	121	2	1.65	2.81	1.57	(0.18, 5.68)
All Others (5)	190	143	3	2.10	3.09	1.82	(0.37, 5.31)
Fuzesi, Laszlo	2	2	0				
Goldstein, Daniel J.	3	3	0				
Karanam, Ravindra	17	14	0				
Prendergast, Thomas	78	62	1				
Saunders, Craig R.	90	62	2				
Total	339	264	5	1.89	2.96	1.71	(0.55, 3.99)
St Francis Medical Center							
Laub, Glenn	242	188	2	1.06	2.88	0.99	(0.11, 3.56)
Other (1)	42	31	1				
Costic, Joseph	42	31	1				
Total	284	219	3	1.37	2.79	1.31	(0.26, 3.84)
St Joseph's Hospital and Medical Center							
DeFilippi, Vincent	235	170	5	2.94	3.55	2.22	(0.71, 5.17)
Kaushik, Raj	192	150	4	2.67	3.01	2.37	(0.64, 6.08)
Mekhjian, Haroutun	274	204	6	2.94	2.46	3.20	(1.17, 6.96)
All Others (3)	31	24	0	0.00	1.75	0.00	(0.00, 23.4)
Levy, Dale++	8	4	0				
Saxena, Amarkanth+	21	18	0				
Schechter, Mark++	2	2	0				
Total	732	548	15	2.74	2.92	2.51	(1.40, 4.14)
St Michael's Medical Center							
Asher, Alain	289	204	6	2.94	3.96	1.99	(0.73, 4.32)
Codoyannis, Aristides	149	117	7	5.98	3.49	4.58	(1.84, 9.44)
Esrig, Barry C.+	191	136	3	2.21	2.64	2.24	(0.45, 6.55)
All Others (4)	79	58	2	3.45	4.55	2.03	(0.23, 7.32)
Herman, Steven++	30	19	1				
Jihayel, A.+	3	2	0				
Losman Jacques+	10	8	0				
Scott, Randolph	36	29	1				
Total	708	515	18	3.50	3.57	2.62	(1.55, 4.14)
UMDNJ University Hospital							
All Others (5)	233	176	12	6.82	2.77	6.59 HI	(3.40, 11.52)
Casale, Alfred++	10	5	1				
Jihayel, A.+	106	76	7				
Rajaii-Khorasani, Ahmad+	110	91	4				
Hussain, S.++	4	2	0				
Perera, S.++	3	2	0				
Total	233	176	12	6.82	2.77	6.59 HI	(3.40, 11.52)
Valley Hospital							
Bronstein, E.	271	230	7	3.04	2.70	3.02	(1.21, 6.22)
Mindich, Bruce	489	258	8	3.10	2.22	3.74	(1.61, 7.36)
Rubinstein, M.	172	163	3	1.84	2.18	2.25	(0.45, 6.59)
Total	932	651	18	2.76	2.38	3.11	(1.84, 4.91)
State Total (2000)	11,585	8,220	220	2.68	2.68	2.68	

SOURCE: New Jersey Department of Health and Senior Services.

*Operative Mortality includes: (1) all deaths occurring during the hospitalization in which the operation was performed, even after 30 days; and (2) those deaths occurring after discharge from the hospital, but within 30 days of the procedures.

LO - The risk-adjusted patient mortality is significantly lower than the state average mortality based on 95 percent confidence interval.

HI - The risk-adjusted patient mortality is significantly higher than the state average mortality based on 95 percent confidence interval.

+ - Surgeon no longer at facility.

++ - Surgeon no longer doing surgery in New Jersey.

Statewide risk-adjusted patient mortality for each year in 1994-2000 compared to the yearly average for the period

Table 4 presents the results of an analysis to identify any trend in the statewide mortality of patients who underwent bypass surgery using a statistical model based on data collected over the period 1994 – 2000. The table presents for each of the seven years, the observed patient mortality, expected mortality, and the risk-adjusted patient mortality statewide. Note that the numbers differ

from those shown in previous reports, due to the revised definition of mortality. The table shows whether the risk-adjusted mortality for the year is statistically different from the average mortality over the seven-year period.

The table also shows that between 1999 and 2000, the number of bypass operations performed in New Jersey increased from 8,108 to 8,220 or about 1.4 percent. Over the same period, the number of deaths decreased from 268 to 220 or almost 17 percent.

Table 4
Comparing Risk-Adjusted Patient Operative Mortality* for Each Year
To the Yearly Average for the Period (1994-2000)

Calendar Year	Number of Isolated CABG Operations	Operative Patient Mortality*	Observed Patient Mortality Rate (%)	Risk-Adjusted Patient Mortality Rate (%)		Yearly change in Risk-Adjusted Mortality Rate (%)	Percent Change from 1994 Risk-adjusted Mortality Rate (%)
1994	6,957	274	3.94	4.46	HI	----	----
1995	7,553	327	4.33	4.59	HI	0.13	2.9
1996	8,262	341	4.13	4.12	HI	-0.47	-7.7
1997	8,286	280	3.38	3.20	SA	-0.91	-28.2
1998	8,377	252	3.01	2.92	LO	-0.28	-34.5
1999	8,108	268	3.31	3.04	LO	0.11	-32.0
2000	8,220	220	2.68	2.74	LO	-0.30	-38.7
1994-2000	55,763	1,962	3.52	3.52			

SOURCE: New Jersey Department of Health and Senior Services.

*Operative Mortality includes: (1) all deaths occurring during the hospitalization in which the operation was performed, even after 30 days; and (2) those deaths occurring after discharge from the hospital, but within 30 days of the procedures.

LO - The risk-adjusted patient mortality is significantly lower than the state average mortality for the 1994-2000 period when evaluated with a 95 percent confidence interval.

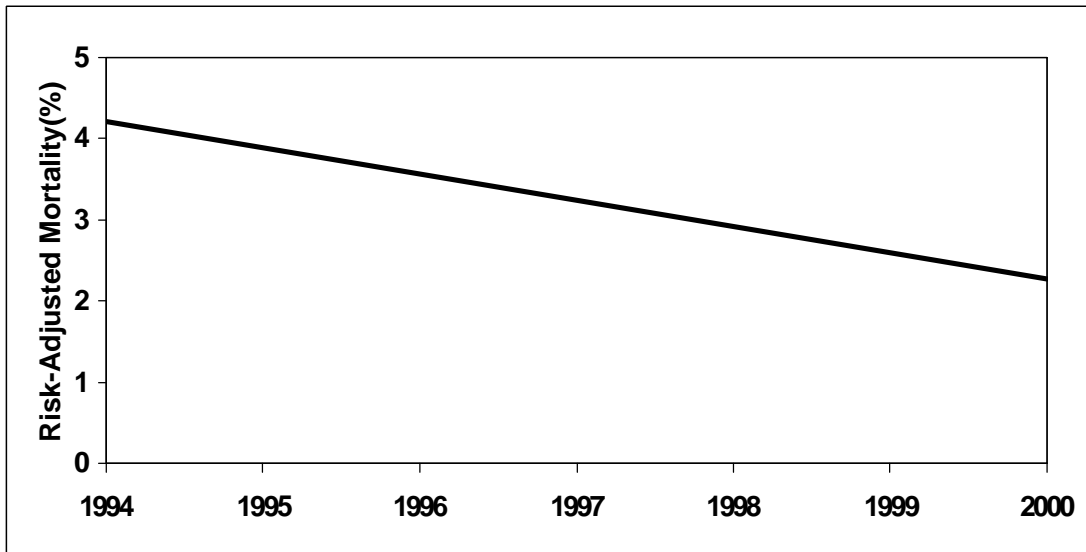
SA - The risk-adjusted patient mortality is same as the state average mortality for the 1994-2000 period when evaluated with a 95 percent confidence interval.

HI - The risk-adjusted patient mortality is significantly higher than the state average mortality for the 1994-2000 period when evaluated with a 95 percent confidence interval.

For most of the period, risk-adjusted operative mortality has dropped by almost 3 percentage points every year. When compared to 1994, patient mortality in 2000 has dropped by more than 35 percent. Figure 2 illustrates the overall downward trend in mortality in New Jersey.

When subjected to statistical tests, the 2000 risk-adjusted patient mortality is not statistically different from the 1999 estimate. From 1998 to 2000 the risk-adjusted patient mortality estimates were significantly lower than the average patient mortality for the period, indicating a trend towards a decline in cardiac bypass surgery mortality.

Figure 2: Trend in Risk-Adjusted Operative Mortality Rate (1994-2000)



SOURCE: NJ Department of Health and Senior Services

Section 6.

Conclusions

This is the fifth in a series of reports presenting information on the risk-adjusted patient mortality for the surgeons and hospitals performing bypass surgery in New Jersey. In this release, we presented the results of analysis using data in 2000 to report on patient mortality for both surgeons and hospitals. The data show the following:

- In 2000, the risk-adjusted patient bypass mortality estimates for most hospitals were not different from the state average. However, one hospital had an estimate significantly higher than the state average.

- In 2000, risk-adjusted patient bypass mortality estimates for most surgeons performing bypass operations were not different from the state average. One surgeon had an estimate significantly lower than the state average and a group of surgeons classified as **All Others** had an estimate significantly higher than the state average.
- Over most of the seven years (1994 through 2000) risk-adjusted patient mortality has dropped substantially. When compared to 1994, patient mortality in 2000 has declined almost 39 percent.

The information presented in this report should encourage hospitals and surgeons to examine their surgical procedures and make changes to improve the quality of bypass surgery in the State.

APPENDIX A

Statewide Observed Mortality Rate

Year	In Hospital Death	Operative Mortality*
1994-1995	3.75	4.14
1996-1997	3.37	3.75
1998	2.60	3.01
1999	2.89	3.31
2000	2.22	2.68

* Operative mortality includes:

- all deaths occurring during the hospitalization in which the operation was performed, even after 30 days
- deaths occurring after discharge from hospital, but within 30 days of the procedure