

Technical Note

For

**The California Report on
Coronary Artery
Bypass Graft Surgery 2017-2018:
Hospital and Surgeon Data**

September 2020

Prepared by

Office of Statewide Health Planning and Development

Suggested citation: State of California, Office of Statewide Health Planning and Development. ***The California Report on Coronary Artery Bypass Graft Surgery, 2017-2018: Hospital and Surgeon Data***, Sacramento, CA: Office of Statewide Health Planning and Development, September 2020. Copies of this document and other CABG surgery-related reports may be found at www.osphd.ca.gov.

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Introduction

This technical note describes the research methods used to develop the California CABG Outcomes Reporting Program's (CCORP) report: *The California Report on Coronary Artery Bypass Graft (CABG) Surgery in California, 2017-2018: Hospital and Surgeon Data*. This report is produced by the Office of Statewide Health Planning and Development (OSHPD) in compliance with California Health and Safety Code Sections 128745-128750 and can be found at: [OSHPD CABG Reports](#).

See Appendix A for definitions of the technical terms used in this document.

Provider Performance Measures Reported

This report provides hospital performance data on five key measures of CABG surgery quality:

Outcome measures

- Isolated CABG operative mortality
- CABG+Valve operative mortality
- Post-operative stroke (isolated CABG)
- 30-day hospital readmission (isolated CABG)

One *process measure* is also included:

- Use of the internal mammary artery (IMA) (isolated CABG)

This report also provides surgeon performance data on one outcome measure: isolated CABG operative mortality.

All outcome measures are risk-adjusted to account for variation in the health status of patients prior to CABG surgery.

Starting in 2015, the definition of CABG operative mortality for isolated CABG and CABG+Valve includes all deaths that occurred during the hospitalization (up to 90 days) in which the CABG surgery was performed, or all deaths after transfer to another acute care center (up to 90 days) and any deaths after discharge within 30 days after the surgery (no matter where they occurred). Furthermore, CABG+Valve, Post-operative stroke and 30-day hospital readmission results in this report combine two years of data (instead of a single year) to improve the stability of the risk-adjusted rates.

Measure Definitions:

Operative mortality includes all deaths that occurred during the hospitalization (up to 90 days) in which the CABG surgery was performed; all deaths after transfer to another acute care center up to 90 days; or any deaths after discharge within 30 days after the surgery (no matter where they occurred). Use of operative mortality instead of in-hospital mortality avoids potential manipulation of outcomes through early discharge practices and holds hospitals accountable for patients who died at home or in other facilities shortly after discharge. The National Quality Forum (NQF), which serves as the national body for vetting quality measures, has endorsed the national Society of Thoracic Surgeons' (STS) operative mortality measure for CABG surgery.¹

¹ National Quality Forum (NQF). National voluntary consensus standards for quality measurement, Washington, DC: National Quality Forum. In 2019, NQF updated its endorsement of the risk-adjusted operative mortality for isolated CABG measure by STS (#0119). Details can be found at [NQF QPS](#).

CCORP uses the STS definition of operative mortality and also verifies deaths following patient discharge using death records from the California Department of Public Health (CDPH).

- *Isolated CABG surgery* is defined as CABG surgery performed on patients aged 18 years or older without other major procedures, such as valve repair or carotid endarterectomy, during the same surgery. For a detailed definition of isolated CABG surgery, please contact CCORP@oshpd.ca.gov.
- *CABG+Valve surgery* is defined as CABG surgery, performed on patients aged 18 years or older, that includes aortic valve replacement, mitral valve replacement or repair, or a combination thereof.

Post-operative stroke is defined as a post-operative, central neurologic deficit that did not resolve within 24 hours after surgery.

30-day hospital readmission includes unplanned readmission that arise from acute clinical events requiring urgent rehospitalization within 30 days of discharge date after isolated CABG surgery. All unplanned readmissions are counted as an outcome, regardless of cause. Starting 2018 data, California adopted all-cause unplanned readmission from Centers for Medicare & Medicaid Services (CMS). The method was based on CMS readmission outcome measure-“Hospital-level 30-day All-Cause Unplanned Readmission Following Coronary Artery Bypass Graft Surgery”. The measure can be found at [here](#).

Use of the internal mammary artery (IMA) is the preferred method for CABG surgery of the left anterior descending (LAD) artery. Research shows that IMA use results in better long-term graft patency and improved patient survival, compared with use of saphenous vein grafts.

Data Quality Review and Verification

Study Population

Under state law, California-licensed hospitals are required to report all isolated and non-isolated CABG surgeries to OSHPD. The study populations for the measures vary by data year and exclusion criteria (Table A).

Table A: Study Populations Used in Measures (Denominator, Exclusion Criteria, and Year)

Measure	Study Population (Denominator)	Data Year(s)
Isolated CABG Operative Mortality	<i>Hospital</i> : Total number of isolated CABG cases without salvage operative status	2018
	<i>Surgeon</i> : Total number of isolated CABG cases without salvage operative status	2017-2018
CABG+Valve Operative Mortality	Total number of CABG cases without salvage operative status with aortic valve replacement, mitral valve repair or mitral valve replacement (or a combination)	2017–2018

Table A: Study Populations Used in Measures (Denominator, Exclusion Criteria, and Year)

Measure	Study Population (Denominator)	Data Year(s)
Post-Operative Stroke	Total number of isolated CABG cases without salvage operative status	2017–2018
30-day Hospital Readmission	Total number of isolated CABG cases, where the patient was discharged alive from the CABG-performing hospital and could be followed via OSHPD’s hospital Patient Discharge Data (PDD) file. Patients in salvage operative status, patients who were transferred to acute care, and patients who left against medical advice were excluded.	2017–2018
Internal Mammary Artery Usage	First-time, non-cardiogenic shock, isolated CABG cases discharged where the operative status was elective or urgent and the LAD artery was bypassed.	2018

In 2017 and 2018, there were 32,310 adult CABG surgeries performed across 124 California hospitals (Table B). Of these, 25,838 (80.0%) were isolated CABG surgeries and 6,472 (20.0%) were non-isolated CABG surgeries. The study population for two measures (hospital operative mortality and IMA use) in this report consists of all adult patients who underwent isolated CABG surgery and were discharged in 2018. To improve the statistical power for surgeon isolated CABG mortality, hospital CABG+Valve mortality, hospital isolated CABG post-operative stroke, and hospital isolated CABG 30-day readmissions, the study population includes those patients who were discharged in 2017 or 2018.

Table B: California CABG Surgery Volume, 2017 and 2018

CABG Type	2017		2018		2017-2018 Combined	
	Cases	%	Cases	%	Cases	%
Isolated CABGs*	13,049	80.4%	12,789	79.6%	25,838	80.0%
CABG+Valve*	2,178	13.4%	2,153	13.4%	4,331	13.4%
Other CABGs	1,011	6.2%	1,130	7.0%	2,141	6.6%
All CABGs	16,238	100%	16,072	100%	32,310	100%

* Case numbers reported in the table only include those cases that were publicly reported.

Data Sources and Data Quality Review

The clinical data used in this report is collected by CCORP’s Cardiac Online Reporting for California (CORC) system which was developed to assist California hospitals with their state-mandated data submissions. CCORP aligns with most data elements from the STS Adult Cardiac Surgery Database. However, a few data elements are exclusive to CCORP. Although STS and CCORP data definitions are generally identical, CCORP provides additional clarifications to assist hospitals with coding. For a detailed definition of CABG surgery, please contact CCORP@oshpd.ca.gov.

CCORP 2017-2018 data includes 124 hospitals and 283 surgeons. The data was linked to OSHPD’s Patient Discharge Data (PDD) linked death records from the California Department of

Public Health to identify patients who died at elsewhere other than the operating hospital following CABG surgery as well as to identify patients who were discharged alive and were readmitted to a hospital within 30 days of discharge date after the CABG surgery.

CCORP reviews the data submitted by each hospital for completeness and errors. Using a three-step, data quality review and verification process, CCORP asks hospitals to check data quality, data discrepancies, and potential risk-factor coding problems.

Step 1: Data Collection and Acceptance

Hospitals submit their data using CORC, the on-line data registry. Automated data acceptance reports notify hospitals of invalid, missing, and abnormally high or low data values. Data quality reports are also generated each time a hospital submits data. Hospitals review these summary reports before they adjust, finalize, and certify their data submission.

Step 2: Data Discrepancy Reports

OSHPD generates data discrepancy reports, which compare the CCORP registry data with the PDD data (the hospital administrative data record). Hospitals are asked to review and account for discrepancies between the two data sources via patient medical chart review to verify that: 1) all CABG cases were reported; 2) each CABG case was accurately coded as isolated or non-isolated CABG surgery; 3) coding of *Discharge Status* was consistent; 4) when relevant, resuscitation occurred prior to CABG surgery; and 5) coding of post-operative complications (including strokes) was consistent.

Step 3: Risk-Factor Coding Reports

Risk-factor coding reports identify values that may be extreme by comparing the hospital-reported prevalence rates in the current year to prior years and to the administrative data from the PDD. CCORP requests hospitals to review and, when necessary, correct miscoded data elements.

Hospital Medical Chart Audit

After completing the data quality review and verification process, CCORP develops a preliminary risk model for operative mortality and post-operative stroke to help identify candidate hospitals for an on-site medical chart audit. Candidate selection for the 2018 audit was based on 1) results of the preliminary model that identified “**Better**” or “**Worse**” hospital performers, and 2) data quality reports that identified problems in hospitals that over- and under-reported patient-risk factors. Additionally, a small number of hospitals were randomly selected for audit.

The 2018 audit included 27 hospitals and a total of 2,331 patient records (22.0% of 123 hospitals and 14.5% of all CABG surgery cases in 2018). On-site medical chart reviews were conducted by trained, independent auditors under contract with OSHPD. All hospital deaths and post-operative strokes at selected hospitals were audited and high-risk patients, based on predicted mortality, were sampled at a higher rate. The number of patient records selected within a hospital was proportional to the CABG volume at each hospital, but generally ranged from 60 to 140 cases. If a selected hospital performed fewer than 40 isolated CABG surgeries per year, all surgeries were audited. Individual audit summary reports were sent to each hospital for review and comment.

Risk Model for Adjusting Hospital and Surgeon Isolated CABG Operative Mortality Rates, 2017-2018

This section explains the development and validation of CCORP's risk model that accounts for the variation in patient severity-of-illness for hospital and surgeon operative mortality. CCORP used a multivariable logistic regression model to estimate the relationship between the demographic and pre-operative risk factors and the probability of operative mortality.

To develop the risk model for hospital mortality and surgeon rates, the 25,838 isolated (non-salvage) CABG surgery cases in 2017 and 2018 were evaluated for missing values. Values for the missing data in 2,610 cases (10.1%) were imputed by replacing the missing data with the lowest risk category of each variable (e.g., *Chronic Lung Disease = none*) to ensure that the effects of risk factors were estimated based on the most complete data available. As a result, 25,838 cases had no missing data in any field and were used for the risk model parameter estimation.

CCORP assigned the lowest risk value for the following reasons: 1) some hospitals leave data fields blank by design when the risk factor is absent or the value is normal; 2) maintains consistency with other major cardiac reporting programs that replace missing data with the lowest-risk or normal value; and 3) creates an incentive for more complete reporting by hospitals. Finally, the parameters of the risk model were applied to all cases to estimate each patient's probability of death. CCORP summed these probabilities to estimate the expected mortality for each hospital or surgeon. The hospital/surgeon risk model (based on 2017 and 2018 data) is presented in Table C-1 with statistically significant risk factors identified in bolded text.

Table C1 : Logistic Regression Risk Model for Isolated CABG Operative Mortality, 2017-2018

Risk Factors	Coefficient	Odds Ratio (OR)	95% Confidence Limits		p-value	
			Lower Level	Upper Level		
Intercept	-7.06				<.0001	
Age (Years)	0.04	1.04	1.03	1.05	<.0001	
Gender	Male	Reference				
	Female	0.49	1.63	1.35	1.95	<.0001
Race	White	Reference				
	Other	0.12	1.13	0.95	1.35	0.1729
Body Mass Index	Normal 18.5 - < 30.0	Reference				
	< 18.5	-0.17	0.84	0.35	2.05	0.7063
	30.0 - 40.0	0.15	1.16	0.96	1.40	0.1294
	> 40.0	0.58	1.78	1.22	2.59	0.0026
Immunocompromise	0.42	1.52	1.01	2.29	0.0446	
Status of Procedure	Elective	Reference				
	Urgent	0.38	1.47	1.15	1.87	0.0021
	Emergent	0.92	2.51	1.60	3.95	<.0001
Hypertension	0.28	1.32	0.93	1.88	0.1179	
Cerebrovascular Disease	0.33	1.39	1.15	1.68	0.0006	
Chronic Lung Disease (severe vs. other categories)	0.58	1.79	1.43	2.24	<.0001	
Myocardial Infarction (MI)	No MI or ≥ 8 days	Reference				
	< 24 hours	0.85	2.35	1.59	3.47	<.0001
	1 - 7 days ago	0.33	1.39	1.14	1.69	0.0011
NYHA (IV vs. I, II, III)	0.51	1.66	1.31	2.10	<.0001	
Ejection Fraction (%)	-0.03	0.97	0.97	0.98	<.0001	
Cardiogenic Shock	1.46	4.30	2.89	6.39	<.0001	
Atrial Fibrillation	0.47	1.60	1.28	2.00	<.0001	
Mitral Insufficiency (Moderate/Severe vs. None/Trivial/Mild)	0.18	1.20	0.95	1.52	0.1322	
Number of Diseased Coronary Vessels	None, One, or Two	Reference				
	3 or more	0.25	1.29	1.03	1.61	0.025
Diabetes	No Diabetes	Reference				
	Non-Insulin	-0.15	0.86	0.70	1.06	0.1608
	Insulin	0.02	1.03	0.82	1.29	0.8331
Liver Disease	0.58	1.78	1.22	2.44	0.0028	
Dialysis	1.21	3.36	2.65	4.25	<.0001	
Peripheral Arterial Disease	0.46	1.58	1.28	1.95	<.0001	
Prior Cardiac Surgery	First	Reference				
	Second or later operation	0.28	1.33	0.72	2.44	0.3635
Previous PCI	No PCI	Reference				
	< = 6 hours	0.32	1.37	0.77	2.45	0.2804
	> 6 hours	0.32	1.37	1.14	1.65	0.0009

Bolded text indicates statistically significant (p<0.05).

Discrimination of Risk Model for Hospital/Surgeon Isolated CABG Operative Mortality

A commonly used measure of discrimination is the C-statistic, also known as the area under the Receiver Operating Characteristic (ROC) curve. For all possible pairs of patients, where one dies and the other survives surgery, the C-statistic describes the proportion of pairs where the patient who died had a higher predicted risk of death than the patient who lived.

C-statistics range from 0.5 to 1, with higher values indicating better discrimination. For the 2017-2018 risk model, the C-statistic was 0.802. In recently published CABG surgery mortality reports by other states (New Jersey, New York, and Pennsylvania), the C-statistics ranged from 0.777 to 0.830. Additionally, the Centers for Medicare and Medicaid Services reported that its 30-day all-cause CABG mortality risk model performance remained constant at 0.74 over a three-year time period (2015-2018).²

Calibration of Risk Model for Hospital/Surgeon Isolated CABG Operative Mortality

A common measure of calibration is the Hosmer-Lemeshow χ^2 test, which compares observed and predicted outcomes over deciles of risk. The p-value of the Hosmer-Lemeshow test statistic for this 2017-2018 risk model is 0.136 indicating there were no significant differences between observed and predicted outcomes over deciles of risk and there were no systematic over- or under-estimations at the extreme deciles of risk.

A second calibration test sorts the data into 10 risk groups and compares observed deaths with predicted deaths in each of 10 risk groups. As presented in Table C-2, Risk Group 10 shows the patients in the highest risk group. Among the 1282 patients in Group 10, 275 patients died, and the model predicted 274.07 patient deaths. Assuming a Poisson distribution for a binary outcome, the predicted range of deaths for Risk Group 10 is 242.58 to 308.52. The observed number of 275 deaths falls within the range of predicted deaths. None of the risk groups showed observed deaths outside the 95% confidence interval for predicted deaths.

Table C-2: Calibration of Risk Model for Hospital/Surgeon Isolated CABG Operative Mortality, 2017-2018

Risk Group	Isolated CABG Cases	Observed Deaths	Predicted Deaths	Difference	95% CI of Predicted Deaths	
1	2,584	6	8.98	-2.98	4.10	17.06
2	2,581	5	14.03	-9.03	7.68	23.53
3	2,584	16	18.21	-2.21	10.83	28.71
4	2,585	19	22.75	-3.75	14.38	34.21
5	2,583	33	28.31	4.69	18.85	40.83
6	2,584	33	35.64	-2.64	24.91	49.42
7	2,584	40	45.80	-5.80	33.51	61.13
8	2,584	71	61.94	9.06	47.48	79.41
9	2,584	105	93.30	11.70	75.33	114.26
10	2,585	275	274.07	0.93	242.58	308.52

Note: Risk Group 1 is the lowest risk for mortality and Risk Group 10 is the highest risk.

²2019 Procedure-Specific Measure Updates and Specifications Report Hospital-Level 30-Day Risk-Standardized Mortality Measure Isolated Coronary Artery Bypass Graft (CABG) Surgery – Version 6.0. Centers for Medicare and Medicaid Services. QualityNet. March 2019.

Process for Calculating Hospital/Surgeon Risk-Adjusted Mortality Rates and Performance Rating

The risk-adjusted mortality rate (RAMR) is computed by dividing the provider's observed mortality by the provider's expected mortality (obtained from the risk model calculation) to get the observed/expected (O/E) ratio. The O/E ratio is then multiplied by the statewide mortality rate (2.44% in 2018 for hospitals and 2.33% in 2017-2018 for surgeons) to obtain the provider's risk-adjusted mortality rate.

However, because a provider's point estimate of the RAMR can be attributed (in part) to chance, the performance rating is not based on a point estimate of the RAMR, but a comparison of the 95% confidence interval (CI) of each provider's RAMR to the statewide mortality rate.³ CCORP treated the 2017 and 2018 data as a sample, and inferred a range within which each provider's true performance was likely to fall.

As shown in Table C-3, a provider's performance rating is "**Better**" if the upper 95% CI of its risk-adjusted mortality rate is below the state average mortality rate (indicating the provider's RAMR is significantly lower than the state average). A provider's performance rating is "**Worse**" if the lower 95% CI of its RAMR is above the state average mortality rate (indicating the provider's risk-adjusted mortality is significantly higher than the state average). If the state average mortality rate is within the 95% CI of a provider's RAMR, then the performance rating is "**Average**."

Hospital Risk-Adjusted Operative Mortality Results for Isolated CABG, 2018

Table C-3 presents the risk-adjusted isolated CABG operative mortality results for each hospital for 2018. The table is sorted by geographic region and contains, for each hospital, the total number of CABG surgeries performed (isolated and non-isolated combined), number of isolated CABG surgeries (excluding salvage cases), number of observed isolated CABG deaths, observed isolated CABG mortality rate, expected isolated CABG mortality rate predicted by the risk model, RAMR and 95% CI of the RAMR, and the associated hospital performance rating.

Among the 12,789 isolated and non-salvage CABG surgeries performed at 123 hospitals in 2018, 312 patients died either in-hospital (up to 90 days, including transfers to other acute care hospitals) or after discharge, but within 30 days of the surgery date, reflecting a statewide hospital operative mortality rate of 2.44%. The *observed* mortality rates among hospitals ranged from 0% to 20.00%. The *expected* mortality rates, which are generated by the risk model and account for patient severity-of-illness, were between 0.97% and 5.04%. The RAMRs, which reflect hospital performance, ranged from 0% to 20.82%.

Based on the 95% confidence intervals for the RAMRs, 119 of 123 hospitals (96.75%) performed within the expected range when compared to the statewide mortality rate. There is no hospital performed significantly "**Better**" than the state average in isolated CABG mortality outcomes and four hospitals performed significantly "**Worse**" than the state average (Hollywood Presbyterian Medical Center, Palomar Health Downtown Campus, Scripps Mercy Hospital, and St. Bernardine Medical Center) (Table C-3).

³ CCORP uses the Poisson Exact Probability method to compute the 95% confidence interval for the risk-adjusted mortality rate. (Buchan Iain, *Calculating Poisson Confidence Interval in Excel*, January 2004).

Table C-3: Hospital Risk-Adjusted Isolated CABG Operative Mortality Results by Region, 2018

Region	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% , RAMR)	95% CI for RAMR		Performance Rating†
								Lower Limit	Upper Limit	
State		16,059	12,789	312	2.44					
Sacramento Valley & Northern California Region	Adventist Health and Rideout	77	65	3	4.62	2.58	4.37	0.90	12.77	Average
	Enloe Medical Center - Esplanade	177	148	3	2.03	2.08	2.37	0.49	6.94	Average
	Mercy General Hospital	715	496	5	1.01	1.98	1.24	0.40	2.90	Average
	Mercy Medical Center - Redding	37	34	2	5.88	4.55	3.15	0.38	11.39	Average
	Mercy San Juan Hospital	127	77	0	0.00	1.60	0.00	0.00	7.32	Average
	Shasta Regional Medical Center	137	108	5	4.63	1.98	5.72	1.86	13.35	Average
	St. Joseph Hospital - Eureka	16	13	1	7.69	2.64	7.10	0.18	39.56	Average
	Sutter Medical Center, Sacramento	483	351	3	0.85	1.98	1.05	0.22	3.07	Average
	UC Davis Medical Center	91	62	1	1.61	1.59	2.48	0.06	13.81	Average
San Francisco Bay Area & San Jose	Adventist Health St. Helena	114	76	1	1.32	3.23	0.99	0.03	5.54	Average
	Alta Bates Summit Medical Center	160	143	2	1.40	2.48	1.37	0.17	4.96	Average
	California Pacific Medical Center - Pacific Campus	92	77	1	1.30	1.21	2.62	0.07	14.63	Average
	Community Hospital of the Monterey Peninsula	97	76	2	2.63	3.25	1.98	0.24	7.13	Average
	Dominican Hospital	99	57	3	5.26	1.62	7.91	1.63	23.12	Average
	El Camino Hospital	130	104	2	1.92	2.05	2.29	0.28	8.28	Average
	Good Samaritan Hospital - San Jose	81	70	4	5.71	2.43	5.74	1.56	14.69	Average
	John Muir Medical Center - Concord Campus	227	182	2	1.10	2.71	0.99	0.12	3.58	Average
	Kaiser Foundation Hospital - San Francisco	428	333	2	0.60	1.16	1.26	0.15	4.57	Average

Table C-3: Hospital Risk-Adjusted Isolated CABG Operative Mortality Results by Region, 2018

Region	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% , RAMR)	95% CI for RAMR		Performance Rating†
								Lower Limit	Upper Limit	
State		16,059	12,789	312	2.44					
San Francisco Bay Area & San Jose (continued)	Kaiser Foundation Hospital - Santa Clara	510	416	3	0.72	1.58	1.12	0.23	3.26	Average
	Marin General Hospital	54	39	1	2.56	1.61	3.89	0.10	21.67	Average
	Mills-Peninsula Medical Center	56	44	1	2.27	1.85	2.99	0.08	16.68	Average
	North Bay Medical Center	51	47	1	2.13	2.93	1.77	0.04	9.88	Average
	O'Connor Hospital	57	49	2	4.08	3.25	3.06	0.37	11.07	Average
	Queen of the Valley Medical Center	49	43	1	2.33	3.20	1.77	0.04	9.87	Average
	Regional Medical of San Jose	92	82	5	6.10	3.61	4.12	1.34	9.61	Average
	Salinas Valley Memorial Hospital	127	98	4	4.08	2.25	4.43	1.21	11.34	Average
	San Ramon Regional Medical Center	28	19	1	5.26	3.23	3.98	0.10	22.15	Average
	Santa Clara Valley Medical Center	73	63	0	0.00	1.89	0.00	0.00	7.57	Average
	Santa Rosa Memorial Hospital - Montgomery	110	86	2	2.33	1.61	3.53	0.43	12.77	Average
	Sequoia Hospital	71	42	0	0.00	2.28	0.00	0.00	9.41	Average
	Seton Medical Center	66	62	0	0.00	3.10	0.00	0.00	4.68	Average
	St. Mary's Medical Center, San Francisco	11	9	1	11.11	1.30	20.82	0.53	100.00	Average
	Stanford Health Care	243	146	6	4.11	1.63	6.17	2.26	13.42	Average
	Stanford Health Care - Valleycare	38	34	0	0.00	3.23	0.00	0.00	8.20	Average
	Sutter Santa Rosa Regional Hospital	60	43	0	0.00	1.44	0.00	0.00	14.54	Average
UC San Francisco Medical Center	106	86	1	1.16	1.67	1.70	0.04	9.48	Average	
Washington Hospital - Fremont	74	63	2	3.17	1.91	4.06	0.49	14.65	Average	

Table C-3: Hospital Risk-Adjusted Isolated CABG Operative Mortality Results by Region, 2018

Region	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%; RAMR)	95% CI for RAMR		Performance Rating†
								Lower Limit	Upper Limit	
State		16,059	12,789	312	2.44					
Central California	Adventist Health Bakersfield	69	64	1	1.56	2.17	1.76	0.04	9.81	Average
	Bakersfield Heart Hospital	89	78	0	0.00	1.51	0.00	0.00	7.65	Average
	Bakersfield Memorial Hospital	113	95	5	5.26	1.95	6.60	2.14	15.40	Average
	Community Regional Medical Center - Fresno	148	135	5	3.70	3.53	2.56	0.83	5.97	Average
	Dameron Hospital	83	80	4	5.00	2.98	4.10	1.12	10.50	Average
	Doctors Medical Center	339	288	16	5.56	3.71	3.66	2.09	5.94	Average
	Fresno Heart and Surgical Hospital	286	247	7	2.83	1.99	3.48	1.40	7.17	Average
	Kaweah Delta Medical Center	218	188	5	2.66	3.53	1.84	0.60	4.29	Average
	Marian Regional Medical Center	95	75	2	2.67	1.35	4.82	0.58	17.43	Average
	Memorial Medical Center - Modesto	169	124	6	4.84	2.28	5.19	1.90	11.29	Average
	Saint Agnes Medical Center	278	213	9	4.23	2.34	4.41	2.02	8.38	Average
St. Joseph's Medical Center of Stockton	257	230	4	1.74	4.18	1.01	0.28	2.60	Average	
San Fernando Valley, Antelope Valley, Ventura & Santa Barbara	Adventist Health Glendale	147	131	4	3.05	2.47	3.02	0.82	7.74	Average
	Antelope Valley Hospital	6	5	1	20.00	2.76	17.69	0.45	98.56	Average
	Community Memorial Hospital - San Buenaventura	81	74	0	0.00	1.86	0.00	0.00	6.53	Average
	French Hospital Medical Center	83	65	2	3.08	1.62	4.64	0.56	16.77	Average
	Glendale Memorial Hospital and Health Center	116	102	2	1.96	1.60	2.98	0.36	10.78	Average
	Los Robles Hospital and Medical Center	75	58	1	1.72	3.86	1.09	0.03	6.07	Average

Table C-3: Hospital Risk-Adjusted Isolated CABG Operative Mortality Results by Region, 2018

Region	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%; RAMR)	95% CI for RAMR		Performance Rating†
								Lower Limit	Upper Limit	
State		16,059	12,789	312	2.44					
San Fernando Valley, Antelope Valley, Ventura & Santa Barbara (continued)	Northridge Hospital Medical Center	74	65	3	4.62	2.35	4.79	0.99	14.00	Average
	Providence Holy Cross Medical Center	70	52	1	1.92	3.06	1.53	0.04	8.55	Average
	Providence Saint Joseph Medical Center	60	54	1	1.85	2.25	2.00	0.05	11.17	Average
	Providence Tarzana Medical Center	39	34	1	2.94	1.65	4.35	0.11	24.25	Average
	Santa Barbara Cottage Hospital	115	88	2	2.27	1.77	3.13	0.38	11.32	Average
	St. John's Regional Medical Center	81	61	3	4.92	4.10	2.92	0.60	8.55	Average
	Valley Presbyterian Hospital	44	41	0	0.00	2.06	0.00	0.00	10.66	Average
	West Hills Hospital and Medical Center	43	37	0	0.00	2.08	0.00	0.00	11.71	Average
Greater Los Angeles	Adventist Health White Memorial	70	63	0	0.00	2.39	0.00	0.00	5.97	Average
	Beverly Hospital	21	21	0	0.00	2.16	0.00	0.00	19.81	Average
	California Hospital Medical Center -	53	49	2	4.08	1.81	5.49	0.67	19.84	Average
	Cedars Sinai Medical Center	235	168	2	1.19	1.34	2.17	0.26	7.84	Average
	Centinela Hospital Medical Center	17	16	1	6.25	5.04	3.03	0.08	16.86	Average
	Emante Health Inter-Community Hospital	154	135	0	0.00	2.63	0.00	0.00	2.53	Average
	Garfield Medical Center	186	160	8	5.00	2.20	5.55	2.40	10.93	Average
	Good Samaritan Hospital - Los Angeles	104	82	3	3.66	1.80	4.95	1.02	14.48	Average
	Henry Mayo Newhall Hospital	43	33	1	3.03	3.59	2.06	0.05	11.48	Average
	Hollywood Presbyterian Medical Center	47	45	4	8.89	2.05	10.56	2.88	27.05	Worse
	Huntington Memorial Hospital	128	101	2	1.98	1.40	3.44	0.42	12.43	Average

Table C-3: Hospital Risk-Adjusted Isolated CABG Operative Mortality Results by Region, 2018

Region	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%; RAMR)	95% CI for RAMR		Performance Rating†
								Lower Limit	Upper Limit	
State		16,059	12,789	312	2.44					
Greater Los Angeles (continued)	Kaiser Foundation Hospital - Los Angeles	878	713	9	1.26	1.87	1.64	0.75	3.12	Average
	Keck Hospital of University of Southern California	124	65	0	0.00	1.39	0.00	0.00	9.94	Average
	Lakewood Regional Medical Center	111	102	2	1.96	3.21	1.49	0.18	5.38	Average
	Los Angeles County/Harbor - UCLA Medical Center	77	70	1	1.43	1.62	2.16	0.05	12.01	Average
	Los Angeles County/University of Southern California Medical Center	57	47	1	2.13	0.97	5.37	0.14	29.94	Average
	Memorialcare Long Beach Medical Center	194	155	8	5.16	2.60	4.85	2.09	9.55	Average
	Methodist Hospital of Southern California	56	48	1	2.08	2.22	2.29	0.06	12.76	Average
	PIH Health Hospital - Downey	40	39	1	2.56	2.28	2.74	0.07	15.27	Average
	PIH Health Hospital - Whittier	86	52	0	0.00	4.21	0.00	0.00	4.11	Average
	Providence Little Company of Mary Medical Center - Torrance	125	108	3	2.78	3.24	2.09	0.43	6.12	Average
	Providence St. John's Health Center	27	20	0	0.00	2.48	0.00	0.00	18.16	Average
	Ronald Reagan UCLA Medical Center	211	131	1	0.76	1.53	1.21	0.03	6.76	Average
	St. Francis Medical Center	43	43	3	6.98	2.45	6.94	1.43	20.27	Average
	St. Mary Medical Center - Long Beach	76	69	3	4.35	2.84	3.74	0.77	10.92	Average
	St. Vincent Medical Center	56	48	4	8.33	2.30	8.83	2.40	22.60	Average
Torrance Memorial Medical Center	106	66	1	1.52	2.20	1.68	0.04	9.38	Average	

Table C-3: Hospital Risk-Adjusted Isolated CABG Operative Mortality Results by Region, 2018

Region	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% , RAMR)	95% CI for RAMR		Performance Rating†
								Lower Limit	Upper Limit	
State		16,059	12,789	312	2.44					
Inland Empire, Riverside & San Bernardino	Desert Regional Medical Center	117	101	2	1.98	1.85	2.61	0.32	9.44	Average
	Desert Valley Hospital	30	27	1	3.70	2.88	3.13	0.08	17.46	Average
	Eisenhower Medical Center	147	111	2	1.80	2.14	2.05	0.25	7.41	Average
	Kaiser Foundation Hospital - Fontana	329	265	4	1.51	2.50	1.47	0.40	3.77	Average
	Loma Linda University Medical Center	249	204	5	2.45	3.08	1.94	0.63	4.53	Average
	Loma Linda University Medical Center - Murrieta	127	116	3	2.59	1.57	4.03	0.83	11.78	Average
	Pomona Valley Hospital Medical Center	109	97	2	2.06	3.19	1.58	0.19	5.70	Average
	Riverside Community Hospital	204	185	8	4.32	3.68	2.87	1.24	5.65	Average
	San Antonio Regional Hospital	166	129	1	0.78	2.16	0.87	0.02	4.87	Average
	St. Bernardine Medical Center	293	241	12	4.98	2.17	5.60	2.89	9.78	Worse
	St. Mary Medical Center - Apple Valley	89	73	3	4.11	2.82	3.56	0.73	10.39	Average
Temecula Valley Hospital	92	90	1	1.11	2.45	1.10	0.03	6.16	Average	
Orange County	AHMC Anaheim Regional Medical Center	139	113	1	0.88	1.40	1.54	0.04	8.58	Average
	Anaheim Global Medical Center	52	43	2	4.65	3.00	3.78	0.46	13.65	Average
	Fountain Valley Regional Hospital and Medical Center - Euclid	85	73	5	6.85	2.46	6.79	2.20	15.84	Average
	Hoag Memorial Hospital Presbyterian	246	157	4	2.55	2.57	2.42	0.66	6.19	Average
	Memorialcare Orange Coast Medical Center	96	77	0	0.00	1.86	0.00	0.00	6.27	Average
	Memorialcare Saddleback Medical Center	49	45	4	8.89	3.47	6.25	1.70	16.02	Average

Table C-3: Hospital Risk-Adjusted Isolated CABG Operative Mortality Results by Region, 2018

Region	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% , RAMR)	95% CI for RAMR		Performance Rating†
								Lower Limit	Upper Limit	
State		16,059	12,789	312	2.44					
Orange County (continued)	Mission Hospital Regional Medical Center	154	124	2	1.61	1.59	2.47	0.30	8.91	Average
	Orange County Global Medical Center	47	38	0	0.00	2.23	0.00	0.00	10.64	Average
	St. Joseph Hospital - Orange	123	98	3	3.06	2.00	3.74	0.77	10.93	Average
	St. Jude Medical Center	87	70	1	1.43	2.66	1.31	0.03	7.31	Average
	UC Irvine Medical Center	75	61	4	6.56	2.85	5.60	1.53	14.35	Average
	West Anaheim Medical Center	32	32	0	0.00	1.74	0.00	0.00	16.15	Average
Greater San Diego	Alvarado Hospital Medical Center	26	24	3	12.50	3.01	10.13	2.09	29.60	Average
	Grossmont Hospital	79	71	1	1.41	3.16	1.09	0.03	6.06	Average
	Palomar Health Downtown Campus	94	79	6	7.59	2.42	7.65	2.81	16.65	Worse
	Scripps Memorial Hospital - La Jolla	440	327	4	1.22	1.87	1.59	0.43	4.08	Average
	Scripps Mercy Hospital	107	84	6	7.14	1.69	10.32	3.79	22.46	Worse
	Sharp Chula Vista Medical Center	81	68	0	0.00	2.64	0.00	0.00	5.01	Average
	Sharp Memorial Hospital	134	83	2	2.41	1.68	3.50	0.42	12.64	Average
	Tri-City Medical Center - Oceanside	65	48	0	0.00	1.55	0.00	0.00	12.07	Average
	UCSD Health La Jolla - Jacobs Medical Center & Sulpizio	229	159	1	0.63	2.15	0.71	0.02	3.98	Average

* The number of CABG cases and outcomes by provider may not equal the total number of statewide CABG cases and outcomes for various reasons, including the surgeon appeals process.

† A hospital is classified as **"Better"** if the upper 95% CI of the RAMR falls below the California observed mortality rate (2.44%). A hospital is classified as **"Worse"** if the lower 95% CI of the RAMR is higher than the California observed mortality rate. A hospital's performance is considered **"Average"** if the California mortality rate falls within the 95% CI of a hospital's RAMR.

Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Table C-4 presents the risk-adjusted isolated CABG operative mortality results for each surgeon for 2017-2018. The table is sorted alphabetically by surgeon last name and includes the total number of CABG surgeries performed (isolated and non-isolated combined), number of isolated CABG surgeries (excluding salvage cases), number of observed isolated CABG deaths, observed isolated CABG mortality rate, expected isolated CABG mortality rate predicted by the risk model, the RAMR and 95% CI of the RAMR, and the associated surgeon performance rating (overall rating and hospital-specific ratings for each surgeon).

Among the 25,838 isolated and non-salvage CABG surgeries performed in 2017 and 2018, 603 patients died either in-hospital (up to 90 days, including transfers to other acute care hospitals) or after discharge, but within 30 days of the surgery date, reflecting a statewide surgeon operative mortality rate of 2.33%. The observed mortality rates among surgeons overall ranged from 0% to 100.00%. The expected mortality rates, which are generated by the risk model and account for patient severity of illness, ranged from 0.25% and 23.59%. The risk-adjusted mortality rates (RAMR) ranged from 0% to 100.00%.

Based on the 95% CI for the RAMR, 275 of 283 surgeons (97.17%) performed within the expected range when compared to the statewide mortality rate. Two surgeons performed significantly “**Better**” than the state average, and six surgeons performed significantly “**Worse**” than the state average (either overall surgeon performance or hospital-specific performance) (Table C-4).

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Abolhoda, Amir M	Surgeon Overall	112	98	4	4.08	3.64	2.62	0.71	6.71	Average
	<i>Lakewood Regional Medical Center</i>	58	52	2	3.85	3.62	2.48	0.30	8.96	Average
	<i>Memorialcare Long Beach Medical Center</i>	54	46	2	4.35	3.66	2.77	0.34	10.02	Average
Abraham, Reginald G	Surgeon Overall	88	76	4	5.26	1.60	7.66	2.09	19.61	Average
	<i>Fountain Valley Regional Hospital and Medical Center - Euclid</i>	88	76	4	5.26	1.60	7.66	2.09	19.61	Average
Adamson, Robert M	Surgeon Overall	63	39	2	5.13	1.93	6.20	0.75	22.40	Average
	<i>Sharp Memorial Hospital</i>	63	39	2	5.13	1.93	6.20	0.75	22.40	Average
Afifi, Alaa Y	Surgeon Overall	85	79	6	7.59	4.07	4.36	1.60	9.48	Average
	<i>Anaheim Global Medical Center</i>	19	17	2	11.76	4.51	6.08	0.74	21.97	Average
	<i>Fountain Valley Regional Hospital and Medical Center - Euclid</i>	52	49	4	8.16	4.38	4.35	1.19	11.15	Average
	<i>Orange County Global Medical Center</i>	13	12	0	0.00	2.19	0.00	0.00	32.80	Average
	<i>West Anaheim Medical Center</i>	1	1	0	0.00	4.07	0.00	0.00	100.00	Average
Ahmadi-Kashani, Mastaneh	Surgeon Overall	91	84	0	0.00	1.65	0.00	0.00	6.22	Average
	<i>Adventist Health Glendale</i>	23	22	0	0.00	1.23	0.00	0.00	31.79	Average
	<i>California Hospital Medical Center - Los Angeles</i>	35	32	0	0.00	2.01	0.00	0.00	13.38	Average
	<i>Garfield Medical Center</i>	8	8	0	0.00	2.15	0.00	0.00	50.03	Average
	<i>Glendale Memorial Hospital and Health Center</i>	25	22	0	0.00	1.36	0.00	0.00	28.87	Average
Ali, Mir W	Surgeon Overall	241	212	9	4.25	2.29	4.33	1.98	8.21	Average
	<i>St. Bernardine Medical Center</i>	241	212	9	4.25	2.29	4.33	1.98	8.21	Average
Allen, Jeremiah G	Surgeon Overall	214	170	0	0.00	1.03	0.00	0.00	4.93	Average
	<i>Kaiser Foundation Hospital - San Francisco</i>	214	170	0	0.00	1.03	0.00	0.00	4.93	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Allen, Keith R	Surgeon Overall	25	24	0	0.00	2.47	0.00	0.00	14.50	Average
	<i>North Bay Medical Center</i>	25	24	0	0.00	2.47	0.00	0.00	14.50	Average
Alyono, David	Surgeon Overall	39	36	0	0.00	1.51	0.00	0.00	15.81	Average
	<i>Kaiser Foundation Hospital - Santa Clara</i>	39	36	0	0.00	1.51	0.00	0.00	15.81	Average
Anastassiou, Peter T	Surgeon Overall	10	10	0	0.00	1.13	0.00	0.00	75.96	Average
	<i>Marin General Hospital</i>	2	2	0	0.00	0.84	0.00	0.00	100.00	Average
	<i>Santa Rosa Memorial Hospital - Montgomery</i>	1	1	0	0.00	0.73	0.00	0.00	100.00	Average
	<i>Sutter Santa Rosa Regional Hospital</i>	7	7	0	0.00	1.28	0.00	0.00	96.39	Average
Araim, Leheb H	Surgeon Overall	224	188	6	3.19	3.57	2.09	0.77	4.55	Average
	<i>Kaweah Delta Medical Center</i>	224	188	6	3.19	3.57	2.09	0.77	4.55	Average
Ardehali, Abbas	Surgeon Overall	152	90	1	1.11	1.47	1.77	0.04	9.86	Average
	<i>Ronald Reagan UCLA Medical Center</i>	152	90	1	1.11	1.47	1.77	0.04	9.86	Average
Atiya, Azmi W	Surgeon Overall	242	215	5	2.33	2.33	2.32	0.75	5.43	Average
	<i>Henry Mayo Newhall Hospital</i>	20	20	1	5.00	1.90	6.14	0.16	34.20	Average
	<i>Northridge Hospital Medical Center</i>	71	63	2	3.17	1.93	3.84	0.47	13.89	Average
	<i>Providence Holy Cross Medical Center</i>	43	33	0	0.00	2.72	0.00	0.00	9.60	Average
	<i>Providence Tarzana Medical Center</i>	58	53	1	1.89	1.86	2.37	0.06	13.22	Average
	<i>Valley Presbyterian Hospital</i>	41	37	0	0.00	3.47	0.00	0.00	6.70	Average
	<i>West Hills Hospital and Medical Center</i>	9	9	1	11.11	2.88	8.99	0.23	50.11	Average
Baay, Peter L	Surgeon Overall	66	51	1	1.96	1.67	2.74	0.07	15.29	Average
	<i>Santa Barbara Cottage Hospital</i>	66	51	1	1.96	1.67	2.74	0.07	15.29	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Baker, Craig J	Surgeon Overall	63	41	0	0.00	1.76	0.00	0.00	11.91	Average
	<i>Huntington Memorial Hospital</i>	8	6	0	0.00	0.65	0.00	0.00	100.00	Average
	<i>Keck Hospital of University of Southern California</i>	47	29	0	0.00	2.12	0.00	0.00	13.99	Average
	<i>Los Angeles County/University of Southern California Medical Center</i>	8	6	0	0.00	1.14	0.00	0.00	100.00	Average
Baladi, Naoum	Surgeon Overall	96	84	2	2.38	3.20	1.74	0.21	6.27	Average
	<i>Seton Medical Center</i>	89	79	1	1.27	2.97	0.99	0.03	5.54	Average
	<i>St. Mary's Medical Center, San Francisco</i>	7	5	1	20.00	6.79	6.87	0.17	38.29	Average
Bansal, Neeraj	Surgeon Overall	23	21	1	4.76	2.43	4.57	0.12	25.49	Average
	<i>Riverside Community Hospital</i>	13	11	1	9.09	2.98	7.13	0.18	39.71	Average
	<i>San Antonio Regional Hospital</i>	10	10	0	0.00	1.83	0.00	0.00	47.12	Average
Baradarian, Sam	Surgeon Overall	174	129	1	0.78	1.61	1.12	0.03	6.25	Average
	<i>Scripps Memorial Hospital - La Jolla</i>	174	129	1	0.78	1.61	1.12	0.03	6.25	Average
Baumgartner, Fritz J	Surgeon Overall	22	20	2	10.00	5.70	4.09	0.50	14.79	Average
	<i>Enloe Medical Center - Esplanade</i>	7	7	0	0.00	2.30	0.00	0.00	53.52	Average
	<i>Lakewood Regional Medical Center</i>	1	1	0	0.00	15.64	0.00	0.00	55.05	Average
	<i>Mercy Medical Center - Redding</i>	14	12	2	16.67	6.86	5.67	0.69	20.50	Average
Benharash, Peyman	Surgeon Overall	73	61	0	0.00	2.12	0.00	0.00	6.65	Average
	<i>Ronald Reagan UCLA Medical Center</i>	73	61	0	0.00	2.12	0.00	0.00	6.65	Average
Bethencourt, Daniel M	Surgeon Overall	112	90	4	4.44	3.39	3.06	0.83	7.84	Average
	<i>Memorialcare Long Beach Medical Center</i>	24	16	1	6.25	6.15	2.37	0.06	13.21	Average
	<i>Memorialcare Orange Coast Medical Center</i>	88	74	3	4.05	2.79	3.39	0.70	9.91	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Beygui, Ramin E	Surgeon Overall	114	96	1	1.04	1.42	1.72	0.04	9.56	Average
	<i>North Bay Medical Center</i>	4	2	0	0.00	1.50	0.00	0.00	100.00	Average
	<i>UC San Francisco Medical Center</i>	45	41	1	2.44	1.13	5.06	0.13	28.19	Average
	<i>Washington Hospital - Fremont</i>	65	53	0	0.00	1.64	0.00	0.00	9.90	Average
Biniwale, Reshma M	Surgeon Overall	1	.	.	.	.	.	.	.	NA
	<i>Ronald Reagan UCLA Medical Center</i>	1	.	.	.	.	.	.	.	NA
Birnbaum, Peter L	Surgeon Overall	145	116	4	3.45	1.94	4.15	1.13	10.62	Average
	<i>Saint Agnes Medical Center</i>	145	116	4	3.45	1.94	4.15	1.13	10.62	Average
Biswas, Shankha S	Surgeon Overall	301	266	4	1.50	2.72	1.29	0.35	3.31	Average
	<i>Riverside Community Hospital</i>	264	236	3	1.27	2.79	1.06	0.22	3.11	Average
	<i>San Antonio Regional Hospital</i>	11	7	0	0.00	3.26	0.00	0.00	37.71	Average
	<i>St. Mary Medical Center - Apple Valley</i>	26	23	1	4.35	1.82	5.58	0.14	31.06	Average
Bowdish, Michael E	Surgeon Overall	60	48	1	2.08	1.01	4.83	0.12	26.92	Average
	<i>Huntington Memorial Hospital</i>	1	.	.	.	.	.	.	.	NA
	<i>Keck Hospital of University of Southern California</i>	5	1	0	0.00	1.02	0.00	0.00	100.00	Average
	<i>Los Angeles County/University of Southern California Medical Center</i>	54	47	1	2.13	1.01	4.93	0.12	27.50	Average
Boyd, Jack H	Surgeon Overall	169	145	1	0.69	1.27	1.26	0.03	7.04	Average
	<i>Stanford Health Care</i>	169	145	1	0.69	1.27	1.26	0.03	7.04	Average
Boyd, Walter D	Surgeon Overall	43	33	0	0.00	2.33	0.00	0.00	11.20	Average
	<i>UC Davis Medical Center</i>	43	33	0	0.00	2.33	0.00	0.00	11.20	Average
Brewster, Scot A	Surgeon Overall	119	82	2	2.44	1.96	2.91	0.35	10.50	Average
	<i>Scripps Memorial Hospital - La Jolla</i>	119	82	2	2.44	1.96	2.91	0.35	10.50	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Burton, Elan C	Surgeon Overall	137	120	2	1.67	1.70	2.29	0.28	8.28	Average
	<i>Santa Clara Valley Medical Center</i>	137	120	2	1.67	1.70	2.29	0.28	8.28	Average
Bushnell, Lamar J	Surgeon Overall	62	56	0	0.00	2.02	0.00	0.00	7.62	Average
	<i>Community Memorial Hospital - San Buenaventura</i>	62	56	0	0.00	2.02	0.00	0.00	7.62	Average
Caffarelli, Anthony D	Surgeon Overall	235	130	4	3.08	3.20	2.24	0.61	5.74	Average
	<i>Hoag Memorial Hospital Presbyterian</i>	235	130	4	3.08	3.20	2.24	0.61	5.74	Average
Cain, Brian S	Surgeon Overall	309	273	5	1.83	1.48	2.88	0.94	6.73	Average
	<i>Kaiser Foundation Hospital - San Francisco</i>	309	273	5	1.83	1.48	2.88	0.94	6.73	Average
Caminha, Sergio D	Surgeon Overall	204	183	3	1.64	4.09	0.94	0.19	2.73	Average
	<i>Kaweah Delta Medical Center</i>	204	183	3	1.64	4.09	0.94	0.19	2.73	Average
Canvasser, David A	Surgeon Overall	149	119	5	4.20	1.85	5.30	1.72	12.38	Average
	<i>French Hospital Medical Center</i>	79	60	3	5.00	2.14	5.46	1.13	15.95	Average
	<i>Marian Regional Medical Center</i>	70	59	2	3.39	1.55	5.09	0.62	18.38	Average
Capouya, Eli R	Surgeon Overall	210	164	4	2.44	2.00	2.84	0.77	7.27	Average
	<i>Adventist Health Glendale</i>	52	45	0	0.00	2.53	0.00	0.00	7.57	Average
	<i>Adventist Health White Memorial</i>	20	19	0	0.00	1.60	0.00	0.00	28.40	Average
	<i>Emante Health Inter-Community Hospital</i>	31	20	0	0.00	1.68	0.00	0.00	25.55	Average
	<i>Good Samaritan Hospital - Los Angeles</i>	24	17	2	11.76	2.13	12.92	1.56	46.67	Average
	<i>Methodist Hospital of Southern California</i>	80	61	2	3.28	1.81	4.22	0.51	15.25	Average
	<i>Providence Saint Joseph Medical Center</i>	3	2	0	0.00	2.13	0.00	0.00	100.00	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Carter, Thomas L	Surgeon Overall	2	.	.	.	.	.	.	.	NA
	<i>Adventist Health and Rideout</i>	2	.	.	.	.	.	.	.	NA
Cash, Jonathan C	Surgeon Overall	23	19	1	5.26	3.19	3.85	0.10	21.47	Average
	<i>Los Robles Hospital and Medical Center</i>	23	19	1	5.26	3.19	3.85	0.10	21.47	Average
Castro, Luis J	Surgeon Overall	137	71	1	1.41	2.00	1.65	0.04	9.18	Average
	<i>Sequoia Hospital</i>	137	71	1	1.41	2.00	1.65	0.04	9.18	Average
Chammas, Joseph H	Surgeon Overall	71	63	2	3.17	2.10	3.52	0.43	12.72	Average
	<i>Loma Linda University Medical Center - Murrieta</i>	65	57	2	3.51	1.96	4.17	0.51	15.07	Average
	<i>Palomar Health Downtown Campus</i>	6	6	0	0.00	3.44	0.00	0.00	41.68	Average
Chaudhry, Pervaiz A	Surgeon Overall	132	115	6	5.22	4.13	2.95	1.08	6.42	Average
	<i>Community Regional Medical Center - Fresno</i>	99	86	6	6.98	4.89	3.33	1.22	7.25	Average
	<i>Fresno Heart and Surgical Hospital</i>	1	1	0	0.00	3.51	0.00	0.00	100.00	Average
	<i>Saint Agnes Medical Center</i>	32	28	0	0.00	1.80	0.00	0.00	17.05	Average
Chen, Raymond H	Surgeon Overall	164	137	5	3.65	1.74	4.90	1.59	11.44	Average
	<i>Kaiser Foundation Hospital - Los Angeles</i>	164	137	5	3.65	1.74	4.90	1.59	11.44	Average
Cheng, Wen	Surgeon Overall	4	2	0	0.00	0.45	0.00	0.00	954.39	Average
	<i>Cedars Sinai Medical Center</i>	4	2	0	0.00	0.45	0.00	0.00	100.00	Average
Chow, Michael I	Surgeon Overall	269	215	3	1.40	1.81	1.80	0.37	5.25	Average
	<i>Mercy General Hospital</i>	269	215	3	1.40	1.81	1.80	0.37	5.25	Average
Chung, Joshua S	Surgeon Overall	53	34	1	2.94	3.22	2.13	0.05	11.89	Average
	<i>Cedars Sinai Medical Center</i>	53	34	1	2.94	3.22	2.13	0.05	11.89	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Cobanoglu, Mustafa A	Surgeon Overall	29	29	0	0.00	1.75	0.00	0.00	16.96	Average
	<i>Loma Linda University Medical Center - Murrieta</i>	29	29	0	0.00	1.75	0.00	0.00	16.96	Average
Cohen, Robbin G	Surgeon Overall	195	154	1	0.65	1.59	0.96	0.02	5.33	Average
	<i>Huntington Memorial Hospital</i>	194	154	1	0.65	1.59	0.96	0.02	5.33	Average
	<i>Keck Hospital of University of Southern California</i>	1	.	.	.	.	.	.	.	NA
Concepcion, Noel L	Surgeon Overall	234	202	6	2.97	3.31	2.09	0.77	4.56	Average
	<i>Doctors Medical Center</i>	234	202	6	2.97	3.31	2.09	0.77	4.56	Average
Connor, Ann R	Surgeon Overall	13	12	1	8.33	2.54	7.67	0.19	42.73	Average
	<i>Adventist Health and Rideout</i>	1	1	0	0.00	1.29	0.00	0.00	100.00	Average
	<i>St. Bernardine Medical Center</i>	12	11	1	9.09	2.65	8.01	0.20	44.62	Average
Cunningham, Mark J	Surgeon Overall	53	28	1	3.57	2.01	4.15	0.11	23.14	Average
	<i>Huntington Memorial Hospital</i>	1	1	0	0.00	1.01	0.00	0.00	100.00	Average
	<i>Keck Hospital of University of Southern California</i>	52	27	1	3.70	2.04	4.23	0.11	23.57	Average
Currie, Maria E	Surgeon Overall	8	8	1	12.50	6.96	4.19	0.11	23.34	Average
	<i>Dameron Hospital</i>	8	8	1	12.50	6.96	4.19	0.11	23.34	Average
Darbinian, Sevak H	Surgeon Overall	204	157	2	1.27	1.55	1.92	0.23	6.92	Average
	<i>Mission Hospital Regional Medical Center</i>	204	157	2	1.27	1.55	1.92	0.23	6.92	Average
Declusin, Richard J	Surgeon Overall	11	10	1	10.00	2.27	10.26	0.26	57.17	Average
	<i>St. John's Regional Medical Center</i>	11	10	1	10.00	2.27	10.26	0.26	57.17	Average
Deeik, Ramzi K	Surgeon Overall	103	82	2	2.44	1.61	3.53	0.43	12.74	Average
	<i>Santa Rosa Memorial Hospital - Montgomery</i>	103	82	2	2.44	1.61	3.53	0.43	12.74	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Defilippi, Vincent J	Surgeon Overall	156	124	6	4.84	2.46	4.59	1.68	9.99	Average
	<i>Salinas Valley Memorial Hospital</i>	156	124	6	4.84	2.46	4.59	1.68	9.99	Average
Dein, John R	Surgeon Overall	49	44	0	0.00	3.13	0.00	0.00	6.24	Average
	<i>Mercy General Hospital</i>	41	37	0	0.00	3.56	0.00	0.00	6.54	Average
	<i>Mercy San Juan Hospital</i>	8	7	0	0.00	0.88	0.00	0.00	100.00	Average
Delrio, Michael J	Surgeon Overall	60	51	2	3.92	2.97	3.08	0.37	11.12	Average
	<i>Fountain Valley Regional Hospital and Medical Center - Euclid</i>	3	2	0	0.00	3.89	0.00	0.00	100.00	Average
	<i>Garfield Medical Center</i>	19	16	0	0.00	1.98	0.00	0.00	27.20	Average
	<i>Riverside Community Hospital</i>	38	33	2	6.06	3.40	4.16	0.50	15.03	Average
Dembitsky, Walter P	Surgeon Overall	26	10	0	0.00	1.00	0.00	0.00	86.48	Average
	<i>Sharp Memorial Hospital</i>	26	10	0	0.00	1.00	0.00	0.00	86.48	Average
Deuse, Tobias	Surgeon Overall	47	41	0	0.00	0.86	0.00	0.00	24.42	Average
	<i>UC San Francisco Medical Center</i>	47	41	0	0.00	0.86	0.00	0.00	24.42	Average
Dharan, Murali	Surgeon Overall	170	135	2	1.48	2.69	1.29	0.16	4.64	Average
	<i>John Muir Medical Center - Concord Campus</i>	104	80	1	1.25	2.20	1.33	0.03	7.40	Average
	<i>San Ramon Regional Medical Center</i>	32	27	1	3.70	2.97	2.91	0.07	16.24	Average
	<i>Stanford Health Care - ValleyCare</i>	34	28	0	0.00	3.84	0.00	0.00	8.02	Average
Dhawan, Puneet	Surgeon Overall	123	105	1	0.95	2.08	1.07	0.03	5.96	Average
	<i>Los Angeles County/Harbor - UCLA Medical Center</i>	61	53	1	1.89	1.70	2.59	0.07	14.44	Average
	<i>San Antonio Regional Hospital</i>	6	6	0	0.00	2.82	0.00	0.00	50.95	Average
	<i>St. Jude Medical Center</i>	21	19	0	0.00	2.91	0.00	0.00	15.57	Average
	<i>St. Mary Medical Center - Apple Valley</i>	35	27	0	0.00	2.07	0.00	0.00	15.38	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Dhillon, Jatinder S	Surgeon Overall	93	80	1	1.25	3.32	0.88	0.02	4.90	Average
	<i>John Muir Medical Center - Concord Campus</i>	80	68	1	1.47	3.71	0.93	0.02	5.16	Average
	<i>San Ramon Regional Medical Center</i>	4	4	0	0.00	1.09	0.00	0.00	100.00	Average
	<i>Stanford Health Care - Valleycare</i>	9	8	0	0.00	1.16	0.00	0.00	92.55	Average
Dunnington, Gansevoort H	Surgeon Overall	94	56	1	1.79	3.28	1.27	0.03	7.09	Average
	<i>Adventist Health St. Helena</i>	90	52	1	1.92	3.45	1.30	0.03	7.25	Average
	<i>North Bay Medical Center</i>	2	2	0	0.00	1.07	0.00	0.00	100.00	Average
	<i>Queen of the Valley Medical Center</i>	2	2	0	0.00	1.04	0.00	0.00	100.00	Average
Egrie, Glenn D	Surgeon Overall	142	110	0	0.00	1.22	0.00	0.00	6.41	Average
	<i>California Pacific Medical Center - Pacific Campus</i>	142	110	0	0.00	1.22	0.00	0.00	6.41	Average
Esmailian, Fardad	Surgeon Overall	193	147	1	0.68	1.61	0.98	0.02	5.49	Average
	<i>Cedars Sinai Medical Center</i>	193	147	1	0.68	1.61	0.98	0.02	5.49	Average
Faber, Luke A	Surgeon Overall	99	81	2	2.47	1.49	3.88	0.47	14.02	Average
	<i>French Hospital Medical Center</i>	62	50	2	4.00	1.46	6.39	0.77	23.10	Average
	<i>Marian Regional Medical Center</i>	37	31	0	0.00	1.53	0.00	0.00	18.20	Average
Faraci, Philip A	Surgeon Overall	22	20	2	10.00	2.10	11.14	1.35	40.23	Average
	<i>Los Robles Hospital and Medical Center</i>	21	19	2	10.53	2.17	11.34	1.37	40.95	Average
	<i>West Hills Hospital and Medical Center</i>	1	1	0	0.00	0.74	0.00	0.00	100.00	Average
Felahy, Isam	Surgeon Overall	4	3	0	0.00	2.21	0.00	0.00	129.78	Average
	<i>Dameron Hospital</i>	2	1	0	0.00	1.33	0.00	0.00	100.00	Average
	<i>St. Joseph's Medical Center of Stockton</i>	2	2	0	0.00	2.65	0.00	0.00	100.00	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Fischbein, Michael P	Surgeon Overall	49	29	2	6.90	2.27	7.09	0.86	25.61	Average
	<i>Stanford Health Care</i>	49	29	2	6.90	2.27	7.09	0.86	25.61	Average
Fleischman, Fernando	Surgeon Overall	65	44	0	0.00	1.22	0.00	0.00	15.99	Average
	<i>Huntington Memorial Hospital</i>	3	3	0	0.00	2.93	0.00	0.00	97.96	Average
	<i>Keck Hospital of University of Southern California</i>	18	9	0	0.00	1.67	0.00	0.00	57.28	Average
	<i>Los Angeles County/University of Southern California Medical Center</i>	44	32	0	0.00	0.94	0.00	0.00	28.66	Average
Florida, Rosario	Surgeon Overall	178	149	4	2.68	3.15	1.99	0.54	5.10	Average
	<i>Loma Linda University Medical Center</i>	177	148	4	2.70	3.16	2.00	0.54	5.12	Average
	<i>Loma Linda University Medical Center - Murrieta</i>	1	1	0	0.00	1.67	0.00	0.00	100.00	Average
Folkerth, Theodore L	Surgeon Overall	6	5	0	0.00	0.94	0.00	0.00	183.12	Average
	<i>Tri-City Medical Center - Oceanside</i>	6	5	0	0.00	0.94	0.00	0.00	100.00	Average
Fontana, Gregory P	Surgeon Overall	38	27	1	3.70	2.66	3.25	0.08	18.11	Average
	<i>Los Robles Hospital and Medical Center</i>	38	27	1	3.70	2.66	3.25	0.08	18.11	Average
Freyaldenhoven, Stephen J	Surgeon Overall	106	80	3	3.75	2.03	4.31	0.89	12.60	Average
	<i>French Hospital Medical Center</i>	46	34	3	8.82	2.07	9.95	2.05	29.08	Average
	<i>Marian Regional Medical Center</i>	60	46	0	0.00	2.00	0.00	0.00	9.35	Average
Fung, Lit K	Surgeon Overall	267	202	10	4.95	3.24	3.56	1.71	6.55	Average
	<i>Memorial Medical Center - Modesto</i>	267	202	10	4.95	3.24	3.56	1.71	6.55	Average
Gao, Guangqiang	Surgeon Overall	123	105	1	0.95	2.72	0.82	0.02	4.55	Average
	<i>Pomona Valley Hospital Medical Center</i>	123	105	1	0.95	2.72	0.82	0.02	4.55	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Gates, Richard N	Surgeon Overall	15	12	1	8.33	4.14	4.70	0.12	26.18	Average
	<i>St. Joseph Hospital - Orange</i>	15	12	1	8.33	4.14	4.70	0.12	26.18	Average
Gaudiani, Vincent A	Surgeon Overall	48	26	1	3.85	1.53	5.88	0.15	32.78	Average
	<i>California Pacific Medical Center - Pacific Campus</i>	2	1	0	0.00	0.49	0.00	0.00	100.00	Average
	<i>Community Hospital of the Monterey Peninsula</i>	14	8	0	0.00	0.76	0.00	0.00	100.00	Average
	<i>El Camino Hospital</i>	31	17	1	5.88	1.95	7.05	0.18	39.26	Average
	<i>Mills-Peninsula Medical Center</i>	1	.	.	.	.	.	.	.	NA
George, Kristopher M	Surgeon Overall	113	100	0	0.00	2.38	0.00	0.00	3.62	Average
	<i>Community Regional Medical Center - Fresno</i>	99	88	0	0.00	2.47	0.00	0.00	3.96	Average
	<i>Fresno Heart and Surgical Hospital</i>	14	12	0	0.00	1.72	0.00	0.00	41.60	Average
Gharai, Fariba	Surgeon Overall	6	6	0	0.00	1.37	0.00	0.00	105.02	Average
	<i>Memorialcare Long Beach Medical Center</i>	6	6	0	0.00	1.37	0.00	0.00	100.00	Average
Gheissari, Ali	Surgeon Overall	193	154	3	1.95	2.17	2.09	0.43	6.12	Average
	<i>Adventist Health Glendale</i>	9	7	0	0.00	0.81	0.00	0.00	100.00	Average
	<i>Good Samaritan Hospital - Los Angeles</i>	142	111	3	2.70	2.34	2.69	0.55	7.86	Average
	<i>Methodist Hospital of Southern California</i>	1	1	0	0.00	2.40	0.00	0.00	100.00	Average
	<i>St. Vincent Medical Center</i>	41	35	0	0.00	1.89	0.00	0.00	13.04	Average
Gibson, Christopher F	Surgeon Overall	46	38	0	0.00	2.27	0.00	0.00	9.97	Average
	<i>St. Bernardine Medical Center</i>	46	38	0	0.00	2.27	0.00	0.00	9.97	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Golts, Eugene M	Surgeon Overall	146	104	0	0.00	1.88	0.00	0.00	4.39	Average
	<i>UCSD Health La Jolla - Jacobs Medical Center & Sulpizio Cardiovascular Center</i>	146	104	0	0.00	1.88	0.00	0.00	4.39	Average
Gordon, Robert T	Surgeon Overall	197	138	1	0.72	1.64	1.03	0.03	5.75	Average
	<i>Kaiser Foundation Hospital - Santa Clara</i>	197	138	1	0.72	1.64	1.03	0.03	5.75	Average
Gottner, Robert J	Surgeon Overall	134	121	2	1.65	1.82	2.12	0.26	7.67	Average
	<i>Adventist Health Glendale</i>	3	3	1	33.33	2.71	28.65	0.73	100.00	Average
	<i>Emante Health Inter-Community Hospital</i>	1	1	0	0.00	2.73	0.00	0.00	100.00	Average
	<i>Good Samaritan Hospital - Los Angeles</i>	12	11	0	0.00	1.49	0.00	0.00	52.51	Average
	<i>Methodist Hospital of Southern California</i>	24	23	0	0.00	2.01	0.00	0.00	18.60	Average
	<i>Providence Saint Joseph Medical Center</i>	93	82	1	1.22	1.76	1.62	0.04	9.02	Average
	<i>St. Vincent Medical Center</i>	1	1	0	0.00	2.06	0.00	0.00	100.00	Average
Gramins, Daniel L	Surgeon Overall	149	112	1	0.89	2.16	0.96	0.02	5.37	Average
	<i>Temecula Valley Hospital</i>	10	10	0	0.00	3.92	0.00	0.00	21.98	Average
	<i>Tri-City Medical Center - Oceanside</i>	123	95	1	1.05	2.01	1.22	0.03	6.81	Average
	<i>UCSD Health La Jolla - Jacobs Medical Center & Sulpizio Cardiovascular Center</i>	16	7	0	0.00	1.74	0.00	0.00	70.80	Average
Gregory, Richard D	Surgeon Overall	244	180	3	1.67	2.36	1.65	0.34	4.83	Average
	<i>Fresno Heart and Surgical Hospital</i>	1	1	0	0.00	1.98	0.00	0.00	100.00	Average
	<i>Saint Agnes Medical Center</i>	243	179	3	1.68	2.36	1.66	0.34	4.85	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Grewal, Navrose S	Surgeon Overall	223	198	5	2.53	2.68	2.20	0.71	5.14	Average
	<i>Fountain Valley Regional Hospital and Medical Center - Euclid</i>	1	1	0	0.00	0.84	0.00	0.00	100.00	Average
	<i>Lakewood Regional Medical Center</i>	72	65	2	3.08	3.56	2.02	0.24	7.30	Average
	<i>Memorialcare Long Beach Medical Center</i>	34	28	0	0.00	2.10	0.00	0.00	14.66	Average
	<i>PIH Health Hospital - Downey</i>	38	36	0	0.00	2.25	0.00	0.00	10.64	Average
	<i>PIH Health Hospital - Whittier</i>	1	.	.	.	.	.	.	.	NA
	<i>St. Mary Medical Center - Long Beach</i>	70	61	3	4.92	2.44	4.70	0.97	13.74	Average
	<i>UC Irvine Medical Center</i>	7	7	0	0.00	1.38	0.00	0.00	89.25	Average
Griffith, Patrick K	Surgeon Overall	108	89	2	2.25	3.10	1.69	0.20	6.11	Average
	<i>Adventist Health and Rideout</i>	2	2	0	0.00	1.44	0.00	0.00	100.00	Average
	<i>Salinas Valley Memorial Hospital</i>	106	87	2	2.30	3.14	1.71	0.21	6.17	Average
Gulati, Rajeev	Surgeon Overall	65	61	4	6.56	4.91	3.12	0.85	7.98	Average
	<i>Grossmont Hospital</i>	1	1	0	0.00	22.37	0.00	0.00	38.48	Average
	<i>Riverside Community Hospital</i>	54	51	4	7.84	5.18	3.53	0.96	9.05	Average
	<i>San Antonio Regional Hospital</i>	10	9	0	0.00	1.43	0.00	0.00	67.08	Average
Gundry, Steven R	Surgeon Overall	4	3	0	0.00	7.31	0.00	0.00	39.24	Average
	<i>Desert Regional Medical Center</i>	4	3	0	0.00	7.31	0.00	0.00	39.24	Average
Guyton, Steven W	Surgeon Overall	2	1	0	0.00	7.02	0.00	0.00	122.56	Average
	<i>Mercy Medical Center - Redding</i>	2	1	0	0.00	7.02	0.00	0.00	100.00	Average
Ha, Richard-Tien V	Surgeon Overall	134	112	4	3.57	1.23	6.79	1.85	17.38	Average
	<i>Kaiser Foundation Hospital - Santa Clara</i>	131	110	4	3.64	1.21	7.00	1.91	17.92	Average
	<i>Stanford Health Care</i>	3	2	0	0.00	2.07	0.00	0.00	100.00	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Habibipour, Saied	Surgeon Overall	242	209	5	2.39	2.06	2.71	0.88	6.32	Average
	<i>Desert Regional Medical Center</i>	242	209	5	2.39	2.06	2.71	0.88	6.32	Average
Hackmann, Amy E	Surgeon Overall	24	16	0	0.00	1.24	0.00	0.00	43.47	Average
	<i>Huntington Memorial Hospital</i>	3	2	0	0.00	1.10	0.00	0.00	100.00	Average
	<i>Keck Hospital of University of Southern California</i>	11	5	0	0.00	1.30	0.00	0.00	100.00	Average
	<i>Los Angeles County/University of Southern California Medical Center</i>	10	9	0	0.00	1.23	0.00	0.00	77.51	Average
Hajiseyedjavadi, Omid	Surgeon Overall	159	131	3	2.29	2.91	1.84	0.38	5.37	Average
	<i>Good Samaritan Hospital - San Jose</i>	47	40	1	2.50	3.55	1.64	0.04	9.16	Average
	<i>O'Connor Hospital</i>	106	86	2	2.33	2.72	2.00	0.24	7.21	Average
	<i>Regional Medical of San Jose</i>	6	5	0	0.00	0.98	0.00	0.00	100.00	Average
Hargrove, Rachel A	Surgeon Overall	77	66	1	1.52	2.02	1.75	0.04	9.73	Average
	<i>Memorialcare Orange Coast Medical Center</i>	77	66	1	1.52	2.02	1.75	0.04	9.73	Average
Harmon, Adam L	Surgeon Overall	12	9	0	0.00	6.52	0.00	0.00	14.67	Average
	<i>Sequoia Hospital</i>	12	9	0	0.00	6.52	0.00	0.00	14.67	Average
Harper, Baron D	Surgeon Overall	136	120	3	2.50	2.64	2.21	0.46	6.47	Average
	<i>Adventist Health and Rideout</i>	136	120	3	2.50	2.64	2.21	0.46	6.47	Average
Hasaniya, Nahidh W	Surgeon Overall	77	66	1	1.52	2.02	1.75	0.04	9.73	Average
	<i>Kaiser Foundation Hospital - Fontana</i>	34	33	1	3.03	1.33	5.31	0.13	29.61	Average
	<i>Loma Linda University Medical Center</i>	45	34	2	5.88	3.16	4.35	0.53	15.71	Average
	<i>Loma Linda University Medical Center - Murrieta</i>	4	3	0	0.00	2.26	0.00	0.00	100.00	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Hemp, James R	Surgeon Overall	133	105	3	2.86	1.36	4.89	1.01	14.30	Average
	<i>Scripps Memorial Hospital - La Jolla</i>	5	3	0	0.00	0.67	0.00	0.00	100.00	Average
	<i>Scripps Mercy Hospital</i>	128	102	3	2.94	1.38	4.96	1.02	14.50	Average
Hiesinger, William	Surgeon Overall	44	27	1	3.70	2.22	3.89	0.10	21.68	Average
	<i>Stanford Health Care</i>	44	27	1	3.70	2.22	3.89	0.10	21.68	Average
Hill, Arthur C	Surgeon Overall	17	16	0	0.00	1.94	0.00	0.00	27.70	Average
	<i>UC San Francisco Medical Center</i>	17	16	0	0.00	1.94	0.00	0.00	27.70	Average
Hittinger, Scott A	Surgeon Overall	19	19	0	0.00	1.35	0.00	0.00	33.59	Average
	<i>Kaiser Foundation Hospital - Santa Clara</i>	19	19	0	0.00	1.35	0.00	0.00	33.59	Average
Hodgins, Darren M	Surgeon Overall	268	239	5	2.09	2.98	1.64	0.53	3.82	Average
	<i>Beverly Hospital</i>	13	13	1	7.69	4.69	3.83	0.10	21.34	Average
	<i>Emante Health Inter-Community Hospital</i>	201	176	1	0.57	2.91	0.46	0.01	2.54	Average
	<i>Garfield Medical Center</i>	44	42	3	7.14	2.88	5.80	1.20	16.94	Average
	<i>Keck Hospital of University of Southern California</i>	4	3	0	0.00	3.04	0.00	0.00	94.33	Average
	<i>Los Angeles County/University of Southern California Medical Center</i>	2	1	0	0.00	0.27	0.00	0.00	100.00	Average
	<i>Methodist Hospital of Southern California</i>	4	4	0	0.00	2.26	0.00	0.00	95.02	Average
Howden, Frederick M	Surgeon Overall	34	28	3	10.71	2.90	8.63	1.78	25.22	Average
	<i>Alvarado Hospital Medical Center</i>	27	21	3	14.29	2.59	12.90	2.66	37.69	Worse
	<i>Grossmont Hospital</i>	2	2	0	0.00	5.98	0.00	0.00	72.03	Average
	<i>Palomar Health Downtown Campus</i>	4	4	0	0.00	3.60	0.00	0.00	59.76	Average
	<i>Sharp Chula Vista Medical Center</i>	1	1	0	0.00	0.48	0.00	0.00	100.00	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Howe, Steven C	Surgeon Overall	205	192	3	1.56	2.07	1.76	0.36	5.14	Average
	<i>Temecula Valley Hospital</i>	204	191	3	1.57	2.07	1.77	0.37	5.18	Average
	<i>Tri-City Medical Center - Oceanside</i>	1	1	0	0.00	3.24	0.00	0.00	100.00	Average
Huang, Mark W	Surgeon Overall	84	79	3	3.80	2.56	3.46	0.71	10.12	Average
	<i>Alvarado Hospital Medical Center</i>	1	1	0	0.00	1.40	0.00	0.00	100.00	Average
	<i>Grossmont Hospital</i>	13	12	0	0.00	2.38	0.00	0.00	30.18	Average
	<i>Palomar Health Downtown Campus</i>	2	1	0	0.00	2.30	0.00	0.00	100.00	Average
	<i>Sharp Chula Vista Medical Center</i>	68	65	3	4.62	2.62	4.12	0.85	12.03	Average
Huang, Ming-Lu	Surgeon Overall	304	262	6	2.29	2.21	2.42	0.89	5.28	Average
	<i>Beverly Hospital</i>	35	33	1	3.03	2.58	2.74	0.07	15.28	Average
	<i>Emante Health Inter-Community Hospital</i>	69	53	1	1.89	2.38	1.85	0.05	10.30	Average
	<i>Garfield Medical Center</i>	193	170	4	2.35	2.02	2.72	0.74	6.96	Average
	<i>Methodist Hospital of Southern California</i>	7	6	0	0.00	3.84	0.00	0.00	37.34	Average
Huh, Joseph	Surgeon Overall	200	135	2	1.48	2.25	1.54	0.19	5.55	Average
	<i>Mercy General Hospital</i>	200	135	2	1.48	2.25	1.54	0.19	5.55	Average
Hunter, Curtis T	Surgeon Overall	44	24	0	0.00	1.53	0.00	0.00	23.39	Average
	<i>Providence St. John's Health Center</i>	6	4	0	0.00	0.75	0.00	0.00	100.00	Average
	<i>Ronald Reagan UCLA Medical Center</i>	38	20	0	0.00	1.69	0.00	0.00	25.45	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Hurwitz, Andrew S	Surgeon Overall	146	131	2	1.53	1.82	1.96	0.24	7.08	Average
	<i>Adventist Health Glendale</i>	22	19	1	5.26	3.59	3.42	0.09	19.07	Average
	<i>California Hospital Medical Center - Los Angeles</i>	1	1	0	0.00	0.62	0.00	0.00	100.00	Average
	<i>Garfield Medical Center</i>	63	56	0	0.00	1.17	0.00	0.00	13.08	Average
	<i>Glendale Memorial Hospital and Health Center</i>	60	55	1	1.82	1.89	2.25	0.06	12.54	Average
Ihnken, Kai A	Surgeon Overall	7	6	0	0.00	2.17	0.00	0.00	65.97	Average
	<i>UC San Francisco Medical Center</i>	7	6	0	0.00	2.17	0.00	0.00	65.97	Average
Ingram, Michael T	Surgeon Overall	327	217	4	1.84	2.30	1.87	0.51	4.80	Average
	<i>Sutter Medical Center, Sacramento</i>	327	217	4	1.84	2.30	1.87	0.51	4.80	Average
Iyengar, Sridhara K	Surgeon Overall	46	44	1	2.27	3.49	1.52	0.04	8.47	Average
	<i>Fountain Valley Regional Hospital and Medical Center - Euclid</i>	46	44	1	2.27	3.49	1.52	0.04	8.47	Average
Jain, Sarika	Surgeon Overall	81	77	3	3.90	2.39	3.80	0.78	11.10	Average
	<i>Pomona Valley Hospital Medical Center</i>	81	77	3	3.90	2.39	3.80	0.78	11.10	Average
Jolly, Shashank	Surgeon Overall	81	74	1	1.35	2.42	1.30	0.03	7.27	Average
	<i>El Camino Hospital</i>	1	1	0	0.00	3.15	0.00	0.00	100.00	Average
	<i>Regional Medical of San Jose</i>	13	11	0	0.00	2.44	0.00	0.00	32.13	Average
	<i>Washington Hospital - Fremont</i>	67	62	1	1.61	2.40	1.57	0.04	8.73	Average
Jones, Blanding U	Surgeon Overall	189	134	2	1.49	2.11	1.65	0.20	5.96	Average
	<i>Kaiser Foundation Hospital - Fontana</i>	10	8	0	0.00	2.04	0.00	0.00	52.65	Average
	<i>Kaiser Foundation Hospital - Los Angeles</i>	179	126	2	1.59	2.12	1.75	0.21	6.32	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Joyo, Colin I	Surgeon Overall	141	116	1	0.86	2.18	0.92	0.02	5.15	Average
	<i>Hoag Memorial Hospital Presbyterian</i>	141	116	1	0.86	2.18	0.92	0.02	5.15	Average
Jubach, Jeremy T	Surgeon Overall	113	105	5	4.76	2.39	4.65	1.51	10.86	Average
	<i>Adventist Health Glendale</i>	45	44	3	6.82	3.16	5.04	1.04	14.72	Average
	<i>California Hospital Medical Center - Los Angeles</i>	12	12	1	8.33	1.66	11.69	0.30	65.15	Average
	<i>Garfield Medical Center</i>	11	9	0	0.00	2.35	0.00	0.00	40.69	Average
	<i>Glendale Memorial Hospital and Health Center</i>	45	40	1	2.50	1.76	3.31	0.08	18.42	Average
Julien, Matheau	Surgeon Overall	5	5	0	0.00	1.11	0.00	0.00	154.66	Average
	<i>Enloe Medical Center - Esplanade</i>	2	2	0	0.00	1.52	0.00	0.00	100.00	Average
	<i>Mercy Medical Center - Redding</i>	3	3	0	0.00	0.84	0.00	0.00	100.00	Average
Kajitani, Michio	Surgeon Overall	279	231	7	3.03	2.21	3.20	1.29	6.60	Average
	<i>St. Bernardine Medical Center</i>	279	231	7	3.03	2.21	3.20	1.29	6.60	Average
Kamlot, Andreas	Surgeon Overall	116	95	0	0.00	2.17	0.00	0.00	4.18	Average
	<i>John Muir Medical Center - Concord Campus</i>	98	78	0	0.00	2.32	0.00	0.00	4.75	Average
	<i>San Ramon Regional Medical Center</i>	6	5	0	0.00	0.96	0.00	0.00	100.00	Average
	<i>Stanford Health Care - Valleycare</i>	12	12	0	0.00	1.66	0.00	0.00	43.11	Average
Kaplon, Richard J	Surgeon Overall	243	149	1	0.67	1.92	0.82	0.02	4.55	Average
	<i>Mercy General Hospital</i>	24	16	1	6.25	3.91	3.73	0.09	20.77	Average
	<i>Mercy San Juan Hospital</i>	219	133	0	0.00	1.68	0.00	0.00	3.86	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Keyser, Eric	Surgeon Overall	98	93	3	3.23	2.38	3.16	0.65	9.25	Average
	<i>Dameron Hospital</i>	71	68	2	2.94	2.64	2.60	0.31	9.40	Average
	<i>Mercy Medical Center - Redding</i>	13	13	0	0.00	1.86	0.00	0.00	35.66	Average
	<i>St. Bernardine Medical Center</i>	14	12	1	8.33	1.48	13.18	0.33	73.46	Average
Khan, Junaid H	Surgeon Overall	200	178	1	0.56	2.19	0.60	0.02	3.34	Average
	<i>Alta Bates Summit Medical Center</i>	200	178	1	0.56	2.19	0.60	0.02	3.34	Average
Khan, Tanveer A	Surgeon Overall	78	72	3	4.17	3.15	3.09	0.64	9.03	Average
	<i>John Muir Medical Center - Concord Campus</i>	64	60	3	5.00	3.11	3.75	0.77	10.96	Average
	<i>San Ramon Regional Medical Center</i>	5	4	0	0.00	1.65	0.00	0.00	100.00	Average
	<i>Stanford Health Care - Valleycare</i>	9	8	0	0.00	4.15	0.00	0.00	25.95	Average
Khodaverdian, Reza	Surgeon Overall	172	163	5	3.07	2.69	2.66	0.86	6.20	Average
	<i>Adventist Health Glendale</i>	65	62	2	3.23	2.87	2.62	0.32	9.46	Average
	<i>Adventist Health White Memorial</i>	10	9	0	0.00	3.23	0.00	0.00	29.60	Average
	<i>Good Samaritan Hospital - Los Angeles</i>	43	40	0	0.00	1.93	0.00	0.00	11.16	Average
	<i>Methodist Hospital of Southern California</i>	3	2	0	0.00	1.04	0.00	0.00	100.00	Average
	<i>Providence Saint Joseph Medical Center</i>	8	7	0	0.00	3.63	0.00	0.00	33.84	Average
	<i>Salinas Valley Memorial Hospital</i>	3	3	0	0.00	1.16	0.00	0.00	100.00	Average
	<i>St. Vincent Medical Center</i>	40	40	3	7.50	3.09	5.67	1.17	16.56	Average
Khoynezhad, Ali	Surgeon Overall	75	57	3	5.26	1.91	6.44	1.33	18.81	Average
	<i>Cedars Sinai Medical Center</i>	2	.	.	.	.	.	.	.	NA
	<i>Memorialcare Long Beach Medical Center</i>	73	57	3	5.26	1.91	6.44	1.33	18.81	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Khwaja, Shamsuddin	Surgeon Overall	638	532	15	2.82	2.25	2.93	1.64	4.83	Average
	<i>Community Regional Medical Center - Fresno</i>	23	20	1	5.00	3.93	2.97	0.08	16.55	Average
	<i>Fresno Heart and Surgical Hospital</i>	523	437	10	2.29	2.03	2.63	1.26	4.84	Average
	<i>Saint Agnes Medical Center</i>	92	75	4	5.33	3.06	4.07	1.11	10.42	Average
Kiankhooy, Armin	Surgeon Overall	95	76	2	2.63	1.31	4.67	0.57	16.89	Average
	<i>Adventist Health Glendale</i>	10	8	1	12.50	1.59	18.33	0.46	100.00	Average
	<i>California Hospital Medical Center - Los Angeles</i>	5	5	0	0.00	1.68	0.00	0.00	100.00	Average
	<i>Glendale Memorial Hospital and Health Center</i>	4	3	0	0.00	0.83	0.00	0.00	100.00	Average
	<i>Huntington Memorial Hospital</i>	22	18	1	5.56	1.86	6.97	0.18	38.81	Average
	<i>Keck Hospital of University of Southern California</i>	20	14	0	0.00	1.44	0.00	0.00	42.72	Average
	<i>Los Angeles County/University of Southern California Medical Center</i>	34	28	0	0.00	0.81	0.00	0.00	38.16	Average
Kincade, Robert C	Surgeon Overall	392	288	3	1.04	1.85	1.31	0.27	3.84	Average
	<i>Sutter Medical Center, Sacramento</i>	392	288	3	1.04	1.85	1.31	0.27	3.84	Average
Kleisli, Thomas	Surgeon Overall	51	44	0	0.00	2.66	0.00	0.00	7.36	Average
	<i>PIH Health Hospital - Whittier</i>	15	13	0	0.00	1.75	0.00	0.00	37.86	Average
	<i>Pomona Valley Hospital Medical Center</i>	36	31	0	0.00	3.04	0.00	0.00	9.14	Average
Klingman, Robert R	Surgeon Overall	129	114	3	2.63	3.06	2.00	0.41	5.86	Average
	<i>Adventist Health St. Helena</i>	1	.	.	.	.	.	.	.	NA
	<i>North Bay Medical Center</i>	41	40	0	0.00	2.21	0.00	0.00	9.74	Average
	<i>Queen of the Valley Medical Center</i>	87	74	3	4.05	3.53	2.68	0.55	7.84	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Kochamba, Gary S	Surgeon Overall	200	173	1	0.58	1.88	0.72	0.02	4.00	Average
	<i>Kaiser Foundation Hospital - Los Angeles</i>	200	173	1	0.58	1.88	0.72	0.02	4.00	Average
Korver, Keith F	Surgeon Overall	263	190	2	1.05	1.55	1.58	0.19	5.71	Average
	<i>California Pacific Medical Center - Pacific Campus</i>	4	3	0	0.00	1.51	0.00	0.00	100.00	Average
	<i>Marin General Hospital</i>	65	50	1	2.00	1.92	2.43	0.06	13.52	Average
	<i>Santa Rosa Memorial Hospital - Montgomery</i>	103	69	1	1.45	1.18	2.88	0.07	16.03	Average
	<i>Sutter Santa Rosa Regional Hospital</i>	91	68	0	0.00	1.67	0.00	0.00	7.60	Average
Koumjian, Michael P	Surgeon Overall	137	127	3	2.36	1.56	3.54	0.73	10.34	Average
	<i>Alvarado Hospital Medical Center</i>	6	5	0	0.00	2.28	0.00	0.00	75.58	Average
	<i>Grossmont Hospital</i>	30	29	2	6.90	2.41	6.67	0.81	24.10	Average
	<i>Loma Linda University Medical Center - Murrieta</i>	95	87	1	1.15	1.25	2.15	0.05	11.96	Average
	<i>Scripps Mercy Hospital</i>	6	6	0	0.00	1.29	0.00	0.00	100.00	Average
Kwon, Murray H	Surgeon Overall	45	26	0	0.00	1.53	0.00	0.00	21.57	Average
	<i>Ronald Reagan UCLA Medical Center</i>	45	26	0	0.00	1.53	0.00	0.00	21.57	Average
Laeq, Ambreen	Surgeon Overall	28	24	3	12.50	4.50	6.48	1.34	18.93	Average
	<i>Community Hospital of the Monterey Peninsula</i>	18	16	1	6.25	4.93	2.96	0.07	16.49	Average
	<i>Dominican Hospital</i>	10	8	2	25.00	3.65	15.98	1.94	57.74	Average
Laga, Stephen F	Surgeon Overall	2	1	0	0.00	0.90	0.00	0.00	958.45	Average
	<i>Mercy Medical Center - Redding</i>	2	1	0	0.00	0.90	0.00	0.00	100.00	Average
Laks, Hillel	Surgeon Overall	17	11	0	0.00	0.93	0.00	0.00	84.51	Average
	<i>Ronald Reagan UCLA Medical Center</i>	17	11	0	0.00	0.93	0.00	0.00	84.51	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Lam, Tuan T	Surgeon Overall	166	119	4	3.36	2.58	3.04	0.83	7.78	Average
	<i>Memorialcare Orange Coast Medical Center</i>	23	16	0	0.00	2.58	0.00	0.00	20.82	Average
	<i>Memorialcare Saddleback Medical Center</i>	1	1	0	0.00	0.46	0.00	0.00	100.00	Average
	<i>San Antonio Regional Hospital</i>	1	.	.	.	.	.	.	.	NA
	<i>St. Jude Medical Center</i>	141	102	4	3.92	2.60	3.52	0.96	9.01	Average
Lapunzina, Paul M	Surgeon Overall	147	109	0	0.00	1.39	0.00	0.00	5.69	Average
	<i>Kaiser Foundation Hospital - San Francisco</i>	147	109	0	0.00	1.39	0.00	0.00	5.69	Average
Larson, Craig R	Surgeon Overall	77	54	0	0.00	1.41	0.00	0.00	11.33	Average
	<i>Sharp Memorial Hospital</i>	77	54	0	0.00	1.41	0.00	0.00	11.33	Average
Laudito, Antonio	Surgeon Overall	11	10	0	0.00	2.65	0.00	0.00	32.44	Average
	<i>Mercy Medical Center - Redding</i>	3	2	0	0.00	1.41	0.00	0.00	100.00	Average
	<i>St. Joseph Hospital - Eureka</i>	8	8	0	0.00	2.96	0.00	0.00	36.31	Average
Lee, Anson M	Surgeon Overall	77	43	4	9.30	2.97	7.32	1.99	18.74	Average
	<i>Stanford Health Care</i>	77	43	4	9.30	2.97	7.32	1.99	18.74	Average
Lee, Hon S	Surgeon Overall	277	244	2	0.82	2.16	0.89	0.11	3.20	Average
	<i>Kaiser Foundation Hospital - Santa Clara</i>	277	244	2	0.82	2.16	0.89	0.11	3.20	Average
Lee, Raymond C	Surgeon Overall	4	3	0	0.00	3.29	0.00	0.00	87.32	Average
	<i>Providence St. John's Health Center</i>	4	3	0	0.00	3.29	0.00	0.00	87.32	Average
Lee, Sang H	Surgeon Overall	128	113	7	6.19	3.50	4.13	1.66	8.50	Average
	<i>O'Connor Hospital</i>	2	2	0	0.00	0.66	0.00	0.00	100.00	Average
	<i>Regional Medical of San Jose</i>	126	111	7	6.31	3.55	4.14	1.66	8.53	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Lee, Teng C	Surgeon Overall	46	43	2	4.65	1.90	5.72	0.69	20.65	Average
	<i>UC San Francisco Medical Center</i>	1	1	0	0.00	2.73	0.00	0.00	100.00	Average
	<i>Washington Hospital - Fremont</i>	45	42	2	4.76	1.88	5.91	0.72	21.36	Average
Lee, Timothy M	Surgeon Overall	36	32	1	3.13	0.87	8.34	0.21	46.46	Average
	<i>Kaiser Foundation Hospital - San Francisco</i>	36	32	1	3.13	0.87	8.34	0.21	46.46	Average
Lee, Vincent G	Surgeon Overall	94	80	2	2.50	3.16	1.85	0.22	6.67	Average
	<i>Riverside Community Hospital</i>	30	29	1	3.45	4.48	1.80	0.05	10.00	Average
	<i>San Antonio Regional Hospital</i>	39	30	0	0.00	2.32	0.00	0.00	12.36	Average
	<i>St. Mary Medical Center - Apple Valley</i>	25	21	1	4.76	2.54	4.38	0.11	24.40	Average
Lemire, Guy G	Surgeon Overall	6	6	1	16.67	4.01	9.70	0.25	54.03	Average
	<i>Shasta Regional Medical Center</i>	6	6	1	16.67	4.01	9.70	0.25	54.03	Average
Lemoine, Philippe H	Surgeon Overall	100	94	6	6.38	3.59	4.15	1.52	9.04	Average
	<i>Centinela Hospital Medical Center</i>	35	33	2	6.06	4.69	3.02	0.37	10.89	Average
	<i>Providence Little Company of Mary Medical Center - Torrance</i>	65	61	4	6.56	2.99	5.12	1.39	13.10	Average
Limmer, Karl K	Surgeon Overall	95	51	1	1.96	1.58	2.89	0.07	16.10	Average
	<i>Sharp Memorial Hospital</i>	95	51	1	1.96	1.58	2.89	0.07	16.10	Average
Lin, John C	Surgeon Overall	41	38	6	15.79	5.08	7.25	2.66	15.78	Worse
	<i>Community Regional Medical Center - Fresno</i>	17	15	2	13.33	7.04	4.42	0.54	15.98	Average
	<i>Fresno Heart and Surgical Hospital</i>	23	22	3	13.64	3.94	8.07	1.66	23.59	Average
	<i>Saint Agnes Medical Center</i>	1	1	1	100.00	0.82	100.00	7.20	100.00	Worse

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Lin, Yuan H	Surgeon Overall	266	227	10	4.41	3.43	3.00	1.44	5.51	Average
	<i>Alvarado Hospital Medical Center</i>	17	17	0	0.00	3.71	0.00	0.00	13.65	Average
	<i>Grossmont Hospital</i>	23	20	0	0.00	4.75	0.00	0.00	9.07	Average
	<i>Palomar Health Downtown Campus</i>	224	188	10	5.32	3.29	3.77	1.81	6.93	Average
	<i>Sharp Chula Vista Medical Center</i>	2	2	0	0.00	0.89	0.00	0.00	100.00	Average
Liu, Minghui	Surgeon Overall	285	240	12	5.00	3.82	3.06	1.58	5.34	Average
	<i>Doctors Medical Center</i>	285	240	12	5.00	3.82	3.06	1.58	5.34	Average
Longoria, James	Surgeon Overall	265	179	2	1.12	1.91	1.36	0.17	4.93	Average
	<i>Sutter Medical Center, Sacramento</i>	265	179	2	1.12	1.91	1.36	0.17	4.93	Average
MacMillan, James C	Surgeon Overall	143	120	3	2.50	2.51	2.32	0.48	6.79	Average
	<i>Doctors Medical Center</i>	142	119	3	2.52	2.52	2.33	0.48	6.82	Average
	<i>Memorial Medical Center - Modesto</i>	1	1	0	0.00	1.30	0.00	0.00	100.00	Average
Madani, Michael M	Surgeon Overall	33	11	0	0.00	0.93	0.00	0.00	84.59	Average
	<i>UCSD Health La Jolla - Jacobs Medical Center & Sulpizio Cardiovascular Center</i>	33	11	0	0.00	0.93	0.00	0.00	84.59	Average
Mahendra, Tom	Surgeon Overall	21	20	3	15.00	1.69	20.76	4.28	60.68	Worse
	<i>Antelope Valley Hospital</i>	17	16	2	12.50	1.81	16.14	1.95	58.30	Average
	<i>Palmdale Regional Medical Center</i>	4	4	1	25.00	1.20	48.65	1.23	100.00	Average
Malekmehr, Farshad	Surgeon Overall	70	67	5	7.46	2.58	6.75	2.19	15.74	Average
	<i>St. Francis Medical Center</i>	34	34	3	8.82	3.49	5.91	1.22	17.26	Average
	<i>Valley Presbyterian Hospital</i>	35	33	2	6.06	1.65	8.58	1.04	30.99	Average
	<i>West Hills Hospital and Medical Center</i>	1	.	.	.	.	.	.	.	NA

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Malki, Alan E	Surgeon Overall	114	93	2	2.15	1.79	2.80	0.34	10.11	Average
	<i>Santa Barbara Cottage Hospital</i>	114	93	2	2.15	1.79	2.80	0.34	10.11	Average
Marmureanu, Alexandru R	Surgeon Overall	25	23	1	4.35	1.52	6.70	0.17	37.32	Average
	<i>Centinela Hospital Medical Center</i>	1	1	0	0.00	0.93	0.00	0.00	100.00	Average
	<i>Hollywood Presbyterian Medical Center</i>	13	12	0	0.00	1.06	0.00	0.00	67.47	Average
	<i>St. Vincent Medical Center</i>	11	10	1	10.00	2.12	11.03	0.28	61.47	Average
Mazur, Paul A	Surgeon Overall	260	217	9	4.15	1.92	5.04	2.30	9.56	Average
	<i>Shasta Regional Medical Center</i>	260	217	9	4.15	1.92	5.04	2.30	9.56	Average
McConnell, Douglas H	Surgeon Overall	5	5	0	0.00	1.35	0.00	0.00	127.21	Average
	<i>Shasta Regional Medical Center</i>	5	5	0	0.00	1.35	0.00	0.00	100.00	Average
McLean, Michael K	Surgeon Overall	22	19	0	0.00	1.98	0.00	0.00	22.92	Average
	<i>California Hospital Medical Center - Los Angeles</i>	3	1	0	0.00	0.55	0.00	0.00	100.00	Average
	<i>Hollywood Presbyterian Medical Center</i>	1	1	0	0.00	0.60	0.00	0.00	100.00	Average
	<i>Mercy Medical Center - Redding</i>	5	4	0	0.00	6.59	0.00	0.00	32.67	Average
	<i>St. Vincent Medical Center</i>	13	13	0	0.00	0.77	0.00	0.00	85.56	Average
McPherson, James G	Surgeon Overall	94	69	2	2.90	3.46	1.96	0.24	7.07	Average
	<i>St. John's Regional Medical Center</i>	94	69	2	2.90	3.46	1.96	0.24	7.07	Average
Megna, Dominick J	Surgeon Overall	3	2	0	0.00	1.11	0.00	0.00	389.31	Average
	<i>Cedars Sinai Medical Center</i>	3	2	0	0.00	1.11	0.00	0.00	100.00	Average
Melikian, Vicken	Surgeon Overall	33	19	0	0.00	2.24	0.00	0.00	20.23	Average
	<i>Kaiser Foundation Hospital - San Francisco</i>	33	19	0	0.00	2.24	0.00	0.00	20.23	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Mellinger, Douglas N	Surgeon Overall	122	108	2	1.85	1.19	3.63	0.44	13.10	Average
	<i>Scripps Memorial Hospital - La Jolla</i>	122	108	2	1.85	1.19	3.63	0.44	13.10	Average
Merrick, Scot H	Surgeon Overall	71	42	0	0.00	1.65	0.00	0.00	12.45	Average
	<i>Marin General Hospital</i>	18	11	0	0.00	1.55	0.00	0.00	50.64	Average
	<i>North Bay Medical Center</i>	1	1	0	0.00	0.67	0.00	0.00	100.00	Average
	<i>UC San Francisco Medical Center</i>	52	30	0	0.00	1.72	0.00	0.00	16.72	Average
Miller, David C	Surgeon Overall	8	.	.	.	.	.	.	.	NA
	<i>Stanford Health Care</i>	8	.	.	.	.	.	.	.	NA
Milliken, Jeffrey C	Surgeon Overall	105	88	5	5.68	1.93	6.88	2.23	16.05	Average
	<i>UC Irvine Medical Center</i>	105	88	5	5.68	1.93	6.88	2.23	16.05	Average
Minasyan, Sarah Z	Surgeon Overall	63	58	2	3.45	3.58	2.25	0.27	8.11	Average
	<i>Community Regional Medical Center - Fresno</i>	62	57	2	3.51	3.63	2.26	0.27	8.16	Average
	<i>Fresno Heart and Surgical Hospital</i>	1	1	0	0.00	1.19	0.00	0.00	100.00	Average
Mohammadzadeh, Gholam R	Surgeon Overall	164	128	3	2.34	3.87	1.41	0.29	4.13	Average
	<i>Los Robles Hospital and Medical Center</i>	92	67	0	0.00	5.41	0.00	0.00	2.38	Average
	<i>Providence Tarzana Medical Center</i>	17	15	0	0.00	1.80	0.00	0.00	31.89	Average
	<i>St. John's Regional Medical Center</i>	1	1	1	100.00	0.99	100.00	6.00	100.00	Worse
	<i>West Hills Hospital and Medical Center</i>	54	45	2	4.44	2.33	4.45	0.54	16.09	Average
Montero, Erick L	Surgeon Overall	81	72	5	6.94	3.36	4.82	1.56	11.25	Average
	<i>Memorialcare Orange Coast Medical Center</i>	2	1	0	0.00	0.55	0.00	0.00	100.00	Average
	<i>Memorialcare Saddleback Medical Center</i>	79	71	5	7.04	3.40	4.83	1.57	11.27	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Moon, James F	Surgeon Overall	14	13	0	0.00	3.53	0.00	0.00	18.74	Average
	<i>Enloe Medical Center - Esplanade</i>	14	13	0	0.00	3.53	0.00	0.00	18.74	Average
Morenocabral, Ricardo J	Surgeon Overall	70	56	3	5.36	2.92	4.29	0.88	12.53	Average
	<i>Grossmont Hospital</i>	28	22	1	4.55	2.51	4.23	0.11	23.55	Average
	<i>Scripps Mercy Hospital</i>	7	6	1	16.67	3.32	11.70	0.30	65.21	Average
	<i>Sharp Chula Vista Medical Center</i>	35	28	1	3.57	3.15	2.65	0.07	14.76	Average
Morris, Allen S	Surgeon Overall	187	97	1	1.03	2.00	1.20	0.03	6.69	Average
	<i>Mercy General Hospital</i>	183	93	1	1.08	1.98	1.27	0.03	7.06	Average
	<i>Mercy San Juan Hospital</i>	4	4	0	0.00	2.52	0.00	0.00	85.46	Average
Morrissey, James D	Surgeon Overall	290	254	6	2.36	4.07	1.35	0.50	2.95	Average
	<i>Dameron Hospital</i>	28	26	2	7.69	2.30	7.80	0.94	28.17	Average
	<i>St. Joseph's Medical Center of Stockton</i>	262	228	4	1.75	4.27	0.96	0.26	2.45	Average
Mudge, Devin R	Surgeon Overall	307	239	4	1.67	2.88	1.36	0.37	3.47	Average
	<i>Kaiser Foundation Hospital - Fontana</i>	307	239	4	1.67	2.88	1.36	0.37	3.47	Average
Mumtaz, Seemal	Surgeon Overall	131	118	2	1.69	3.01	1.32	0.16	4.75	Average
	<i>Grossmont Hospital</i>	65	59	1	1.69	3.51	1.13	0.03	6.27	Average
	<i>Palomar Health Downtown Campus</i>	1	1	0	0.00	8.62	0.00	0.00	99.83	Average
	<i>Sharp Chula Vista Medical Center</i>	65	58	1	1.72	2.39	1.68	0.04	9.37	Average
Noble, Stephen L	Surgeon Overall	7	7	0	0.00	1.07	0.00	0.00	115.07	Average
	<i>Memorial Medical Center - Modesto</i>	7	7	0	0.00	1.07	0.00	0.00	100.00	Average
Nucho, Ramsay C	Surgeon Overall	116	102	2	1.96	2.97	1.54	0.19	5.56	Average
	<i>Adventist Health Glendale</i>	10	7	0	0.00	2.97	0.00	0.00	41.36	Average
	<i>Adventist Health White Memorial</i>	106	95	2	2.11	2.97	1.65	0.20	5.97	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Odeh, Yousef M	Surgeon Overall	46	37	3	8.11	4.61	4.11	0.85	12.00	Average
	<i>St. John's Regional Medical Center</i>	46	37	3	8.11	4.61	4.11	0.85	12.00	Average
Ogden, William D	Surgeon Overall	25	20	0	0.00	1.94	0.00	0.00	22.24	Average
	<i>Santa Clara Valley Medical Center</i>	25	20	0	0.00	1.94	0.00	0.00	22.24	Average
Oka, Tomomi	Surgeon Overall	149	124	2	1.61	1.72	2.19	0.26	7.89	Average
	<i>Dominican Hospital</i>	1	1	0	0.00	2.87	0.00	0.00	100.00	Average
	<i>El Camino Hospital</i>	42	34	1	2.94	1.48	4.65	0.12	25.89	Average
	<i>Mills-Peninsula Medical Center</i>	106	89	1	1.12	1.80	1.45	0.04	8.10	Average
Omari, Bassam O	Surgeon Overall	143	137	2	1.46	1.76	1.94	0.23	6.99	Average
	<i>Desert Valley Hospital</i>	1	1	0	0.00	0.77	0.00	0.00	100.00	Average
	<i>Los Angeles County/Harbor - UCLA Medical Center</i>	77	74	2	2.70	1.65	3.82	0.46	13.81	Average
	<i>St. Francis Medical Center</i>	59	56	0	0.00	1.81	0.00	0.00	8.48	Average
	<i>St. Mary Medical Center - Apple Valley</i>	3	3	0	0.00	4.44	0.00	0.00	64.68	Average
	<i>St. Mary Medical Center - Long Beach</i>	2	2	0	0.00	1.15	0.00	0.00	100.00	Average
	<i>Torrance Memorial Medical Center</i>	1	1	0	0.00	1.20	0.00	0.00	100.00	Average
Osman, Ashraf I	Surgeon Overall	3	3	0	0.00	3.38	0.00	0.00	84.78	Average
	<i>Mercy Medical Center - Redding</i>	3	3	0	0.00	3.38	0.00	0.00	84.78	Average
Ott, Richard A	Surgeon Overall	356	281	4	1.42	2.17	1.53	0.42	3.91	Average
	<i>AHMC Anaheim Regional Medical Center</i>	199	154	4	2.60	1.80	3.36	0.92	8.61	Average
	<i>Anaheim Global Medical Center</i>	78	61	0	0.00	2.73	0.00	0.00	5.17	Average
	<i>Orange County Global Medical Center</i>	79	66	0	0.00	2.52	0.00	0.00	5.17	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Overton, John B	Surgeon Overall	8	8	0	0.00	4.23	0.00	0.00	25.42	Average
	<i>Dameron Hospital</i>	8	8	0	0.00	4.23	0.00	0.00	25.42	Average
Palafox, Brian A	Surgeon Overall	204	161	7	4.35	2.40	4.23	1.70	8.72	Average
	<i>St. Joseph Hospital - Orange</i>	202	159	5	3.14	2.13	3.44	1.12	8.04	Average
	<i>UC Irvine Medical Center</i>	2	2	2	100.00	23.59	9.89	1.20	35.74	Average
Pamula, Ramesh B	Surgeon Overall	11	11	2	18.18	3.64	11.66	1.41	42.12	Average
	<i>Community Regional Medical Center - Fresno</i>	5	5	1	20.00	5.42	8.61	0.22	47.96	Average
	<i>Fresno Heart and Surgical Hospital</i>	2	2	0	0.00	1.08	0.00	0.00	100.00	Average
	<i>Saint Agnes Medical Center</i>	4	4	1	25.00	2.69	21.68	0.55	100.00	Average
Panagiotides, George P	Surgeon Overall	253	240	6	2.50	2.60	2.24	0.82	4.89	Average
	<i>Lakewood Regional Medical Center</i>	91	86	0	0.00	2.58	0.00	0.00	3.89	Average
	<i>Memorialcare Long Beach Medical Center</i>	52	49	2	4.08	2.17	4.39	0.53	15.86	Average
	<i>Orange County Global Medical Center</i>	4	4	1	25.00	3.84	15.21	0.38	84.72	Average
	<i>PIH Health Hospital - Downey</i>	35	34	1	2.94	2.73	2.51	0.06	14.01	Average
	<i>PIH Health Hospital - Whittier</i>	5	5	0	0.00	3.25	0.00	0.00	52.94	Average
	<i>St. Mary Medical Center - Long Beach</i>	66	62	2	3.23	2.77	2.72	0.33	9.83	Average
Paw, Patrick T	Surgeon Overall	64	60	3	5.00	1.85	6.31	1.30	18.43	Average
	<i>Adventist Health Bakersfield</i>	33	31	1	3.23	2.10	3.59	0.09	19.98	Average
	<i>Bakersfield Heart Hospital</i>	1	1	0	0.00	2.17	0.00	0.00	100.00	Average
	<i>Bakersfield Memorial Hospital</i>	30	28	2	7.14	1.56	10.66	1.29	38.51	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Peck, Eric A	Surgeon Overall	134	114	1	0.88	1.81	1.13	0.03	6.30	Average
	<i>Adventist Health Bakersfield</i>	53	48	0	0.00	2.28	0.00	0.00	7.86	Average
	<i>Bakersfield Heart Hospital</i>	1	1	0	0.00	1.65	0.00	0.00	100.00	Average
	<i>Bakersfield Memorial Hospital</i>	80	65	1	1.54	1.47	2.45	0.06	13.64	Average
Perch, Paul G	Surgeon Overall	237	202	1	0.50	1.74	0.67	0.02	3.71	Average
	<i>Kaiser Foundation Hospital - Los Angeles</i>	237	202	1	0.50	1.74	0.67	0.02	3.71	Average
Perkowski, David J	Surgeon Overall	30	28	1	3.57	1.80	4.62	0.12	25.73	Average
	<i>Memorialcare Saddleback Medical Center</i>	30	28	1	3.57	1.80	4.62	0.12	25.73	Average
Perry, Paul A	Surgeon Overall	82	69	2	2.90	2.34	2.89	0.35	10.45	Average
	<i>UC Davis Medical Center</i>	82	69	2	2.90	2.34	2.89	0.35	10.45	Average
Petrik, Pavel V	Surgeon Overall	1	1	0	0.00	0.67	0.00	0.00	1293.90	Average
	<i>Antelope Valley Hospital</i>	1	1	0	0.00	0.67	0.00	0.00	100.00	Average
Pfeffer, Thomas A	Surgeon Overall	313	250	7	2.80	2.13	3.07	1.24	6.33	Average
	<i>Kaiser Foundation Hospital - Los Angeles</i>	313	250	7	2.80	2.13	3.07	1.24	6.33	Average
Phillips, Robert A	Surgeon Overall	32	28	0	0.00	3.04	0.00	0.00	10.10	Average
	<i>Memorialcare Long Beach Medical Center</i>	16	14	0	0.00	1.56	0.00	0.00	39.35	Average
	<i>Memorialcare Orange Coast Medical Center</i>	16	14	0	0.00	4.53	0.00	0.00	13.59	Average
Poa, Li	Surgeon Overall	221	186	8	4.30	3.35	3.00	1.29	5.91	Average
	<i>Providence Little Company of Mary Medical Center - Torrance</i>	221	186	8	4.30	3.35	3.00	1.29	5.91	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Pollema, Travis L	Surgeon Overall	122	113	2	1.77	2.27	1.82	0.22	6.56	Average
	<i>UCSD Health La Jolla - Jacobs Medical Center & Sulpizio Cardiovascular Center</i>	122	113	2	1.77	2.27	1.82	0.22	6.56	Average
Pompili, Mario F	Surgeon Overall	231	163	5	3.07	2.17	3.31	1.07	7.72	Average
	<i>Kaiser Foundation Hospital - Santa Clara</i>	231	163	5	3.07	2.17	3.31	1.07	7.72	Average
Postel, Joachim M	Surgeon Overall	32	24	1	4.17	1.63	5.97	0.15	33.29	Average
	<i>St. Joseph Hospital - Eureka</i>	32	24	1	4.17	1.63	5.97	0.15	33.29	Average
Pottmeyer, Edward W	Surgeon Overall	55	42	1	2.38	5.32	1.05	0.03	5.82	Average
	<i>Good Samaritan Hospital - San Jose</i>	54	41	1	2.44	5.42	1.05	0.03	5.85	Average
	<i>Shasta Regional Medical Center</i>	1	1	0	0.00	0.92	0.00	0.00	100.00	Average
Powers, Matthew E	Surgeon Overall	149	117	2	1.71	2.15	1.85	0.22	6.70	Average
	<i>Eisenhower Medical Center</i>	149	117	2	1.71	2.15	1.85	0.22	6.70	Average
Pretorius, Gertdiederick V	Surgeon Overall	103	61	1	1.64	3.50	1.09	0.03	6.09	Average
	<i>UCSD Health La Jolla - Jacobs Medical Center & Sulpizio Cardiovascular Center</i>	103	61	1	1.64	3.50	1.09	0.03	6.09	Average
Pribyl, Shea M	Surgeon Overall	27	22	1	4.55	3.55	2.99	0.08	16.67	Average
	<i>North Bay Medical Center</i>	21	17	1	5.88	4.08	3.36	0.09	18.74	Average
	<i>Queen of the Valley Medical Center</i>	6	5	0	0.00	1.73	0.00	0.00	99.52	Average
Puig-Palomar, Miguel	Surgeon Overall	309	269	6	2.23	2.09	2.49	0.91	5.41	Average
	<i>Enloe Medical Center - Esplanade</i>	309	269	6	2.23	2.09	2.49	0.91	5.41	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Purewal, Sarabjit S	Surgeon Overall	320	281	8	2.85	2.04	3.26	1.41	6.42	Average
	<i>Adventist Health Bakersfield</i>	66	60	2	3.33	2.01	3.87	0.47	13.99	Average
	<i>Bakersfield Heart Hospital</i>	162	142	2	1.41	1.92	1.71	0.21	6.17	Average
	<i>Bakersfield Memorial Hospital</i>	92	79	4	5.06	2.27	5.21	1.42	13.34	Average
Rabkin, David G	Surgeon Overall	156	139	3	2.16	2.48	2.03	0.42	5.93	Average
	<i>Loma Linda University Medical Center</i>	16	15	0	0.00	1.29	0.00	0.00	44.50	Average
	<i>Loma Linda University Medical Center - Murrieta</i>	140	124	3	2.42	2.62	2.15	0.44	6.30	Average
Ramzy, Danny	Surgeon Overall	103	85	0	0.00	1.31	0.00	0.00	7.75	Average
	<i>Cedars Sinai Medical Center</i>	103	85	0	0.00	1.31	0.00	0.00	7.75	Average
Randhawa, Mohinder P	Surgeon Overall	45	43	3	6.98	3.73	4.36	0.90	12.75	Average
	<i>Mercy Medical Center - Redding</i>	45	43	3	6.98	3.73	4.36	0.90	12.75	Average
Raney, Aidan A	Surgeon Overall	66	25	1	4.00	1.93	4.85	0.12	27.00	Average
	<i>Hoag Memorial Hospital Presbyterian</i>	66	25	1	4.00	1.93	4.85	0.12	27.00	Average
Razzouk, Anees J	Surgeon Overall	137	96	0	0.00	2.58	0.00	0.00	3.47	Average
	<i>Loma Linda University Medical Center</i>	137	96	0	0.00	2.58	0.00	0.00	3.47	Average
Reemtsen, Brian L	Surgeon Overall	7	6	0	0.00	2.94	0.00	0.00	48.81	Average
	<i>Ronald Reagan UCLA Medical Center</i>	7	6	0	0.00	2.94	0.00	0.00	48.81	Average
Roberts, Randall F	Surgeon Overall	174	154	2	1.30	2.16	1.40	0.17	5.06	Average
	<i>Adventist Health Glendale</i>	43	33	0	0.00	2.77	0.00	0.00	9.42	Average
	<i>California Hospital Medical Center - Los Angeles</i>	40	38	1	2.63	2.93	2.10	0.05	11.68	Average
	<i>Garfield Medical Center</i>	9	7	1	14.29	1.47	22.70	0.57	100.00	Average
	<i>Glendale Memorial Hospital and Health Center</i>	82	76	0	0.00	1.58	0.00	0.00	7.18	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Robertson, John M	Surgeon Overall	57	42	0	0.00	1.85	0.00	0.00	11.09	Average
	<i>Providence St. John's Health Center</i>	57	42	0	0.00	1.85	0.00	0.00	11.09	Average
Rodriguez, Victor M	Surgeon Overall	36	23	0	0.00	1.74	0.00	0.00	21.51	Average
	<i>UC Davis Medical Center</i>	36	23	0	0.00	1.74	0.00	0.00	21.51	Average
Sakopoulos, Andreas G	Surgeon Overall	121	95	2	2.11	2.34	2.10	0.25	7.60	Average
	<i>Adventist Health St. Helena</i>	121	95	2	2.11	2.34	2.10	0.25	7.60	Average
Salem, Fakhri M	Surgeon Overall	83	75	5	6.67	2.52	6.17	2.00	14.41	Average
	<i>Grossmont Hospital</i>	3	3	0	0.00	2.17	0.00	0.00	100.00	Average
	<i>Scripps Mercy Hospital</i>	80	72	5	6.94	2.53	6.39	2.08	14.92	Average
Schwartz, Steven M	Surgeon Overall	42	38	1	2.63	1.99	3.08	0.08	17.19	Average
	<i>Good Samaritan Hospital - San Jose</i>	41	37	1	2.70	1.96	3.21	0.08	17.91	Average
	<i>O'Connor Hospital</i>	1	1	0	0.00	3.05	0.00	0.00	100.00	Average
Scoville, David H	Surgeon Overall	85	77	1	1.30	1.38	2.20	0.06	12.23	Average
	<i>Kaiser Foundation Hospital - Santa Clara</i>	85	77	1	1.30	1.38	2.20	0.06	12.23	Average
Serna, Daniel L	Surgeon Overall	295	239	3	1.26	2.03	1.45	0.30	4.23	Average
	<i>Kaiser Foundation Hospital - Fontana</i>	295	239	3	1.26	2.03	1.45	0.30	4.23	Average
Setty, Shaun P	Surgeon Overall	1	.	.	.	.	.	.	.	NA
	<i>Memorialcare Long Beach Medical Center</i>	1	.	.	.	.	.	.	.	NA

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Shafi, Bilal M	Surgeon Overall	224	138	4	2.90	2.01	3.36	0.92	8.61	Average
	<i>Community Hospital of the Monterey Peninsula</i>	2	1	0	0.00	2.78	0.00	0.00	100.00	Average
	<i>Dominican Hospital</i>	199	122	3	2.46	2.03	2.83	0.58	8.28	Average
	<i>Good Samaritan Hospital - San Jose</i>	22	15	1	6.67	1.84	8.45	0.21	47.09	Average
	<i>Mills-Peninsula Medical Center</i>	1	.	.	.	.	.	.	.	NA
Shah, Aamir S	Surgeon Overall	22	12	0	0.00	3.82	0.00	0.00	18.77	Average
	<i>Cedars Sinai Medical Center</i>	17	8	0	0.00	4.18	0.00	0.00	25.73	Average
	<i>Torrance Memorial Medical Center</i>	5	4	0	0.00	3.10	0.00	0.00	69.40	Average
Shah, Asad A	Surgeon Overall	45	38	0	0.00	1.20	0.00	0.00	18.95	Average
	<i>Hoag Memorial Hospital Presbyterian</i>	45	38	0	0.00	1.20	0.00	0.00	18.95	Average
Shah, Sachin	Surgeon Overall	2	2	0	0.00	5.73	0.00	0.00	75.13	Average
	<i>Mercy Medical Center - Redding</i>	2	2	0	0.00	5.73	0.00	0.00	75.13	Average
Sharma, Kapil	Surgeon Overall	191	120	1	0.83	1.94	1.00	0.03	5.60	Average
	<i>Mercy General Hospital</i>	181	114	1	0.88	1.88	1.09	0.03	6.08	Average
	<i>Mercy San Juan Hospital</i>	10	6	0	0.00	3.04	0.00	0.00	47.13	Average
Shayan, Hossein	Surgeon Overall	80	70	0	0.00	2.59	0.00	0.00	4.74	Average
	<i>Riverside Community Hospital</i>	19	19	0	0.00	2.35	0.00	0.00	19.31	Average
	<i>San Antonio Regional Hospital</i>	41	33	0	0.00	2.78	0.00	0.00	9.40	Average
	<i>St. Mary Medical Center - Apple Valley</i>	20	18	0	0.00	2.51	0.00	0.00	19.03	Average
Sheikh, Ahmad Y	Surgeon Overall	149	108	3	2.78	1.33	4.87	1.00	14.24	Average
	<i>Kaiser Foundation Hospital - San Francisco</i>	149	108	3	2.78	1.33	4.87	1.00	14.24	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Shemin, Richard J	Surgeon Overall	102	50	1	2.00	1.73	2.70	0.07	15.07	Average
	<i>Ronald Reagan UCLA Medical Center</i>	102	50	1	2.00	1.73	2.70	0.07	15.07	Average
Sheridan, Brett C	Surgeon Overall	20	18	1	5.56	1.22	10.61	0.27	59.11	Average
	<i>California Pacific Medical Center - Pacific Campus</i>	20	18	1	5.56	1.22	10.61	0.27	59.11	Average
Shuman, Robert L	Surgeon Overall	5	5	1	20.00	2.45	19.06	0.48	106.20	Average
	<i>Memorialcare Long Beach Medical Center</i>	5	5	1	20.00	2.45	19.06	0.48	100.00	Average
Silva, Raymond	Surgeon Overall	12	10	2	20.00	1.81	25.74	3.12	92.99	Worse
	<i>Good Samaritan Hospital - San Jose</i>	12	10	2	20.00	1.81	25.74	3.12	92.99	Worse
Slachman, Frank N	Surgeon Overall	164	117	0	0.00	2.07	0.00	0.00	3.56	Average
	<i>Mercy General Hospital</i>	152	108	0	0.00	2.12	0.00	0.00	3.75	Average
	<i>Mercy San Juan Hospital</i>	12	9	0	0.00	1.39	0.00	0.00	69.04	Average
Smith, Larry H	Surgeon Overall	1	1	0	0.00	1.63	0.00	0.00	527.72	Average
	<i>Mercy Medical Center - Redding</i>	1	1	0	0.00	1.63	0.00	0.00	100.00	Average
Soltero, Michael J	Surgeon Overall	136	99	3	3.03	2.29	3.09	0.64	9.03	Average
	<i>Henry Mayo Newhall Hospital</i>	49	35	0	0.00	2.20	0.00	0.00	11.16	Average
	<i>Northridge Hospital Medical Center</i>	28	25	1	4.00	1.87	5.00	0.13	27.83	Average
	<i>Providence Holy Cross Medical Center</i>	48	32	1	3.13	2.72	2.68	0.07	14.94	Average
	<i>Providence Tarzana Medical Center</i>	4	2	0	0.00	1.30	0.00	0.00	100.00	Average
	<i>Valley Presbyterian Hospital</i>	2	2	1	50.00	5.16	22.62	0.57	100.00	Average
	<i>West Hills Hospital and Medical Center</i>	5	3	0	0.00	0.89	0.00	0.00	100.00	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Spowart, Gregory S	Surgeon Overall	165	130	3	2.31	2.69	2.00	0.41	5.85	Average
	<i>Community Hospital of the Monterey Peninsula</i>	165	130	3	2.31	2.69	2.00	0.41	5.85	Average
Stahl, Richard D	Surgeon Overall	247	193	3	1.55	2.31	1.57	0.32	4.58	Average
	<i>Scripps Memorial Hospital - La Jolla</i>	247	193	3	1.55	2.31	1.57	0.32	4.58	Average
Stanten, Russell D	Surgeon Overall	122	109	3	2.75	2.15	2.99	0.62	8.75	Average
	<i>Alta Bates Summit Medical Center</i>	122	109	3	2.75	2.15	2.99	0.62	8.75	Average
Starnes, Vaughn A	Surgeon Overall	79	36	0	0.00	1.05	0.00	0.00	22.67	Average
	<i>Keck Hospital of University of Southern California</i>	79	36	0	0.00	1.05	0.00	0.00	22.67	Average
Stein, Alexander G	Surgeon Overall	86	62	2	3.23	2.56	2.94	0.36	10.62	Average
	<i>Memorialcare Long Beach Medical Center</i>	86	62	2	3.23	2.56	2.94	0.36	10.62	Average
Stewart, Robert D	Surgeon Overall	58	49	2	4.08	4.09	2.33	0.28	8.42	Average
	<i>Community Regional Medical Center - Fresno</i>	45	37	2	5.41	4.86	2.59	0.31	9.37	Average
	<i>Fresno Heart and Surgical Hospital</i>	2	2	0	0.00	0.71	0.00	0.00	100.00	Average
	<i>Saint Agnes Medical Center</i>	11	10	0	0.00	1.89	0.00	0.00	45.54	Average
Stoneburner, John M	Surgeon Overall	115	79	1	1.27	1.82	1.62	0.04	9.04	Average
	<i>Torrance Memorial Medical Center</i>	115	79	1	1.27	1.82	1.62	0.04	9.04	Average
Stowell, Donald E	Surgeon Overall	38	38	2	5.26	3.73	3.29	0.40	11.89	Average
	<i>St. Joseph's Medical Center of Stockton</i>	38	38	2	5.26	3.73	3.29	0.40	11.89	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Sun, Jack C	Surgeon Overall	120	75	1	1.33	2.35	1.32	0.03	7.37	Average
	<i>Keck Hospital of University of Southern California</i>	2	.	.	.	.	.	.	.	NA
	<i>Torrance Memorial Medical Center</i>	86	51	1	1.96	2.64	1.73	0.04	9.66	Average
	<i>UC Irvine Medical Center</i>	32	24	0	0.00	1.75	0.00	0.00	20.54	Average
Tabe, Cyril E	Surgeon Overall	1	1	0	0.00	1.63	0.00	0.00	529.48	Average
	<i>Desert Regional Medical Center</i>	1	1	0	0.00	1.63	0.00	0.00	100.00	Average
Talieh, Yahya J	Surgeon Overall	57	52	2	3.85	3.02	2.97	0.36	10.73	Average
	<i>Doctors Medical Center</i>	14	13	2	15.38	1.98	18.13	2.20	65.49	Average
	<i>Memorial Medical Center - Modesto</i>	43	39	0	0.00	3.37	0.00	0.00	6.55	Average
Tang, Eddie	Surgeon Overall	64	60	2	3.33	3.54	2.20	0.27	7.94	Average
	<i>Enloe Medical Center - Esplanade</i>	13	12	0	0.00	3.09	0.00	0.00	23.25	Average
	<i>O'Connor Hospital</i>	1	1	0	0.00	0.97	0.00	0.00	100.00	Average
	<i>Regional Medical of San Jose</i>	35	35	1	2.86	4.49	1.48	0.04	8.27	Average
	<i>St. Mary's Medical Center, San Francisco</i>	15	12	1	8.33	1.42	13.66	0.35	76.11	Average
Tang, Taylor	Surgeon Overall	173	160	3	1.88	1.79	2.45	0.50	7.15	Average
	<i>Mission Hospital Regional Medical Center</i>	112	105	2	1.90	1.59	2.79	0.34	10.09	Average
	<i>St. Joseph Hospital - Orange</i>	43	40	1	2.50	2.28	2.56	0.06	14.26	Average
	<i>St. Jude Medical Center</i>	18	15	0	0.00	1.85	0.00	0.00	31.05	Average
Tedesco, Dominic J	Surgeon Overall	103	94	2	2.13	1.50	3.31	0.40	11.96	Average
	<i>Community Memorial Hospital - San Buenaventura</i>	103	94	2	2.13	1.50	3.31	0.40	11.96	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Tendulkar, Amod P	Surgeon Overall	189	168	2	1.19	3.63	0.76	0.09	2.76	Average
	<i>St. Joseph's Medical Center of Stockton</i>	189	168	2	1.19	3.63	0.76	0.09	2.76	Average
Thibault, William N	Surgeon Overall	21	20	0	0.00	2.36	0.00	0.00	18.21	Average
	<i>Mission Hospital Regional Medical Center</i>	2	2	0	0.00	0.78	0.00	0.00	100.00	Average
	<i>St. Jude Medical Center</i>	19	18	0	0.00	2.54	0.00	0.00	18.83	Average
Tovar, Eduardo A	Surgeon Overall	177	103	0	0.00	3.62	0.00	0.00	2.31	Better
	<i>PIH Health Hospital - Whittier</i>	177	103	0	0.00	3.62	0.00	0.00	2.31	Better
Trento, Alfredo	Surgeon Overall	106	47	1	2.13	1.14	4.35	0.11	24.26	Average
	<i>Cedars Sinai Medical Center</i>	106	47	1	2.13	1.14	4.35	0.11	24.26	Average
Trivedi, Dhaval	Surgeon Overall	261	241	1	0.41	1.70	0.57	0.01	3.18	Average
	<i>Kaiser Foundation Hospital - Los Angeles</i>	261	241	1	0.41	1.70	0.57	0.01	3.18	Average
Trivedi, Rohitkumar R	Surgeon Overall	83	77	3	3.90	2.56	3.55	0.73	10.36	Average
	<i>Desert Valley Hospital</i>	69	63	2	3.17	2.64	2.81	0.34	10.14	Average
	<i>St. Mary Medical Center - Apple Valley</i>	14	14	1	7.14	2.22	7.50	0.19	41.80	Average
Tsau, Pei H	Surgeon Overall	181	148	3	2.03	3.36	1.41	0.29	4.12	Average
	<i>El Camino Hospital</i>	173	141	3	2.13	3.43	1.45	0.30	4.23	Average
	<i>Good Samaritan Hospital - San Jose</i>	1	1	0	0.00	0.76	0.00	0.00	100.00	Average
	<i>Mills-Peninsula Medical Center</i>	7	6	0	0.00	2.09	0.00	0.00	68.80	Average
Tyner, John J	Surgeon Overall	190	140	2	1.43	1.14	2.93	0.36	10.59	Average
	<i>Scripps Memorial Hospital - La Jolla</i>	190	140	2	1.43	1.14	2.93	0.36	10.59	Average
	<i>Bakersfield Memorial Hospital</i>	92	79	4	5.06	2.27	5.21	1.42	13.34	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Veeragandham, Ramesh S	Surgeon Overall	121	92	0	0.00	2.66	0.00	0.00	3.52	Average
	<i>John Muir Medical Center - Concord Campus</i>	103	79	0	0.00	2.89	0.00	0.00	3.77	Average
	<i>San Ramon Regional Medical Center</i>	5	1	0	0.00	1.06	0.00	0.00	100.00	Average
	<i>Stanford Health Care - Valleycare</i>	13	12	0	0.00	1.25	0.00	0.00	57.35	Average
Vial, Conrad M	Surgeon Overall	31	18	0	0.00	0.96	0.00	0.00	50.00	Average
	<i>El Camino Hospital</i>	12	7	0	0.00	1.00	0.00	0.00	100.00	Average
	<i>Mills-Peninsula Medical Center</i>	19	11	0	0.00	0.93	0.00	0.00	84.51	Average
Vo, Quang T	Surgeon Overall	21	18	0	0.00	0.82	0.00	0.00	58.01	Average
	<i>Emante Health Inter-Community Hospital</i>	1	.	.	.	.	.	.	.	NA
	<i>Fountain Valley Regional Hospital and Medical Center - Euclid</i>	3	3	0	0.00	0.42	0.00	0.00	100.00	Average
	<i>Garfield Medical Center</i>	12	11	0	0.00	1.01	0.00	0.00	77.64	Average
	<i>Memorialcare Long Beach Medical Center</i>	1	1	0	0.00	0.65	0.00	0.00	100.00	Average
	<i>Riverside Community Hospital</i>	4	3	0	0.00	0.62	0.00	0.00	100.00	Average
Vunnamadala, Syam P	Surgeon Overall	140	132	7	5.30	2.99	4.14	1.66	8.53	Average
	<i>AHMC Anaheim Regional Medical Center</i>	64	59	3	5.08	3.53	3.37	0.69	9.84	Average
	<i>Anaheim Global Medical Center</i>	10	8	0	0.00	4.96	0.00	0.00	21.71	Average
	<i>West Anaheim Medical Center</i>	66	65	4	6.15	2.26	6.35	1.73	16.26	Average
Wang, Nan	Surgeon Overall	311	222	3	1.35	2.41	1.31	0.27	3.83	Average
	<i>Riverside Community Hospital</i>	14	12	0	0.00	3.20	0.00	0.00	22.44	Average
	<i>San Antonio Regional Hospital</i>	232	163	3	1.84	2.38	1.80	0.37	5.27	Average
	<i>St. Mary Medical Center - Apple Valley</i>	65	47	0	0.00	2.30	0.00	0.00	7.95	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Watkins, Amelia C	Surgeon Overall	11	7	1	14.29	3.51	9.50	0.24	52.93	Average
	<i>Stanford Health Care</i>	11	7	1	14.29	3.51	9.50	0.24	52.93	Average
West, Phillip N	Surgeon Overall	64	53	2	3.77	2.05	4.29	0.52	15.49	Average
	<i>Santa Barbara Cottage Hospital</i>	64	53	2	3.77	2.05	4.29	0.52	15.49	Average
Wieselthaler, Georg M	Surgeon Overall	40	30	1	3.33	1.88	4.14	0.10	23.09	Average
	<i>UC San Francisco Medical Center</i>	40	30	1	3.33	1.88	4.14	0.10	23.09	Average
Wilson, Joseph W	Surgeon Overall	156	129	1	0.78	1.73	1.04	0.03	5.81	Average
	<i>Eisenhower Medical Center</i>	156	129	1	0.78	1.73	1.04	0.03	5.81	Average
Woo, Yi-Ping J	Surgeon Overall	107	33	0	0.00	1.33	0.00	0.00	19.57	Average
	<i>Stanford Health Care</i>	107	33	0	0.00	1.33	0.00	0.00	19.57	Average
Wozniak, Curtis J	Surgeon Overall	21	21	0	0.00	1.80	0.00	0.00	22.77	Average
	<i>Kaiser Foundation Hospital - San Francisco</i>	6	6	0	0.00	1.31	0.00	0.00	100.00	Average
	<i>Marin General Hospital</i>	1	1	0	0.00	0.25	0.00	0.00	100.00	Average
	<i>North Bay Medical Center</i>	3	3	0	0.00	1.09	0.00	0.00	100.00	Average
	<i>UC San Francisco Medical Center</i>	11	11	0	0.00	2.40	0.00	0.00	32.58	Average
Yankey, Godfred K	Surgeon Overall	27	23	2	8.70	3.33	6.10	0.74	22.02	Average
	<i>Saint Agnes Medical Center</i>	27	23	2	8.70	3.33	6.10	0.74	22.02	Average
Yap, Alexander G	Surgeon Overall	33	30	1	3.33	4.07	1.91	0.05	10.65	Average
	<i>Seton Medical Center</i>	33	30	1	3.33	4.07	1.91	0.05	10.65	Average

Table C-4: Surgeon Risk-Adjusted Operative Mortality Results for Isolated CABG, 2017-2018

Surgeon	Hospital	All CABG Cases	Isolated CABG Cases	Isolated CABG Mortality	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (%)	95% CI for RAMR		Performance Rating*
								Lower Bound	Upper Bound	
State		32,297	25,838	603	2.33					
Yasuda, Roderick K	Surgeon Overall	175	151	5	3.31	2.75	2.81	0.91	6.55	Average
	<i>Henry Mayo Newhall Hospital</i>	28	21	0	0.00	3.39	0.00	0.00	12.09	Average
	<i>Northridge Hospital Medical Center</i>	49	44	2	4.55	2.36	4.49	0.54	16.24	Average
	<i>Providence Holy Cross Medical Center</i>	39	36	1	2.78	3.26	1.99	0.05	11.09	Average
	<i>Providence Tarzana Medical Center</i>	8	8	0	0.00	0.97	0.00	0.00	100.00	Average
	<i>Valley Presbyterian Hospital</i>	6	6	1	16.67	1.73	22.52	0.57	100.00	Average
	<i>West Hills Hospital and Medical Center</i>	45	36	1	2.78	2.92	2.22	0.06	12.37	Average
Yokoyama, Taro	Surgeon Overall	82	78	5	6.41	1.84	8.15	2.65	19.02	Worse
	<i>Hollywood Presbyterian Medical Center</i>	64	63	5	7.94	2.05	9.02	2.93	21.06	Worse
	<i>St. Vincent Medical Center</i>	18	15	0	0.00	0.92	0.00	0.00	62.28	Average
Young, Joseph N	Surgeon Overall	39	26	0	0.00	1.56	0.00	0.00	21.26	Average
	<i>UC Davis Medical Center</i>	39	26	0	0.00	1.56	0.00	0.00	21.26	Average
Yun, Kwok L	Surgeon Overall	388	273	3	1.10	1.46	1.75	0.36	5.12	Average
	<i>Kaiser Foundation Hospital - Fontana</i>	6	1	0	0.00	0.82	0.00	0.00	100.00	Average
	<i>Kaiser Foundation Hospital - Los Angeles</i>	382	272	3	1.10	1.47	1.76	0.36	5.13	Average
Zhu, Henry L	Surgeon Overall	399	320	1	0.31	1.92	0.38	0.01	2.12	Better
	<i>Mercy General Hospital</i>	399	320	1	0.31	1.92	0.38	0.01	2.12	Better

Note: The number of CABG cases and outcomes by provider may not equal the total number of statewide CABG cases and outcomes for various reasons, including the surgeon appeals process.

Note: NA=Not applicable. Non-isolated CABG cases were not used to determine performance ratings in this report.

*A provider is classified as **“Better”** if the upper 95% CI of the RAMR falls below the California observed mortality rate (2.33%). A provider is classified as **“Worse”** if the lower 95% CI of the RAMR is higher than the California observed mortality rate. A provider’s performance is considered **“Average”** if the California mortality rate falls within the 95% CI of the provider’s RAMR.

Risk Model for Adjusting Hospital CABG + Valve Operative Mortality Rates, 2017–2018

Performance ratings for hospitals performing CABG+valve surgery are based on operations occurring in 2017 or 2018 that combined CABG and aortic valve replacement, mitral valve repair, and/or mitral valve replacement procedures. These operations exclude patients in salvage operative status.

To develop the risk model for hospital CABG+valve operative mortality, the 4,331 CABG+valve cases in 2017–2018 were evaluated for missing data. Values for the missing data in 298 records (6.2%) were imputed by replacing them with the lowest risk category of the same variable (e.g., *Chronic Lung Disease = none*) to ensure that the effects of risk factors were estimated based on the most complete data available. As a result, 4,331 cases had no missing data in any field and were used for the risk model parameter estimation. The risk model, based on the 2017–2018 data, is presented in Table D-1 with statistically significant risk factors identified in bolded text.

Table D-1: Logistic Regression Risk Model for Hospital CABG+Valve Operative Mortality, 2017-2018

Risk Factor		Coefficient	Odds Ratio	95% Confidence Limits		p-value
Intercept		-6.31				
Surgery Type	AVR+CABG	Reference				
	MV Repair+CABG	0.20	1.22	0.81	1.84	0.3457
	MVR+CABG	0.59	1.80	1.23	2.64	0.0026
	AVR+MVR+CABG	0.67	1.96	1.13	3.41	0.0169
Age (Years)		0.04	1.04	1.02	1.06	0.0002
Gender	Male	Reference				
	Female	0.43	1.53	1.13	2.08	0.006
Race	White	Reference				
	Other	0.24	1.27	0.93	1.73	0.1347
Body Mass Index	18.5- <30.0	Reference				
	<18.5	0.65	1.92	0.65	5.67	0.24
	30.0-40.0	0.13	1.13	0.82	1.57	0.449
	>40.0	0.86	2.37	1.25	4.48	0.0081
Status of Procedure	Elective	Reference				
	Urgent	0.43	1.53	1.08	2.17	0.017
	Emergent	1.74	5.70	2.41	13.50	<.0001
Hypertension		0.55	1.73	0.97	3.12	0.0656
Cerebrovascular Disease		0.27	1.32	0.96	1.81	0.0915
Chronic Lung Disease (severe vs. other categories)		0.04	1.04	0.68	1.59	0.8658
Myocardial Infarction (MI)	No MI or ≥ 8 days	Reference				
	< 24 hours	-0.03	0.97	0.28	3.35	0.9666
	1 - 7 days ago	0.42	1.53	1.05	2.22	0.0279

Table D-1: Logistic Regression Risk Model for Hospital CABG+Valve Operative Mortality, 2017-2018

Risk Factor		Coefficient	Odds Ratio	95% Confidence Limits		p-value
NYHA (IV vs. I, II, III)		0.55	1.73	1.20	2.47	0.003
Ejection Fraction (%)		0.00	1.00	0.98	1.01	0.573
Cardiogenic Shock		0.98	2.67	1.16	6.12	0.0208
Atrial Fibrillation		0.61	1.84	1.35	2.51	0.0001
Left Main Disease		0.08	1.09	0.78	1.51	0.6168
Diabetes	No Diabetes	Reference				
	Non-Insulin	-0.01	0.99	0.71	1.38	0.9569
	Insulin	0.14	1.15	0.76	1.73	0.5215
Liver Disease		0.92	2.51	1.38	4.57	0.0026
Dialysis		0.93	2.54	1.55	4.16	0.0002
Peripheral Arterial Disease		0.22	1.25	0.86	1.82	0.2496
Immunocompromise		0.26	1.29	0.71	2.34	0.3995
Incidence of Cardiac Surgery	First operation	Reference				
	Second or later operation	0.83	2.29	1.33	3.92	0.0027
Previous PCI	No PCI	Reference				
	< = 6 hours	1.13	3.11	0.56	17.16	0.1928
	> 6 hours	0.07	1.07	0.76	1.51	0.6885

Bolded text indicates statistically significant at $p < 0.05$.

Discrimination of Risk Model for Hospital CABG+Valve Operative Mortality

Discrimination methods are explained in the section for hospital isolated CABG operative mortality. For this 2017-2018 risk model, the C-statistic was 0.762. The Society of Thoracic Surgeons 2018 cardiac surgery risk model⁴ reported the CABG+Valve surgery mortality C-statistic was 0.761.

Calibration of Risk Model for Hospital CABG+Valve Operative Mortality

Calibration methods are explained in the section for hospital isolated CABG operative mortality. The p-value of the Hosmer-Lemeshow test statistic for this 2017-2018 risk model is 0.531, indicating there were no significant differences between observed and predicted outcomes over deciles of risk and there were no systematic over- or under-estimations at the extreme deciles of risk.

A second calibration test sorts the data into 10 risk groups and compares observed deaths with predicted deaths (Table D-2). Among the 432 patients in Group 10 (the highest risk group), the model predicted 85.21 patient deaths, while 87 patients actually died. Assuming a Poisson distribution for a binary outcome, the predicted range of deaths for Risk Group 10 is 68.08 to 105.33. The observed number of 87 deaths falls within the range of predicted deaths. None of the risk groups showed observed deaths outside the 95% confidence interval for predicted deaths.

⁴ O'Brien SM, Feng, L, He X, et al. The Society of Thoracic Surgeons 2018 cardiac surgery risk models: part 2—Statistical Methods and Results. *Annals of Thoracic Surgery*. 2018; 105:1419–28.

Table D-2: Calibration of Risk Model for Hospital CABG+Valve Operative Mortality, 2017-2018

Risk Group	CABG+Valve Cases	Observed Deaths	Predicted Deaths	Difference	95%CI of Predicted Deaths	
1	434	3	4.17	-1.17	1.18	10.49
2	433	6	6.31	-0.31	2.39	13.48
3	434	5	8.06	-3.06	3.49	15.85
4	433	8	10.00	-2.00	4.80	18.39
5	433	19	12.35	6.65	6.45	21.40
6	433	18	15.34	2.66	8.65	25.17
7	433	19	19.57	-0.57	11.88	30.37
8	433	27	25.75	1.25	16.78	37.79
9	433	32	37.24	-5.24	26.26	51.28
10	432	87	85.21	1.79	68.08	105.33

Note: Risk Group 1 is the lowest risk for mortality and Risk Group 10 is the highest risk.

Process for Calculating Hospital Risk-Adjusted CABG+Valve Operative Mortality Rates and Performance Rating

The RAMR is computed by dividing the provider’s observed mortality by the provider’s expected mortality (based on the risk model) to get the observed/expected (O/E) ratio. The O/E ratio is then multiplied by the statewide average mortality rate (5.17% in 2017-2018) to obtain the provider’s RAMR.

However, because a provider’s point estimate of the RAMR can be attributed (in part) to chance, the performance rating is not based on the point estimate of the RAMR, but on a comparison of the 95% CI of each provider’s RAMR to the statewide mortality rate.⁵ CCORP treated the 2017–2018 data as a sample, and inferred a range within which each provider’s true performance was likely to fall. As shown in Table D-3, a provider’s performance rating is “**Better**” if the upper 95% CI of a provider’s risk-adjusted mortality is below the state average mortality rate (indicating the provider’s RAMR is significantly lower than the state average). A provider’s performance rating is “**Worse**” if the lower 95% CI of a provider’s RAMR is above the state average mortality rate (indicating the provider’s risk-adjusted mortality is significantly higher than the state average). If the state average mortality rate is within the 95% CI of a provider’s RAMR, then the performance rating is “**Average**.”

Hospital Risk-Adjusted CABG+Valve Operative Mortality Results, 2017–2018

Table D-3 presents the risk-adjusted CABG+valve operative mortality results for each hospital for 2017–2018. The table is sorted by geographic region and contains, for each hospital, the total number of CABG surgeries performed (isolated and non-isolated combined), number of CABG+valve surgeries (excluding salvage cases), number of observed CABG+valve operative deaths, observed CABG+valve mortality rate, expected CABG+valve mortality rate predicted by

⁵ CCORP uses the Poisson Exact Probability method to compute the 95% confidence interval for the risk-adjusted mortality rate (Buchan Iain, Calculating Poisson Confidence Interval in Excel, January 2004).

the risk model, RAMR and 95% CI of the RAMR, and the associated hospital performance rating.

Among the 4,331 CABG+valve, non-salvage surgeries performed at 124 hospitals in 2017–2018, 224 patients died either in-hospital (up to 90 days) or after discharge but within 30 days of the surgery date, reflecting a statewide operative mortality rate of 5.17%, a 11.66% increase from 4.63% in 2016-2017. The *observed* mortality rates among hospitals ranged from 0% to 100.00%. The *expected* mortality rates, which are generated by the risk model and account for patient severity-of-illness, were between 1.86% and 14.36%. The RAMR, which reflects hospital performance, ranged from 0% to 100.00%.

Based on the 95% confidence intervals for RAMR, no hospital was rated “**Better**” than the state average. Four hospitals performed “**Worse**” than the state average (Memorial Medical Center – Modesto, Memorialcare Long Beach Medical Center, North Bay Medical Center, and Palomar Health Downtown Campus). The remaining 120 hospitals performed within the expected range when compared to the statewide mortality rate (Table D-3).

Table D-3: Hospital Risk-Adjusted CABG+Valve Mortality Operative Results by Region, 2017–2018

Region	Hospital	All CABG Cases	CABG + AV/MV Cases	CABG + AV/MV Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% , RAMR)	95%CI for RAMR		Performance Rating†
								Lower Limit	Upper Limit	
State		32,297	4,331	224	5.17					
Sacramento Valley & Northern California Region	Adventist Health and Rideout	141	11	2	18.18	6.60	14.25	1.73	51.47	Average
	Enloe Medical Center - Esplanade	345	34	2	5.88	4.43	6.86	0.83	24.80	Average
	Mercy General Hospital	1,449	272	10	3.68	5.52	3.45	1.65	6.34	Average
	Mercy Medical Center - Redding	93	5	1	20.00	2.77	37.32	0.94	100.00	Average
	Mercy San Juan Hospital	253	48	3	6.25	5.61	5.76	1.19	16.83	Average
	Shasta Regional Medical Center	272	31	1	3.23	3.32	5.03	0.13	28.00	Average
	St. Joseph Hospital - Eureka	40	4	0	0.00	2.63	0.00	0.00	100.00	Average
	Sutter Medical Center, Sacramento	984	220	10	4.55	5.01	4.69	2.25	8.63	Average
	UC Davis Medical Center	200	23	2	8.70	4.63	9.71	1.18	35.06	Average
San Francisco Bay Area & San Jose	Adventist Health St. Helena	212	29	0	0.00	4.04	0.00	0.00	16.29	Average
	Alta Bates Summit Medical Center	322	30	0	0.00	4.12	0.00	0.00	15.42	Average
	California Pacific Medical Center - Pacific Campus	168	24	0	0.00	4.83	0.00	0.00	16.46	Average
	Community Hospital of the Monterey Peninsula	199	29	0	0.00	4.00	0.00	0.00	16.46	Average
	Dominican Hospital	210	45	3	6.67	6.74	5.11	1.05	14.94	Average
	El Camino Hospital	259	36	0	0.00	5.59	0.00	0.00	9.49	Average
	Good Samaritan Hospital - San Jose	177	25	2	8.00	10.87	3.81	0.46	13.75	Average
	John Muir Medical Center - Concord Campus	449	60	2	3.33	4.80	3.59	0.43	12.97	Average

Table D-3: Hospital Risk-Adjusted CABG+Valve Mortality Operative Results by Region, 2017–2018

Region	Hospital	All CABG Cases	CABG + AV/MV Cases	CABG + AV/MV Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% , RAMR)	95%CI for RAMR		Performance Rating†
								Lower Limit	Upper Limit	
State		32,297	4,331	224	5.17					
San Francisco Bay Area & San Jose (continued)	Kaiser Foundation Hospital - San Francisco	894	107	6	5.61	3.08	9.40	3.45	20.47	Average
	Kaiser Foundation Hospital - Santa Clara	979	161	6	3.73	3.67	5.24	1.92	11.42	Average
	Marin General Hospital	86	18	1	5.56	4.12	6.98	0.18	38.90	Average
	Mills-Peninsula Medical Center	134	17	2	11.76	4.02	15.13	1.83	54.65	Average
	North Bay Medical Center	97	6	2	33.33	3.88	44.45	5.38	100.00	Worse
	O'Connor Hospital	110	14	2	14.29	5.48	13.47	1.63	48.67	Average
	Queen of the Valley Medical Center	95	12	0	0.00	4.70	0.00	0.00	33.80	Average
	Regional Medical of San Jose	180	13	2	15.38	9.64	8.25	1.00	29.81	Average
	Salinas Valley Memorial Hospital	265	31	2	6.45	6.94	4.81	0.58	17.37	Average
	San Ramon Regional Medical Center	52	9	0	0.00	5.76	0.00	0.00	36.80	Average
	Santa Clara Valley Medical Center	162	14	0	0.00	3.77	0.00	0.00	36.17	Average
	Santa Rosa Memorial Hospital - Montgomery	207	45	1	2.22	3.67	3.13	0.08	17.45	Average
	Sequoia Hospital	149	46	4	8.70	7.49	6.01	1.64	15.38	Average
	Seton Medical Center	122	7	0	0.00	8.04	0.00	0.00	33.88	Average
	St. Mary's Medical Center, San Francisco	22	5	0	0.00	14.36	0.00	0.00	26.57	Average
Stanford Health Care	468	84	4	4.76	7.21	3.42	0.93	8.75	Average	
Stanford Health Care - Valleycare	77	7	0	0.00	3.94	0.00	0.00	69.20	Average	

Table D-3: Hospital Risk-Adjusted CABG+Valve Mortality Operative Results by Region, 2017–2018

Region	Hospital	All CABG Cases	CABG + AV/MV Cases	CABG + AV/MV Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% , RAMR)	95%CI for RAMR		Performance Rating†
								Lower Limit	Upper Limit	
State		32,297	4,331	224	5.17					
San Francisco Bay Area & San Jose (continued)	Sutter Santa Rosa Regional Hospital	98	19	2	10.53	6.44	8.45	1.02	30.53	Average
	UC San Francisco Medical Center	220	35	3	8.57	4.90	9.04	1.86	26.42	Average
	Washington Hospital - Fremont	177	14	0	0.00	3.46	0.00	0.00	39.34	Average
Central California	Adventist Health Bakersfield	152	12	1	8.33	5.80	7.43	0.19	41.41	Average
	Bakersfield Heart Hospital	164	16	0	0.00	3.75	0.00	0.00	31.81	Average
	Bakersfield Memorial Hospital	202	28	3	10.71	3.56	15.56	3.21	45.48	Average
	Community Regional Medical	350	25	3	12.00	5.87	10.58	2.18	30.92	Average
	Dameron Hospital	117	2	0	0.00	8.21	0.00	0.00	100.00	Average
	Doctors Medical Center	675	73	6	8.22	6.58	6.46	2.37	14.06	Average
	Fresno Heart and Surgical Hospital	567	69	6	8.70	6.34	7.09	2.60	15.43	Average
	Kaweah Delta Medical Center	428	45	6	13.33	8.74	7.89	2.90	17.17	Average
	Marian Regional Medical Center	167	27	1	3.70	3.47	5.52	0.14	30.73	Average
	Memorial Medical Center - Modesto	318	41	9	21.95	8.65	13.13	6.00	24.92	Worse
	Saint Agnes Medical Center	555	83	6	7.23	4.97	7.52	2.76	16.36	Average
St. Joseph's Medical Center of Stockton	491	42	1	2.38	6.77	1.82	0.05	10.13	Average	
San Fernando Valley, Antelope Valley, Ventura & Santa Barbara	Adventist Health Glendale	282	16	0	0.00	5.49	0.00	0.00	21.74	Average
	Antelope Valley Hospital	18	.	.	.	.	.	.	.	N/A
	Community Memorial Hospital - San Buenaventura	165	11	0	0.00	2.86	0.00	0.00	60.56	Average
	French Hospital Medical Center	187	38	2	5.26	2.65	10.26	1.24	37.06	Average

Table D-3: Hospital Risk-Adjusted CABG+Valve Mortality Operative Results by Region, 2017–2018

Region	Hospital	All CABG Cases	CABG + AV/MV Cases	CABG + AV/MV Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% , RAMR)	95%CI for RAMR		Performance Rating†
								Lower Limit	Upper Limit	
State		32,297	4,331	224	5.17					
San Fernando Valley, Antelope Valley, Ventura & Santa Barbara (continued)	Glendale Memorial Hospital and Health Center	216	13	1	7.69	7.41	5.37	0.14	29.90	Average
	Los Robles Hospital and Medical Center	174	26	2	7.69	9.56	4.16	0.50	15.03	Average
	Northridge Hospital Medical Center	148	10	1	10.00	5.58	9.28	0.23	51.68	Average
	Palmdale Regional Medical Center	4	.	.	.	.	.	.	.	N/A
	Providence Holy Cross Medical Center	130	19	1	5.26	5.24	5.20	0.13	28.97	Average
	Providence Saint Joseph Medical Center	104	10	0	0.00	2.88	0.00	0.00	66.29	Average
	Providence Tarzana Medical Center	87	7	1	14.29	12.66	5.83	0.15	32.51	Average
	Santa Barbara Cottage Hospital	244	36	1	2.78	3.24	4.44	0.11	24.72	Average
	St. John's Regional Medical Center	152	22	2	9.09	4.10	11.45	1.39	41.38	Average
	Valley Presbyterian Hospital	84	5	0	0.00	3.78	0.00	0.00	100.00	Average
West Hills Hospital and Medical Center	115	12	1	8.33	5.87	7.35	0.19	40.93	Average	
Greater Los Angeles	Adventist Health White Memorial	136	11	0	0.00	3.64	0.00	0.00	47.68	Average
	Beverly Hospital	48	2	0	0.00	1.86	0.00	0.00	100.00	Average
	California Hospital Medical Center - Los Angeles	96	5	0	0.00	6.46	0.00	0.00	59.06	Average
	Cedars Sinai Medical Center	481	81	0	0.00	4.24	0.00	0.00	5.56	Average
	Centinela Hospital Medical Center	36	1	1	100.00	4.33	100.00	3.02	100.00	Average

Table D-3: Hospital Risk-Adjusted CABG+Valve Mortality Operative Results by Region, 2017–2018

Region	Hospital	All CABG Cases	CABG + AV/MV Cases	CABG + AV/MV Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% , RAMR)	95%CI for RAMR		Performance Rating†
								Lower Limit	Upper Limit	
State		32,297	4,331	224	5.17					
Greater Los Angeles (continued)	Emante Health Inter-Community Hospital	303	24	0	0.00	3.49	0.00	0.00	22.79	Average
	Garfield Medical Center	359	29	1	3.45	5.24	3.41	0.09	18.97	Average
	Good Samaritan Hospital - Los Angeles	221	20	1	5.00	4.45	5.82	0.15	32.40	Average
	Henry Mayo Newhall Hospital	97	14	0	0.00	3.94	0.00	0.00	34.57	Average
	Hollywood Presbyterian Medical Center	78	1	1	100.00	10.55	49.01	1.24	100.00	Average
	Huntington Memorial Hospital	232	34	0	0.00	3.37	0.00	0.00	16.67	Average
	Kaiser Foundation Hospital - Los Angeles	1,736	279	7	2.51	4.54	2.86	1.15	5.89	Average
	Keck Hospital of University of Southern California	239	54	3	5.56	5.13	5.60	1.15	16.36	Average
	Lakewood Regional Medical Center	222	16	1	6.25	6.95	4.65	0.12	25.91	Average
	Los Angeles County/Harbor - UCLA Medical Center	138	9	0	0.00	3.92	0.00	0.00	54.10	Average
	Los Angeles County/University of Southern California Medical Center	152	20	2	10.00	2.72	19.05	2.31	68.80	Average
	Memorialcare Long Beach Medical Center	352	44	6	13.64	4.87	14.48	5.31	31.51	Worse
	Methodist Hospital of Southern California	119	7	0	0.00	4.37	0.00	0.00	62.36	Average
	PIH Health Hospital - Downey	73	3	0	0.00	7.30	0.00	0.00	87.09	Average
PIH Health Hospital - Whittier	198	64	4	6.25	8.81	3.67	1.00	9.40	Average	

Table D-3: Hospital Risk-Adjusted CABG+Valve Mortality Operative Results by Region, 2017–2018

Region	Hospital	All CABG Cases	CABG + AV/MV Cases	CABG + AV/MV Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% , RAMR)	95%CI for RAMR		Performance Rating†
								Lower Limit	Upper Limit	
State		32,297	4,331	224	5.17					
Greater Los Angeles (continued)	Providence Little Company of Mary Medical Center - Torrance	286	27	0	0.00	5.38	0.00	0.00	13.13	Average
	Providence St. John's Health Center	67	13	1	7.69	4.26	9.33	0.24	52.00	Average
	Ronald Reagan UCLA Medical Center	435	71	2	2.82	5.59	2.61	0.32	9.42	Average
	St. Francis Medical Center	93	3	0	0.00	3.30	0.00	0.00	100.00	Average
	St. Mary Medical Center - Long Beach	138	11	2	18.18	11.96	7.86	0.95	28.40	Average
	St. Vincent Medical Center	124	3	1	33.33	6.68	25.80	0.65	100.00	Average
	Torrance Memorial Medical Center	207	50	2	4.00	6.34	3.26	0.40	11.79	Average
Inland Empire, Riverside & San Bernardino	Desert Regional Medical Center	247	22	0	0.00	5.01	0.00	0.00	17.32	Average
	Desert Valley Hospital	70	5	1	20.00	3.78	27.38	0.69	100.00	Average
	Eisenhower Medical Center	305	47	3	6.38	5.23	6.31	1.30	18.45	Average
	Kaiser Foundation Hospital - Fontana	652	117	3	2.56	4.72	2.81	0.58	8.21	Average
	Loma Linda University Medical Center	499	62	4	6.45	4.81	6.94	1.89	17.76	Average
	Loma Linda University Medical Center - Murrieta	210	11	0	0.00	2.03	0.00	0.00	85.46	Average
	Pomona Valley Hospital Medical Center	240	24	3	12.50	5.29	12.23	2.52	35.74	Average
	Riverside Community Hospital	436	34	3	8.82	7.63	5.98	1.23	17.47	Average
	San Antonio Regional Hospital	350	59	0	0.00	3.99	0.00	0.00	8.11	Average

Table D-3: Hospital Risk-Adjusted CABG+Valve Mortality Operative Results by Region, 2017–2018

Region	Hospital	All CABG Cases	CABG + AV/MV Cases	CABG + AV/MV Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% , RAMR)	95%CI for RAMR		Performance Rating†
								Lower Limit	Upper Limit	
State		32,297	4,331	224	5.17					
Inland Empire, Riverside & San Bernardino (continued)	St. Bernardine Medical Center	592	73	5	6.85	4.56	7.77	2.52	18.13	Average
	St. Mary Medical Center - Apple Valley	188	30	3	10.00	4.70	11.01	2.27	32.16	Average
	Temecula Valley Hospital	214	10	1	10.00	2.67	19.40	0.49	100.00	Average
Orange County	AHMC Anaheim Regional Medical Center	263	36	0	0.00	3.75	0.00	0.00	14.12	Average
	Anaheim Global Medical Center	107	18	0	0.00	7.88	0.00	0.00	13.44	Average
	Fountain Valley Regional Hospital and Medical Center - Euclid	193	6	0	0.00	6.72	0.00	0.00	47.29	Average
	Hoag Memorial Hospital Presbyterian	487	87	6	6.90	4.40	8.11	2.98	17.65	Average
	Memorialcare Orange Coast Medical Center	206	23	2	8.70	5.23	8.60	1.04	31.05	Average
	Memorialcare Saddleback Medical Center	110	8	0	0.00	2.92	0.00	0.00	81.71	Average
	Mission Hospital Regional Medical Center	318	29	1	3.45	5.45	3.27	0.08	18.24	Average
	Orange County Global Medical Center	96	12	1	8.33	6.22	6.93	0.18	38.62	Average
	St. Joseph Hospital - Orange	260	30	1	3.33	4.45	3.88	0.10	21.60	Average
	St. Jude Medical Center	199	25	2	8.00	4.88	8.47	1.03	30.60	Average
	UC Irvine Medical Center	146	14	2	14.29	9.77	7.56	0.92	27.30	Average
	West Anaheim Medical Center	67	1	0	0.00	7.82	0.00	0.00	100.00	Average

Table D-3: Hospital Risk-Adjusted CABG+Valve Mortality Operative Results by Region, 2017–2018

Region	Hospital	All CABG Cases	CABG + AV/MV Cases	CABG + AV/MV Deaths	Observed Mortality Rate (%)	Expected Mortality Rate (%)	Risk-Adjusted Mortality Rate (% , RAMR)	95%CI for RAMR		Performance Rating†
								Lower Limit	Upper Limit	
State		32,297	4,331	224	5.17					
Greater San Diego	Alvarado Hospital Medical Center	51	6	0	0.00	2.58	0.00	0.00	100.00	Average
	Grossmont Hospital	165	14	1	7.14	6.80	5.44	0.14	30.29	Average
	Palomar Health Downtown Campus	237	22	4	18.18	4.30	21.86	5.96	55.97	Worse
	Scripps Memorial Hospital - La Jolla	857	155	6	3.87	4.89	4.09	1.50	8.90	Average
	Scripps Mercy Hospital	221	24	1	4.17	3.30	6.53	0.17	36.38	Average
	Sharp Chula Vista Medical Center	171	15	3	20.00	5.57	18.58	3.83	54.29	Average
	Sharp Memorial Hospital	261	62	3	4.84	5.89	4.25	0.88	12.41	Average
	Tri-City Medical Center - Oceanside	130	21	1	4.76	5.73	4.30	0.11	23.94	Average
	UCSD Health La Jolla - Jacobs Medical Center & Sulpizio Cardiovascular Center	420	55	0	0.00	4.26	0.00	0.00	8.14	Average

AV/MV=aortic valve, mitral valve repair or replacement

* The number of CABG cases and outcomes by provider may not equal the total number of statewide CABG cases and outcomes for various reasons, including the surgeon appeals process.

† A hospital is classified as “Better” if the upper 95% CI of the RAMR falls below the California observed mortality rate (5.17%). A hospital is classified as “Worse” if the lower 95% CI of the RAMR is higher than the California observed mortality rate. A hospital’s performance is considered “Average” if the California mortality rate falls within the 95% CI of a hospital’s RAMR.

Risk Model for Adjusting Hospital Post-Operative Stroke Rates, 2017–2018

Post-operative stroke is a relatively rare, but serious, complication that can occur after CABG surgery. To assess hospital performance, CCORP combined 2017 and 2018 data to increase the number of cases and reliability of hospital results. Similar to the methodology used to assess the operative mortality rate, CCORP used a multivariable logistic regression model to estimate the relationship between each of the demographic and pre-operative risk factors and the probability of post-operative stroke. The risk model, based on the 2017–2018 data, is presented in Table E-1 with statistically significant risk factors identified in bolded text.

Table E-1: Logistic Regression Risk Model for Hospital Post-Operative Stroke, 2017–2018

Risk Factors		Coefficient	Odds Ratio (OR)	95% Confidence Limits		p value
				Lower Level	Upper Level	
Intercept		-6.17				<.0001
Age (Years)		0.02	1.02	1.01	1.03	0.0002
Gender	Male	Reference				
	Female	0.33	1.38	1.11	1.73	0.0037
Race	White	Reference				
	Other	0.26	1.30	1.06	1.60	0.0139
Body Mass Index	Normal 18.5 - < 30.0	Reference				
	< 18.5	0.77	2.16	0.98	4.76	0.0553
	30.0 - 40.0	-0.35	0.70	0.56	0.89	0.0032
	> 40.0	-0.57	0.56	0.30	1.04	0.0675
Hypertension		0.50	1.66	1.05	2.60	0.0286
Cerebrovascular Disease		0.81	2.25	1.83	2.78	<.0001
Myocardial Infarction (MI)	No MI or ≥ 8 days	Reference				
	< 24 hours	0.98	2.65	1.74	4.03	<.0001
	1 - 7 days ago	0.41	1.50	1.22	1.85	0.0002
NYHA (IV vs. I, II, III)		0.43	1.54	1.13	2.10	0.0069
Ejection Fraction (%)		-0.02	0.98	0.97	0.99	0.0006
Cardiogenic Shock		0.67	1.96	1.08	3.55	0.0274
Atrial Fibrillation		0.37	1.45	1.09	1.92	0.0111
Diabetes Control	No Diabetes	Reference				
	Non-insulin	0.53	1.69	1.34	2.15	<.0001
	Insulin	0.44	1.55	1.17	2.05	0.0023
Liver Disease		0.47	1.59	0.99	2.56	0.0539
Peripheral Arterial Disease		0.19	1.20	0.93	1.57	0.1683

Bolded text indicates statistically significant ($p \leq 0.05$).

Discrimination of Risk Model for Hospital Post-Operative Stroke

Discrimination methods are explained in the section for hospital isolated CABG operative mortality. For the 2017-2018 risk model, the C-statistic was 0.724. This risk model compares unfavorably with an earlier STS post-operative stroke model (C-statistic = 0.697 for isolated CABG surgery).⁴

Calibration of Risk Model for Hospital Post-Operative Stroke

A common measure of calibration is the Hosmer-Lemeshow χ^2 test, which compares observed and predicted outcomes over deciles of risk. The p-value of the Hosmer-Lemeshow test statistic for this post-operative stroke risk model is 0.672, indicating there were no significant differences between observed and predicted outcomes over deciles of risk and there were no systematic over- or under-estimations at the extreme deciles of risk.

A second calibration test sorts the data and compares observed stroke cases with predicted stroke cases in each of 10 risk groups. As presented in Table E-2, Risk Group 7 shows patients in a mid-level risk group. Among the 2,585 patients in this group, 42 patients had post-operative strokes, but the model predicted 38.78 cases. Assuming a Poisson distribution for a binary outcome, the predicted range of strokes for this group is 27.55 to 53.06. The observed number of 42 strokes falls within the range of predicted strokes. None of the risk groups showed observed strokes outside the 95% confidence interval for predicted strokes.

Table E-2: Calibration of Risk Model for Hospital Post-Operative Stroke, 2017–2018

Risk Group	Isolated CABG Cases	Observed Post-Op Strokes	Predicted Post-Op Strokes	Difference	95% CI of Predicted Post-Op Stroke	
1	2,585	6	9.55	-3.55	4.48	17.80
2	2,598	13	14.31	-1.31	7.88	23.88
3	2,578	18	17.84	0.16	10.54	28.25
4	2,585	19	21.83	-2.83	13.65	33.10
5	2,584	24	26.30	-2.30	17.22	38.45
6	2,584	32	31.57	0.43	21.53	44.67
7	2,585	42	38.78	3.22	27.55	53.06
8	2,587	52	48.99	3.01	36.24	64.77
9	2,584	80	67.11	12.89	52.02	85.22
10	2,568	122	131.72	-9.72	110.19	156.23

Note: Risk Group 1 is the lowest risk and Risk Group 10 is the highest risk.

Process for Calculating Hospital Risk-Adjusted Post-Operative Stroke Rate and Performance Ratings

The risk-adjusted post-operative stroke rate (RASR) is computed by dividing the provider’s observed number of patient strokes by the provider’s expected number of patient strokes (based on the risk model) to obtain the observed/expected (O/E) ratio. The O/E ratio is then multiplied by the statewide post-operative stroke rate (1.58% for 2017-2018) to obtain the provider’s RASR.

The performance rating is based on a comparison of the 95% CI of each provider's RASR to the statewide post-operative stroke rate. Thus, CCORP treated 2017–2018 data as a sample, and inferred the range in which each provider's true performance was likely to fall. As shown in Table E-3, if the upper 95% CI of a provider's risk-adjusted stroke rate is below the state average stroke rate, indicating the provider's RASR is significantly lower than the state average, the performance rating is "**Better**." If the lower 95% CI of a provider's RASR is above the state average stroke rate, indicating the provider's risk-adjusted stroke rate is significantly higher than the state average, the performance rating is "**Worse**." If the state average stroke rate is within the 95% CI of a provider's RASR, the performance rating is "**Average**."

Hospital Risk-Adjusted Post-Operative Stroke Results, 2017–2018

Table E-3 presents the risk-adjusted post-operative stroke results for each hospital for 2017–2018. The table is sorted by geographic region and contains, for each hospital, the total number of CABG surgeries performed (isolated and non-isolated combined), number of isolated CABG surgeries (excluding salvage cases), number of observed isolated-CABG post-operative stroke cases, observed post-operative stroke rate, expected post-operative stroke rate predicted by the risk model, RASR and 95% CI of the RASR, and the associated hospital performance rating.

Among the 25,838 isolated CABG surgeries performed in 2017 and 2018, 408 patients had a post-operative stroke in-hospital, reflecting an overall statewide rate of 1.58%. Among the 408 patients with post-operative stroke, 60 (14.71%) died either in-hospital (up to 90 days, including transfers to other acute care hospitals) or after discharge, but within 30 days of the surgery date. The observed stroke rate among hospitals ranged from 0% to 6.25%. The expected stroke rates, which are generated by the model and measure patient severity of illness, were between 1.10% and 2.69%. The RASR ranged from 0% to 6.33%.

Based on the 95% confidence intervals for the RASR, 117 of 124 hospitals (94.35%) performed within the expected range when compared to the state average stroke rate, two hospitals performed significantly "**Better**" than the state average (Fresno Heart and Surgical Hospital and Riverside Community Hospital), and five hospitals were rated significantly "**Worse**" than the state average (Garfield Medical Center, Grossmont Hospital, Stanford Health Care, Torrance Memorial Medical Center, and West Hills Hospital and Medical Center) (Table E-3).

Table E-3: Hospital Risk-Adjusted Post-Operative Stroke Results by Region, 2017–2018

Region	Hospital	All CABG Cases	Isolated CABG Cases	Iso-CABG Post-Operative Strokes	Observed Post-Op Stroke Rate (%)	Expected Post-Op Stroke Rate (%)	Risk-Adjusted Post-Op Stroke Rate (% RASR)	95% CI for RASR		Performance Rating†
								Lower Limit	Upper Limit	
State		32,297*	25,838*	408*	1.58					
Sacramento Valley & Northern California Region	Adventist Health and Rideout	141	123	0	0.00	1.86	0.00	0.00	2.54	Average
	Enloe Medical Center - Esplanade	345	303	2	0.66	1.35	0.77	0.09	2.79	Average
	Mercy General Hospital	1,449	1,038	13	1.25	1.36	1.46	0.78	2.49	Average
	Mercy Medical Center - Redding	93	85	0	0.00	2.01	0.00	0.00	3.40	Average
	Mercy San Juan Hospital	253	159	3	1.89	1.32	2.26	0.47	6.61	Average
	Shasta Regional Medical Center	272	229	2	0.87	1.44	0.96	0.12	3.47	Average
	St. Joseph Hospital - Eureka	40	32	0	0.00	1.19	0.00	0.00	15.28	Average
	Sutter Medical Center, Sacramento	984	684	12	1.75	1.36	2.03	1.05	3.55	Average
	UC Davis Medical Center	200	151	1	0.66	1.35	0.78	0.02	4.33	Average
San Francisco Bay Area & San Jose	Adventist Health St. Helena	212	147	1	0.68	1.83	0.59	0.01	3.27	Average
	Alta Bates Summit Medical Center	322	287	3	1.05	1.71	0.96	0.20	2.82	Average
	California Pacific Medical Center - Pacific Campus	168	132	1	0.76	1.22	0.98	0.02	5.48	Average
	Community Hospital of the Monterey Peninsula	199	155	2	1.29	1.84	1.11	0.13	4.00	Average
	Dominican Hospital	210	131	3	2.29	1.24	2.91	0.60	8.50	Average
	El Camino Hospital	259	200	2	1.00	1.75	0.90	0.11	3.26	Average
	Good Samaritan Hospital - San Jose	177	144	2	1.39	1.87	1.18	0.14	4.25	Average
	John Muir Medical Center - Concord Campus	449	365	5	1.37	1.82	1.19	0.39	2.78	Average

Table E-3: Hospital Risk-Adjusted Post-Operative Stroke Results by Region, 2017–2018

Region	Hospital	All CABG Cases	Isolated CABG Cases	Iso-CABG Post-Operative Strokes	Observed Post-Op Stroke Rate (%)	Expected Post-Op Stroke Rate (%)	Risk-Adjusted Post-Op Stroke Rate (% RASR)	95% CI for RASR		Performance Rating†
								Lower Limit	Upper Limit	
State		32,297*	25,838*	408*	1.58					
San Francisco Bay Area & San Jose (continued)	Kaiser Foundation Hospital - San Francisco	894	717	10	1.39	1.13	1.94	0.93	3.57	Average
	Kaiser Foundation Hospital - Santa Clara	979	787	12	1.52	1.35	1.79	0.92	3.13	Average
	Marin General Hospital	86	64	0	0.00	1.15	0.00	0.00	7.88	Average
	Mills-Peninsula Medical Center	134	106	2	1.89	1.42	2.09	0.25	7.57	Average
	North Bay Medical Center	97	89	0	0.00	1.82	0.00	0.00	3.60	Average
	O'Connor Hospital	110	90	1	1.11	1.69	1.04	0.03	5.78	Average
	Queen of the Valley Medical Center	95	81	1	1.23	1.71	1.14	0.03	6.35	Average
	Regional Medical of San Jose	180	162	2	1.23	2.38	0.82	0.10	2.96	Average
	Salinas Valley Memorial Hospital	265	214	5	2.34	1.98	1.86	0.61	4.35	Average
	San Ramon Regional Medical Center	52	41	2	4.88	1.22	6.33	0.77	22.85	Average
	Santa Clara Valley Medical Center	162	140	2	1.43	1.47	1.53	0.19	5.54	Average
	Santa Rosa Memorial Hospital - Montgomery	207	152	2	1.32	1.14	1.83	0.22	6.59	Average
	Sequoia Hospital	149	80	1	1.25	1.61	1.22	0.03	6.82	Average
	Seton Medical Center	122	109	3	2.75	2.04	2.14	0.44	6.24	Average
	St. Mary's Medical Center, San Francisco	22	17	0	0.00	1.78	0.00	0.00	19.21	Average
	Stanford Health Care	468	286	9	3.15	1.43	3.47	1.59	6.58	Worse
	Stanford Health Care - Valleycare	77	68	3	4.41	1.48	4.72	0.97	13.78	Average
	Sutter Santa Rosa Regional Hospital	98	75	0	0.00	1.30	0.00	0.00	5.97	Average
	UC San Francisco Medical Center	220	176	3	1.70	1.18	2.28	0.47	6.67	Average
Washington Hospital - Fremont	177	157	1	0.64	1.66	0.61	0.02	3.38	Average	

Table E-3: Hospital Risk-Adjusted Post-Operative Stroke Results by Region, 2017–2018

Region	Hospital	All CABG Cases	Isolated CABG Cases	Iso-CABG Post-Operative Strokes	Observed Post-Op Stroke Rate (%)	Expected Post-Op Stroke Rate (%)	Risk-Adjusted Post-Op Stroke Rate (% RASR)	95% CI for RASR		Performance Rating†
								Lower Limit	Upper Limit	
State		32,297*	25,838*	408*	1.58					
Central California	Adventist Health Bakersfield	152	139	4	2.88	1.38	3.29	0.90	8.43	Average
	Bakersfield Heart Hospital	164	144	2	1.39	1.43	1.53	0.19	5.53	Average
	Bakersfield Memorial Hospital	202	172	1	0.58	1.27	0.72	0.02	4.01	Average
	Community Regional Medical Center -	350	308	6	1.95	2.42	1.27	0.47	2.77	Average
	Dameron Hospital	117	111	2	1.80	1.72	1.65	0.20	5.96	Average
	Doctors Medical Center	675	574	10	1.74	1.82	1.51	0.72	2.77	Average
	Fresno Heart and Surgical Hospital	567	478	2	0.42	1.58	0.42	0.05	1.52	Better
	Kaweah Delta Medical Center	428	371	4	1.08	2.09	0.81	0.22	2.08	Average
	Marian Regional Medical Center	167	136	4	2.94	1.46	3.19	0.87	8.16	Average
	Memorial Medical Center - Modesto	318	249	2	0.80	1.62	0.78	0.09	2.82	Average
	Saint Agnes Medical Center	555	436	4	0.92	1.60	0.91	0.25	2.33	Average
St. Joseph's Medical Center of Stockton	491	436	6	1.38	2.04	1.07	0.39	2.32	Average	
San Fernando Valley, Antelope Valley, Ventura & Santa Barbara	Adventist Health Glendale	282	250	2	0.80	1.66	0.76	0.09	2.74	Average
	Antelope Valley Hospital	18	17	0	0.00	1.10	0.00	0.00	31.10	Average
	Community Memorial Hospital - San Buenaventura	165	150	1	0.67	1.32	0.80	0.02	4.44	Average
	French Hospital Medical Center	187	144	1	0.69	1.31	0.84	0.02	4.68	Average
	Glendale Memorial Hospital and Health Center	216	196	1	0.51	1.24	0.65	0.02	3.63	Average
	Los Robles Hospital and Medical Center	174	132	3	2.27	1.96	1.83	0.38	5.35	Average
	Northridge Hospital Medical Center	148	132	4	3.03	1.42	3.38	0.92	8.65	Average
	Palmdale Regional Medical Center	4	4	0	0.00	1.52	0.00	0.00	95.80	Average

Table E-3: Hospital Risk-Adjusted Post-Operative Stroke Results by Region, 2017–2018

Region	Hospital	All CABG Cases	Isolated CABG Cases	Iso-CABG Post-Operative Strokes	Observed Post-Op Stroke Rate (%)	Expected Post-Op Stroke Rate (%)	Risk-Adjusted Post-Op Stroke Rate (% RASR)	95% CI for RASR		Performance Rating†
								Lower Limit	Upper Limit	
State		32,297*	25,838*	408*	1.58					
San Fernando Valley, Antelope Valley, Ventura & Santa Barbara (continued)	Providence Holy Cross Medical Center	130	101	2	1.98	2.01	1.55	0.19	5.61	Average
	Providence Saint Joseph Medical Center	104	91	3	3.30	1.45	3.60	0.74	10.51	Average
	Providence Tarzana Medical Center	87	78	3	3.85	1.28	4.73	0.97	13.81	Average
	Santa Barbara Cottage Hospital	244	197	3	1.52	1.23	1.95	0.40	5.71	Average
	St. John's Regional Medical Center	152	117	6	5.13	2.21	3.66	1.34	7.97	Average
	Valley Presbyterian Hospital	84	78	4	5.13	1.85	4.37	1.19	11.18	Average
	West Hills Hospital and Medical Center	115	94	5	5.32	1.63	5.16	1.67	12.04	Worse
Greater Los Angeles	Adventist Health White Memorial	136	123	2	1.63	1.80	1.43	0.17	5.16	Average
	Beverly Hospital	48	46	1	2.17	2.01	1.71	0.04	9.52	Average
	California Hospital Medical Center - Los Angeles	96	89	1	1.12	1.94	0.92	0.02	5.10	Average
	Cedars Sinai Medical Center	481	325	8	2.46	1.26	3.09	1.33	6.09	Average
	Centinela Hospital Medical Center	36	34	2	5.88	2.69	3.45	0.42	12.45	Average
	Emante Health Inter-Community Hospital	303	250	7	2.80	1.86	2.38	0.96	4.90	Average
	Garfield Medical Center	359	319	13	4.08	1.74	3.69	1.97	6.32	Worse
	Good Samaritan Hospital - Los Angeles	221	179	2	1.12	1.56	1.13	0.14	4.08	Average
	Henry Mayo Newhall Hospital	97	76	1	1.32	1.33	1.56	0.04	8.68	Average
	Hollywood Presbyterian Medical Center	78	76	1	1.32	1.61	1.29	0.03	7.18	Average
	Huntington Memorial Hospital	232	184	3	1.63	1.30	1.99	0.41	5.81	Average
	Kaiser Foundation Hospital - Los Angeles	1,736	1,401	13	0.93	1.42	1.03	0.55	1.76	Average
	Keck Hospital of University of Southern California	239	124	1	0.81	1.37	0.93	0.02	5.18	Average

Table E-3: Hospital Risk-Adjusted Post-Operative Stroke Results by Region, 2017–2018

Region	Hospital	All CABG Cases	Isolated CABG Cases	Iso-CABG Post-Operative Strokes	Observed Post-Op Stroke Rate (%)	Expected Post-Op Stroke Rate (%)	Risk-Adjusted Post-Op Stroke Rate (% RASR)	95% CI for RASR		Performance Rating†
								Lower Limit	Upper Limit	
State		32,297*	25,838*	408*	1.58					
Greater Los Angeles (continued)	Lakewood Regional Medical Center	222	204	3	1.47	1.98	1.17	0.24	3.43	Average
	Los Angeles County/Harbor - UCLA Medical Center	138	127	0	0.00	1.65	0.00	0.00	2.78	Average
	Los Angeles County/University of Southern California Medical Center	152	123	1	0.81	1.26	1.02	0.03	5.68	Average
	Memorialcare Long Beach Medical Center	352	284	6	2.11	1.62	2.06	0.76	4.48	Average
	Methodist Hospital of Southern California	119	97	3	3.09	1.56	3.12	0.64	9.13	Average
	PIH Health Hospital - Downey	73	70	0	0.00	2.10	0.00	0.00	3.97	Average
	PIH Health Hospital - Whittier	198	121	2	1.65	2.07	1.26	0.15	4.54	Average
	Providence Little Company of Mary Medical Center - Torrance	286	247	5	2.02	1.96	1.63	0.53	3.81	Average
	Providence St. John's Health Center	67	49	1	2.04	1.23	2.61	0.07	14.54	Average
	Ronald Reagan UCLA Medical Center	435	264	4	1.52	1.23	1.94	0.53	4.96	Average
	St. Francis Medical Center	93	90	3	3.33	2.02	2.60	0.54	7.60	Average
	St. Mary Medical Center - Long Beach	138	125	2	1.60	1.79	1.41	0.17	5.11	Average
	St. Vincent Medical Center	124	114	1	0.88	1.56	0.89	0.02	4.95	Average
	Torrance Memorial Medical Center	207	135	7	5.19	1.83	4.47	1.80	9.21	Worse
Inland Empire, Riverside & San Bernardino	Desert Regional Medical Center	247	213	2	0.94	1.45	1.02	0.12	3.68	Average
	Desert Valley Hospital	70	64	4	6.25	1.76	5.60	1.53	14.34	Average
	Eisenhower Medical Center	305	246	1	0.41	1.35	0.47	0.01	2.64	Average
	Kaiser Foundation Hospital - Fontana	652	520	6	1.15	1.53	1.19	0.44	2.59	Average
	Loma Linda University Medical Center	499	402	5	1.24	1.83	1.08	0.35	2.51	Average

Table E-3: Hospital Risk-Adjusted Post-Operative Stroke Results by Region, 2017–2018

Region	Hospital	All CABG Cases	Isolated CABG Cases	Iso-CABG Post-Operative Strokes	Observed Post-Op Stroke Rate (%)	Expected Post-Op Stroke Rate (%)	Risk-Adjusted Post-Op Stroke Rate (% RASR)	95% CI for RASR		Performance Rating†
								Lower Limit	Upper Limit	
State		32,297*	25,838*	408*	1.58					
Inland Empire, Riverside & San Bernardino (continued)	Loma Linda University Medical Center - Murrieta	210	192	5	2.60	1.20	3.43	1.11	8.01	Average
	Pomona Valley Hospital Medical Center	240	213	6	2.82	2.04	2.18	0.80	4.74	Average
	Riverside Community Hospital	436	394	1	0.25	1.91	0.21	0.01	1.17	Better
	San Antonio Regional Hospital	350	258	8	3.10	1.67	2.94	1.27	5.78	Average
	St. Bernardine Medical Center	592	504	13	2.58	1.56	2.62	1.39	4.48	Average
	St. Mary Medical Center - Apple Valley	188	153	4	2.61	1.36	3.03	0.83	7.76	Average
	Temecula Valley Hospital	214	201	1	0.50	1.49	0.53	0.01	2.94	Average
Orange County	AHMC Anaheim Regional Medical Center	263	213	0	0.00	1.50	0.00	0.00	1.82	Average
	Anaheim Global Medical Center	107	86	0	0.00	2.31	0.00	0.00	2.93	Average
	Fountain Valley Regional Hospital and Medical Center - Euclid	193	175	5	2.86	1.90	2.37	0.77	5.54	Average
	Hoag Memorial Hospital Presbyterian	487	309	1	0.32	1.42	0.36	0.01	2.00	Average
	Memorialcare Orange Coast Medical	206	171	6	3.51	1.73	3.21	1.18	6.98	Average
	Memorialcare Saddleback Medical Center	110	100	0	0.00	1.46	0.00	0.00	3.99	Average
	Mission Hospital Regional Medical Center	318	264	0	0.00	1.24	0.00	0.00	1.78	Average
	Orange County Global Medical Center	96	82	0	0.00	2.04	0.00	0.00	3.48	Average
	St. Joseph Hospital - Orange	260	211	3	1.42	1.63	1.38	0.28	4.02	Average
	St. Jude Medical Center	199	154	2	1.30	1.51	1.36	0.16	4.90	Average
	UC Irvine Medical Center	146	121	3	2.48	1.50	2.61	0.54	7.64	Average
	West Anaheim Medical Center	67	66	0	0.00	1.62	0.00	0.00	5.46	Average

Table E-3: Hospital Risk-Adjusted Post-Operative Stroke Results by Region, 2017–2018

Region	Hospital	All CABG Cases	Isolated CABG Cases	Iso-CABG Post-Operative Strokes	Observed Post-Op Stroke Rate (%)	Expected Post-Op Stroke Rate (%)	Risk-Adjusted Post-Op Stroke Rate (% RASR)	95% CI for RASR		Performance Rating†
								Lower Limit	Upper Limit	
State		32,297*	25,838*	408*	1.58					
Greater San Diego	Alvarado Hospital Medical Center	51	44	2	4.55	1.89	3.80	0.46	13.73	Average
	Grossmont Hospital	165	148	9	6.08	2.13	4.50	2.06	8.54	Worse
	Palomar Health Downtown Campus	237	200	7	3.50	1.87	2.95	1.19	6.08	Average
	Scripps Memorial Hospital - La Jolla	857	655	8	1.22	1.24	1.56	0.67	3.07	Average
	Scripps Mercy Hospital	221	186	5	2.69	1.41	3.01	0.98	7.04	Average
	Sharp Chula Vista Medical Center	171	154	3	1.95	1.83	1.68	0.35	4.90	Average
	Sharp Memorial Hospital	261	154	5	3.25	1.29	3.98	1.29	9.29	Average
	Tri-City Medical Center - Oceanside	130	101	1	0.99	1.58	0.99	0.03	5.51	Average
	UCSD Health La Jolla - Jacobs Medical Center & Sulpizio Cardiovascular Center	420	296	3	1.01	1.73	0.92	0.19	2.70	Average

* The number of CABG cases and outcomes by provider may not equal the total number of statewide CABG cases and outcomes for various reasons, including the surgeon appeals process.

† A hospital is classified as “Better” if the upper 95% CI of the RASR falls below the California observed stroke rate (1.58%). A hospital is classified as “Worse” if the lower 95% CI of the RASR is higher than the California observed stroke rate. A hospital’s performance is considered “Average” if the California stroke rate falls within the 95% CI of a hospital’s RASR.

Risk Model for Adjusting Hospital 30-Day Readmission Rates, 2017–2018

Readmissions account for a significant percentage of hospital healthcare costs. With better care and discharge planning, hospitals might avoid unnecessary readmissions. To assess hospital performance on this outcome, CCORP limited the analysis to isolated CABG surgery patients at risk for readmission to any acute care hospital within 30 days of being discharged to home or a non-acute care setting (see study population noted on page 3). Patients in salvage operative status, patients who were transferred to acute care, and patients who left against medical advice were excluded. Starting 2017-2018 data, CCORP adopted the Centers for Medicare & Medicaid Services (CMS)'s 30-day all-cause unplanned readmission methodology. The detail about the readmission methodology can be found at "[Hospital-level 30-day All-Cause Unplanned Readmission Following Coronary Artery Bypass Graft Surgery](#)" published by CMS.

Similar to the methodology used to assess the operative mortality and post-operative stroke rates, CCORP used a multivariable logistic regression model to estimate the relationship between each of the demographic and pre-operative risk factors and the probability of a readmission within 30 days. The risk model, based on the 2017–2018 data, is presented in Table F-1 with statistically significant risk factors identified in bolded text.

Table F-1: Logistic Regression Risk Model for Hospital 30-Day Readmission, 2017–2018

Risk Factor		Coefficient	Odds Ratio	95% Confidence Limits		p-value
Intercept		-3.49				<.0001
Age (Years)		0.01	1.01	1.01	1.02	<.0001
Gender	Male	Reference				
	Female	0.36	1.44	1.31	1.59	<.0001
Race	White	Reference				
	Other	0.06	1.06	0.97	1.16	0.175
Body Mass Index	Normal 18.5 - < 30.0	Reference				
	< 18.5	0.40	1.50	0.95	2.37	0.0831
	30.0 - 40.0	0.05	1.05	0.96	1.15	0.315
	> 40.0	0.28	1.33	1.09	1.62	0.0054
Status of Procedure	Elective	Reference				
	Urgent	0.24	1.27	1.14	1.41	<.0001
	Emergent	0.27	1.31	0.95	1.80	0.0976
Hypertension		0.22	1.25	1.06	1.47	0.0089
Cerebrovascular Disease		0.25	1.29	1.17	1.43	<.0001
Chronic Lung Disease	None/Mild/Moderate	Reference				
	Severe	0.34	1.40	1.22	1.60	<.0001
Myocardial Infarction (MI)	No MI or ≥ 8 days	Reference				
	< 24 hours	0.09	1.09	0.82	1.45	0.5466
	1 - 7 days ago	0.05	1.05	0.95	1.16	0.3834
NYHA (IV vs. I, II, III)		0.25	1.28	1.09	1.51	0.0033
Ejection Fraction (%)		-0.01	0.99	0.99	1.00	<.0001
Cardiogenic Shock		0.17	1.19	0.74	1.92	0.4753
Atrial Fibrillation		0.35	1.43	1.25	1.62	<.0001
Mitral Insufficiency (Moderate/Severe vs. None/Trivial/Mild)		0.25	1.29	1.12	1.48	0.0005
Diabetes	No Diabetes	Reference				
	Non-Insulin	0.13	1.14	1.03	1.26	0.0145
	Insulin	0.35	1.41	1.26	1.59	<.0001
Liver Disease		0.31	1.37	1.09	1.71	0.006
Dialysis		0.76	2.13	1.84	2.46	<.0001
Peripheral Arterial Disease		0.23	1.25	1.11	1.41	0.0002
Immunocompromise		0.37	1.45	1.16	1.81	0.001
Previous CABG		0.24	1.27	0.89	1.83	0.1911
Previous Valve		0.70	2.02	1.06	3.84	0.033
Previous PCI	No PCI	Reference				
	< = 6 hours	0.44	1.55	0.98	2.44	0.06
	> 6 hours	0.12	1.13	1.03	1.24	0.0129
Year (2018 vs. 2017)		0.24	1.27	1.17	1.38	<.0001

Bolded text indicates statistically significant at p <0.05.

Discrimination of Risk Model for Hospital 30-Day Readmission

Discrimination methods are explained in the section for hospital isolated CABG operative mortality. For the 2017-2018 risk model, the C-statistic was 0.657 which is slightly better than the CMS risk model which has a C-statistic of 0.64 for hospital 30-day readmission following CABG surgery using data from 2015 to 2018.⁶

Calibration of Risk Model for Hospital 30-Day Readmission

A common measure of calibration is the Hosmer-Lemeshow χ^2 test, which compares observed and predicted outcomes over deciles of risk. The p-value of the Hosmer-Lemeshow test statistic for this 2017-2018 risk model is 0.061, indicating there were no significant differences between observed and predicted outcomes over deciles of risk and there were no systematic over- or under-estimations at the extreme deciles of risk.

Another way to test model calibration is to partition the data and compare observed readmissions with predicted readmissions in each of 10 risk groups. As presented in Table F-2, Risk Group 1 shows the patients in the lowest risk group. Among the 2244 patients in this group, 102 patients were readmitted to the hospital, but the model predicted 113.12 readmissions. Assuming a Poisson distribution for a binary outcome, the predicted range of deaths for Risk Group 1 is 93.24 to 135.99. The observed number of 102 readmissions falls within the range of predicted readmissions. None of the risk groups showed observed readmissions outside the 95% confidence interval for predicted readmissions.

Table F-2: Calibration of Risk Model for Hospital 30-Day Readmission, 2017–2018

Risk Group	Isolated CABG cases	Observed 30-Day Readmission	Predicted 30-Day Readmission	Difference	95% CI of predicted 30-Day Readmission	
1	2,244	102	113.12	-11.12	93.24	135.99
2	2,241	120	141.57	-21.57	119.21	166.91
3	2,241	163	161.33	1.67	137.39	188.23
4	2,241	177	181.11	-4.11	155.69	209.49
5	2,241	208	202.34	5.66	175.42	232.23
6	2,241	237	226.90	10.10	198.34	258.43
7	2,241	253	257.05	-4.05	226.58	290.47
8	2,241	341	299.03	41.97	266.10	334.92
9	2,241	378	366.43	11.57	329.87	405.94
10	2,235	539	569.20	-30.20	523.39	617.94

Note: Risk Group 1 is the lowest risk and Risk Group 10 is the highest risk.

⁶ 2019 Procedure-Specific Readmission Measures Updates and Specifications Report Isolated Coronary Artery Bypass Graft (CABG) Surgery – Version 6.0 Elective Primary Total Hip Arthroplasty (THA) and/or Total Knee Arthroplasty (TKA) – Version 8.0. Centers for Medicare and Medicaid Services. March, 2019.

Process for Calculating Hospital Risk-Adjusted 30-Day Readmission Rate and Performance Ratings

The risk-adjusted readmission rate (RARR) is computed by dividing the provider's observed readmission rate by the provider's expected readmission rate (obtained from the risk model calculation) to get the observed/expected (O/E) ratio. The O/E ratio is then multiplied by the statewide readmission rate (11.23% for 2017–2018) to obtain the provider's RARR.

However, because a provider's point estimate of the RARR can be attributed (in part) to chance, the performance rating is not based on a point estimate of the RARR, but on a comparison of the 95% CI of each provider's RARR to the California average readmission rate.⁷ CCORP treated the 2017–2018 data as samples, and inferred a range within which each provider's true performance was likely to fall. As shown in Table F-3, if the upper 95% CI of a provider's RARR is below the state average readmission rate, indicating the provider's RARR is significantly lower than the state average, the performance rating is "**Better.**" If the lower 95% CI of a provider's RARR is above the state average readmission rate, indicating the provider's RARR is significantly higher than the state average, the performance rating is "**Worse.**" If the state average readmission rate is within the 95% CI of a provider's RARR, the performance rating is "**Average.**"

Hospital Risk-Adjusted 30-Day Readmission Results, 2017–2018

Table F-3 presents the risk-adjusted readmission results for each hospital for 2017–2018. The table is sorted by geographic region and contains, for each hospital, the total number of CABG surgeries performed (isolated and non-isolated combined), number of patients discharged alive after isolated CABG surgeries (excluding salvage patients), number of observed isolated CABG readmissions, observed readmission rate, expected readmission rate predicted by the risk model, risk-adjusted readmission rate (RARR) and 95% CI of the RARR, and the associated hospital performance rating.

Among the 22,407 patients discharged alive following isolated (non-salvage) CABG surgeries in 2017–2018, 2,518 patients were readmitted to the same or another acute care hospital within 30 days of the surgery date, reflecting a statewide readmission rate of 11.23%. The observed readmission rates among hospitals ranged from 0% to 42.00%. The expected readmission rates, which are generated by the risk model and account for patient severity of illness, ranged between 5.73% and 14.59%. The RARR, which reflects hospital performance, ranged from 0% to 35.83%.

Based on the 95% confidence intervals for risk-adjusted readmission rates, 113 of 124 hospitals (91.12%) performed within the expected range compared to the statewide readmission rate. Four hospitals performed significantly "**Better**" than the state average (Kaiser Foundation Hospital - Los Angeles, Kaiser Foundation Hospital – Santa Clara, Santa Rosa Memorial Hospital - Montgomery, and St. Jude Medical Center), and seven hospitals performed significantly "**Worse**" than the state average (Adventist Health Bakersfield, Henry Mayo Newhall Hospital, Hollywood Presbyterian Medical Center, Los Angeles County/University of Southern California Medical Center, Los Robles Hospital and Medical Center, Providence Little Company of Mary Medical Center – Torrance, and St. Mary Medical Center - Long Beach) (Table F-3).

⁷ The Poisson Exact Probability method is used for computing the 95% confidence interval for the risk-adjusted readmission rate. (Buchan Iain, *Calculating Poisson Confidence Interval in Excel*, January 2004)

Table F-3: Hospital Risk-Adjusted 30-Day Readmission Results by Region, 2017–2018

Region	Hospital	All CABG Cases	Isolated CABG Cases Discharged Alive	Isolated CABG Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	95%CI for RARR		Performance Rating†
								Lower Limit	Upper Limit	
State		32,297*	22,407*	2,518*	11.23					
Sacramento Valley & Northern California Region	Adventist Health and Rideout	141	113	20	17.70	12.79	15.56	9.50	24.02	Average
	Enloe Medical Center - Esplanade	345	287	40	13.94	11.14	14.06	10.04	19.14	Average
	Mercy General Hospital	1,449	919	82	8.92	10.78	9.30	7.40	11.55	Average
	Mercy Medical Center - Redding	93	79	12	15.19	12.72	13.42	6.94	23.45	Average
	Mercy San Juan Hospital	253	152	13	8.55	9.94	9.67	5.15	16.54	Average
	Shasta Regional Medical Center	272	212	23	10.85	10.47	11.64	7.38	17.47	Average
	St. Joseph Hospital - Eureka	40	30	7	23.33	9.50	27.59	11.09	56.85	Average
	Sutter Medical Center, Sacramento	984	627	61	9.73	10.27	10.64	8.14	13.67	Average
	UC Davis Medical Center	200	139	15	10.79	10.64	11.40	6.38	18.80	Average
San Francisco Bay Area & San Jose	Adventist Health St. Helena	212	124	16	12.90	12.67	11.44	6.54	18.58	Average
	Alta Bates Summit Medical Center	322	255	25	9.80	11.27	9.78	6.33	14.43	Average
	California Pacific Medical Center - Pacific Campus	168	116	12	10.34	9.43	12.32	6.37	21.52	Average
	Community Hospital of the Monterey Peninsula	199	140	13	9.29	11.70	8.92	4.75	15.25	Average
	Dominican Hospital	210	117	12	10.26	9.25	12.46	6.44	21.77	Average
	El Camino Hospital	259	144	13	9.03	11.83	8.58	4.57	14.67	Average
	Good Samaritan Hospital - San Jose	177	122	12	9.84	12.21	9.06	4.68	15.82	Average
	John Muir Medical Center - Concord Campus	449	313	27	8.63	12.13	7.99	5.27	11.63	Average
	Kaiser Foundation Hospital - San Francisco	894	700	56	8.00	9.05	9.93	7.50	12.89	Average
	Kaiser Foundation Hospital - Santa Clara	979	758	60	7.92	10.56	8.42	6.43	10.84	Better
	Marin General Hospital	86	55	2	3.64	10.15	4.03	0.49	14.55	Average
	Mills-Peninsula Medical Center	134	83	6	7.23	10.49	7.75	2.84	16.86	Average
North Bay Medical Center	97	78	8	10.26	12.36	9.32	4.03	18.37	Average	

Table F-3: Hospital Risk-Adjusted 30-Day Readmission Results by Region, 2017–2018

Region	Hospital	All CABG Cases	Isolated CABG Cases Discharged Alive	Isolated CABG Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	95%CI for RARR		Performance Rating†
								Lower Limit	Upper Limit	
State		32,297*	22,407*	2,518*	11.23					
San Francisco Bay Area & San Jose (continued)	O'Connor Hospital	110	76	8	10.53	12.39	9.54	4.12	18.80	Average
	Queen of the Valley Medical Center	95	65	9	13.85	13.68	11.38	5.20	21.60	Average
	Regional Medical of San Jose	180	132	16	12.12	13.78	9.88	5.65	16.05	Average
	Salinas Valley Memorial Hospital	265	183	30	16.39	11.61	15.87	10.71	22.66	Average
	San Ramon Regional Medical Center	52	35	3	8.57	8.64	11.15	2.30	32.59	Average
	Santa Clara Valley Medical Center	162	114	8	7.02	10.51	7.50	3.24	14.79	Average
	Santa Rosa Memorial Hospital - Montgomery	207	141	6	4.26	9.51	5.03	1.84	10.94	Better
	Sequoia Hospital	149	72	5	6.94	9.84	7.93	2.57	18.50	Average
	Seton Medical Center	122	88	12	13.64	11.64	13.16	6.80	23.00	Average
	St. Mary's Medical Center, San Francisco	22	15	3	20.00	11.19	20.09	4.14	58.72	Average
	Stanford Health Care	468	190	25	13.16	9.79	15.11	9.78	22.31	Average
	Stanford Health Care - Valleycare	77	63	5	7.94	11.43	7.80	2.53	18.21	Average
	Sutter Santa Rosa Regional Hospital	98	66	8	12.12	10.55	12.91	5.57	25.43	Average
	UC San Francisco Medical Center	220	148	15	10.14	9.32	12.23	6.84	20.17	Average
	Washington Hospital - Fremont	177	134	12	8.96	10.54	9.55	4.93	16.68	Average
Central California	Adventist Health Bakersfield	152	111	20	18.02	10.92	18.54	11.33	28.64	Worse
	Bakersfield Heart Hospital	164	129	14	10.85	10.92	11.17	6.11	18.74	Average
	Bakersfield Memorial Hospital	202	152	20	13.16	10.48	14.11	8.62	21.79	Average
	Community Regional Medical Center - Fresno	350	269	48	17.84	14.30	14.02	10.34	18.59	Average
	Dameron Hospital	117	77	10	12.99	12.31	11.86	5.69	21.81	Average
	Doctors Medical Center	675	481	60	12.47	12.45	11.26	8.59	14.49	Average
	Fresno Heart and Surgical Hospital	567	449	39	8.69	11.27	8.66	6.16	11.84	Average
	Kaweah Delta Medical Center	428	329	44	13.37	14.49	10.37	7.54	13.93	Average
	Marian Regional Medical Center	167	127	12	9.45	10.00	10.62	5.49	18.55	Average

Table F-3: Hospital Risk-Adjusted 30-Day Readmission Results by Region, 2017–2018

Region	Hospital	All CABG Cases	Isolated CABG Cases Discharged Alive	Isolated CABG Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	95%CI for RARR		Performance Rating†
								Lower Limit	Upper Limit	
State		32,297*	22,407*	2,518*	11.23					
Central California (continued)	Memorial Medical Center - Modesto	318	234	30	12.82	12.45	11.58	7.81	16.52	Average
	Saint Agnes Medical Center	555	372	42	11.29	11.45	11.08	7.98	14.97	Average
	St. Joseph's Medical Center of Stockton	491	367	55	14.99	12.93	13.03	9.81	16.96	Average
San Fernando Valley, Antelope Valley, Ventura & Santa Barbara	Adventist Health Glendale	282	173	24	13.87	11.94	13.06	8.37	19.43	Average
	Antelope Valley Hospital	18	12	1	8.33	7.81	11.99	0.30	66.82	Average
	Community Memorial Hospital - San Buenaventura	165	130	13	10.00	9.11	12.33	6.57	21.09	Average
	French Hospital Medical Center	187	131	11	8.40	9.42	10.01	5.00	17.92	Average
	Glendale Memorial Hospital and Health Center	216	152	17	11.18	10.75	11.70	6.81	18.73	Average
	Los Robles Hospital and Medical Center	174	115	25	21.74	13.55	18.02	11.66	26.61	Worse
	Northridge Hospital Medical Center	148	115	11	9.57	11.34	9.48	4.73	16.96	Average
	Palmdale Regional Medical Center	4	2	0	0.00	5.73	0.00	0.00	100.00	Average
	Providence Holy Cross Medical Center	130	84	9	10.71	12.76	9.43	4.31	17.91	Average
	Providence Saint Joseph Medical Center	104	83	5	6.02	11.18	6.06	1.97	14.13	Average
	Providence Tarzana Medical Center	87	71	11	15.49	10.25	16.99	8.48	30.40	Average
	Santa Barbara Cottage Hospital	244	183	16	8.74	9.19	10.69	6.11	17.36	Average
	St. John's Regional Medical Center	152	100	16	16.00	13.93	12.91	7.38	20.96	Average
	Valley Presbyterian Hospital	84	56	7	12.50	11.91	11.79	4.74	24.30	Average
	West Hills Hospital and Medical Center	115	71	9	12.68	10.49	13.58	6.21	25.77	Average
Greater Los Angeles	Adventist Health White Memorial	136	93	13	13.98	13.01	12.07	6.43	20.64	Average
	Beverly Hospital	48	32	4	12.50	13.03	10.78	2.94	27.61	Average
	California Hospital Medical Center - Los Angeles	96	69	10	14.49	12.43	13.11	6.28	24.10	Average
	Cedars Sinai Medical Center	481	248	31	12.50	10.24	13.72	9.32	19.47	Average
	Centinela Hospital Medical Center	36	28	6	21.43	14.22	16.94	6.22	36.87	Average
Emante Health Inter-Community Hospital	303	211	18	8.53	11.91	8.05	4.77	12.72	Average	

Table F-3: Hospital Risk-Adjusted 30-Day Readmission Results by Region, 2017–2018

Region	Hospital	All CABG Cases	Isolated CABG Cases Discharged Alive	Isolated CABG Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	95%CI for RARR		Performance Rating†
								Lower Limit	Upper Limit	
State		32,297*	22,407*	2,518*	11.23					
Greater Los Angeles (continued)	Garfield Medical Center	359	198	29	14.65	11.25	14.63	9.80	21.02	Average
	Good Samaritan Hospital - Los Angeles	221	124	17	13.71	10.34	14.91	8.68	23.87	Average
	Henry Mayo Newhall Hospital	97	64	13	20.31	10.30	22.17	11.80	37.91	Worse
	Hollywood Presbyterian Medical Center	78	50	21	42.00	13.17	35.83	22.18	54.76	Worse
	Huntington Memorial Hospital	232	162	14	8.64	10.04	9.68	5.29	16.23	Average
	Kaiser Foundation Hospital - Los Angeles	1,736	1,353	98	7.24	10.88	7.48	6.07	9.12	Better
	Keck Hospital of University of Southern California	239	80	14	17.50	11.48	17.13	9.36	28.74	Average
	Lakewood Regional Medical Center	222	168	21	12.50	14.59	9.63	5.96	14.72	Average
	Los Angeles County/Harbor - UCLA Medical Center	138	91	8	8.79	11.69	8.45	3.65	16.65	Average
	Los Angeles County/University of Southern California Medical Center	152	78	13	16.67	8.80	21.29	11.34	36.41	Worse
	Memorialcare Long Beach Medical Center	352	231	23	9.96	11.73	9.54	6.05	14.31	Average
	Methodist Hospital of Southern California	119	92	10	10.87	11.52	10.60	5.08	19.49	Average
	PIH Health Hospital - Downey	73	62	9	14.52	13.19	12.36	5.65	23.47	Average
	PIH Health Hospital - Whittier	198	118	15	12.71	13.58	10.52	5.89	17.35	Average
	Providence Little Company of Mary Medical Center - Torrance	286	210	47	22.38	13.30	18.91	13.89	25.14	Worse
	Providence St. John's Health Center	67	45	5	11.11	9.27	13.47	4.37	31.43	Average
	Ronald Reagan UCLA Medical Center	435	223	27	12.11	10.62	12.82	8.45	18.65	Average
	St. Francis Medical Center	93	69	9	13.04	11.84	12.38	5.66	23.51	Average
	St. Mary Medical Center - Long Beach	138	108	23	21.30	12.12	19.75	12.52	29.64	Worse
	St. Vincent Medical Center	124	93	13	13.98	10.54	14.91	7.94	25.50	Average
Torrance Memorial Medical Center	207	121	14	11.57	11.09	11.72	6.41	19.67	Average	

Table F-3: Hospital Risk-Adjusted 30-Day Readmission Results by Region, 2017–2018

Region	Hospital	All CABG Cases	Isolated CABG Cases Discharged Alive	Isolated CABG Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	95%CI for RARR		Performance Rating†
								Lower Limit	Upper Limit	
State		32,297*	22,407*	2,518*	11.23					
Inland Empire, Riverside & San Bernardino	Desert Regional Medical Center	247	192	13	6.77	10.98	6.93	3.69	11.86	Average
	Desert Valley Hospital	70	54	9	16.67	12.69	14.76	6.75	28.01	Average
	Eisenhower Medical Center	305	223	30	13.45	10.07	15.01	10.12	21.42	Average
	Kaiser Foundation Hospital - Fontana	652	502	49	9.76	11.90	9.22	6.82	12.19	Average
	Loma Linda University Medical Center	499	345	54	15.65	12.56	14.00	10.52	18.27	Average
	Loma Linda University Medical Center - Murrieta	210	171	20	11.70	10.21	12.87	7.86	19.87	Average
	Pomona Valley Hospital Medical Center	240	190	20	10.53	12.16	9.73	5.94	15.03	Average
	Riverside Community Hospital	436	326	45	13.80	12.76	12.16	8.87	16.27	Average
	San Antonio Regional Hospital	350	238	31	13.03	11.08	13.21	8.97	18.75	Average
	St. Bernardine Medical Center	592	450	61	13.56	11.54	13.20	10.10	16.96	Average
	St. Mary Medical Center - Apple Valley	188	139	15	10.79	11.28	10.75	6.02	17.73	Average
Temecula Valley Hospital	214	168	26	15.48	11.33	15.35	10.02	22.48	Average	
Orange County	AHMC Anaheim Regional Medical Center	263	142	24	16.90	10.94	17.36	11.12	25.83	Average
	Anaheim Global Medical Center	107	72	11	15.28	13.37	12.84	6.41	22.98	Average
	Fountain Valley Regional Hospital and Medical Center - Euclid	193	119	19	15.97	11.71	15.32	9.22	23.92	Average
	Hoag Memorial Hospital Presbyterian	487	279	27	9.68	9.23	11.78	7.76	17.13	Average
	Memorialcare Orange Coast Medical Center	206	159	12	7.55	11.84	7.16	3.70	12.51	Average
	Memorialcare Saddleback Medical Center	110	88	7	7.95	9.96	8.97	3.61	18.49	Average
	Mission Hospital Regional Medical Center	318	227	15	6.61	9.54	7.78	4.36	12.84	Average
	Orange County Global Medical Center	96	64	10	15.63	12.87	13.64	6.54	25.09	Average
	St. Joseph Hospital - Orange	260	155	11	7.10	9.98	7.99	3.99	14.30	Average
	St. Jude Medical Center	199	142	8	5.63	11.49	5.51	2.38	10.86	Better
	UC Irvine Medical Center	146	91	11	12.09	10.65	12.75	6.37	22.82	Average
West Anaheim Medical Center	67	53	11	20.75	10.83	21.54	10.75	38.54	Average	

Table F-3: Hospital Risk-Adjusted 30-Day Readmission Results by Region, 2017–2018

Region	Hospital	All CABG Cases	Isolated CABG Cases Discharged Alive	Isolated CABG Readmissions	Observed Readmission Rate (%)	Expected Readmission Rate (%)	Risk-Adjusted Readmission Rate (% RARR)	95%CI for RARR		Performance Rating†
								Lower Limit	Upper Limit	
State		32,297*	22,407*	2,518*	11.23					
Greater San Diego	Alvarado Hospital Medical Center	51	35	1	2.86	14.21	2.26	0.06	12.59	Average
	Grossmont Hospital	165	130	23	17.69	13.17	15.10	9.57	22.66	Average
	Palomar Health Downtown Campus	237	180	29	16.11	12.86	14.08	9.43	20.22	Average
	Scripps Memorial Hospital - La Jolla	857	581	52	8.95	9.72	10.34	7.72	13.56	Average
	Scripps Mercy Hospital	221	167	16	9.58	10.14	10.61	6.07	17.24	Average
	Sharp Chula Vista Medical Center	171	138	19	13.77	12.77	12.12	7.30	18.93	Average
	Sharp Memorial Hospital	261	149	18	12.08	10.16	13.36	7.92	21.12	Average
	Tri-City Medical Center - Oceanside	130	82	3	3.66	10.29	4.00	0.82	11.68	Average
	UCSD Health La Jolla - Jacobs Medical Center & Sulpizio Cardiovascular Center	420	275	24	8.73	11.59	8.46	5.42	12.59	Average

* The number of CABG cases and outcomes by provider may not equal the total number of statewide CABG cases and outcomes for various reasons, including the surgeon appeals process.

† A hospital is classified as “Better” if the upper 95% CI of the RARR falls below the California observed readmission rate (11.23%). A hospital is classified as “Worse” if the lower 95% CI of the RARR is higher than the California observed readmission rate. A hospital’s performance is considered “Average” if the California readmission rate falls within the 95% CI of a hospital’s RARR.

Hospital Internal Mammary Artery Usage Results, 2018

A widely accepted definition of healthcare quality contains three dimensions: process, structure, and outcomes.⁸ In addition to publishing hospital outcomes, this report also assesses a process of care measure by reporting hospital use of the internal mammary artery (IMA) in surgery. Although outcomes measurement permits comparison of provider performance and can be used within health care organizations for investigating processes and structures, assessing the process of care provides a more immediate path to improved care since it measures a specific step in patient care. If diagnostic and therapeutic strategies with clear links to outcomes are monitored, some healthcare quality problems can be detected and ameliorated long before demonstrable health outcomes occur.

In most cases of first-time, isolated CABG surgery where the operative status is elective or urgent, the surgeon has the option of using the IMA (also known as the internal mammary artery). Clinical literature strongly supports use of the IMA to promote long-term graft patency (durability) and patient survival. Research also suggests a reduction in immediate operative mortality associated with use of the IMA rather than saphenous (leg) vein revascularization.⁹ The IMA, and especially the left IMA, is considered the preferred conduit for revascularizing the left anterior descending (LAD) coronary artery.

Many nationally respected organizations encourage the use of IMA when appropriate. The Leapfrog Evidence-Based Hospital Referral program endorses the goal of 80% hospital adherence to IMA use. The National Quality Forum does not endorse a specific rate but states that the goal is to raise the IMA usage rates of hospitals with low utilization. The Society of Thoracic Surgeons states that IMA use should be given primary consideration in every CABG surgery patient. Furthermore, a number of healthcare quality advocates recommend public reporting of IMA usage rates for CABG surgery.

Table G-1 presents hospital results by region for usage of the IMA during 2018. Only first-time, non-cardiogenic shock isolated CABG surgeries where the operative status is elective or urgent and the LAD was bypassed are included in calculating IMA usage rates. The statewide IMA usage rate remains high and slightly increased (98.64% in 2018 vs. 98.22% in 2017). Six hospitals received a “**Low**” rating for 2018 (Bakersfield Heart Hospital, PIH Health Hospital – Downey, PIH Health Hospital – Whittier, Providence St. John's Health Center, Stanford Health Care - Valleycare and Temecula Valley Hospital). Hospital IMA usage rates above the statewide average rate are not rated because there is no consensus on what constitutes an optimal IMA usage rate.

Definitions of Table G-1 Terms

Isolated CABG Surgeries: Includes only first-time, non-cardiogenic shock, isolated CABG surgeries for 2018 where the operative status was elective or urgent and the LAD artery was bypassed. This number is usually smaller than the total isolated CABG cases performed by the hospital.

⁸ Donabedian A. Evaluating the Quality of Medical Care. *The Milbank Quarterly*, 2005; 83(4):691-729.

⁹ Ferguson TB Jr, Coombs LP, Peterson ED. “Internal thoracic artery grafting in the elderly patient undergoing coronary artery bypass grafting: room for process improvement?” *Journal of Thoracic and Cardiovascular Surgery*, 2002; 123(5):869-80.

IMA Usage Rate: The ratio of the number of CABG surgeries with IMA grafts (including left IMA, right IMA, and bilateral IMA) and selected first-time isolated CABG cases multiplied by 100: Percent IMA Use = Number of IMA Grafts used for First-Time Isolated CABG Surgeries/Number of First-Time Isolated CABG Cases × 100.

Performance Rating: An “**Acceptable**” rating indicates the hospital IMA usage rate is within two standard deviations of the California statewide average rate. A “**Low**” rating indicates the IMA usage rate for a hospital is less than 94.80%, i.e., two standard deviations (0.0196 x 1.96) below the statewide average rate (98.64%). IMA usage rates above the hospital statewide average rate were not evaluated because there is no consensus on what constitutes an optimal rate of usage.

Table G-1: Hospital Internal Mammary Artery Usage Results by Region, 2018

Region	Hospital	Isolated CABGs*	Percent IMA Use	Rating†
State		12,056	98.64%	
Sacramento Valley & Northern California Region	Adventist Health and Rideout	59	100.00%	Acceptable
	Enloe Medical Center - Esplanade	143	97.90%	Acceptable
	Mercy General Hospital	481	100.00%	Acceptable
	Mercy Medical Center - Redding	27	96.30%	Acceptable
	Mercy San Juan Hospital	75	100.00%	Acceptable
	Shasta Regional Medical Center	97	97.94%	Acceptable
	St. Joseph Hospital - Eureka	12	100.00%	Acceptable
	Sutter Medical Center, Sacramento	329	98.48%	Acceptable
	UC Davis Medical Center	60	100.00%	Acceptable
San Francisco Bay Area & San Jose	Adventist Health St. Helena	66	100.00%	Acceptable
	Alta Bates Summit Medical Center	140	100.00%	Acceptable
	California Pacific Medical Center - Pacific Campus	75	100.00%	Acceptable
	Community Hospital of The Monterey Peninsula	71	97.18%	Acceptable
	Dominican Hospital	53	100.00%	Acceptable
	El Camino Hospital	96	100.00%	Acceptable
	Good Samaritan Hospital - San Jose	64	100.00%	Acceptable
	John Muir Medical Center - Concord Campus	171	99.42%	Acceptable
	Kaiser Foundation Hospital - San Francisco	328	100.00%	Acceptable
	Kaiser Foundation Hospital - Santa Clara	406	100.00%	Acceptable
	Marin General Hospital	36	97.22%	Acceptable
	Mills-Peninsula Medical Center	42	100.00%	Acceptable
	North Bay Medical Center	45	97.78%	Acceptable
	O'Connor Hospital	41	97.56%	Acceptable
	Queen of The Valley Medical Center	42	100.00%	Acceptable
	Regional Medical of San Jose	78	97.44%	Acceptable
	Salinas Valley Memorial Hospital	92	100.00%	Acceptable
	San Ramon Regional Medical Center	17	100.00%	Acceptable
	Santa Clara Valley Medical Center	59	96.61%	Acceptable
Santa Rosa Memorial Hospital - Montgomery	84	98.81%	Acceptable	

Table G-1: Hospital Internal Mammary Artery Usage Results by Region, 2018

Region	Hospital	Isolated CABGs*	Percent IMA Use	Rating†
State		12,056	98.64%	
San Francisco Bay Area & San Jose (continued)	Sequoia Hospital	36	100.00%	Acceptable
	Seton Medical Center	56	98.21%	Acceptable
	St. Mary's Medical Center, San Francisco	9	100.00%	Acceptable
	Stanford Health Care	132	100.00%	Acceptable
	Stanford Health Care - Valleycare	31	93.55%	Low
	Sutter Santa Rosa Regional Hospital	43	97.67%	Acceptable
	UC San Francisco Medical Center	79	98.73%	Acceptable
	Washington Hospital - Fremont	59	100.00%	Acceptable
Central California	Adventist Health Bakersfield	59	96.61%	Acceptable
	Bakersfield Heart Hospital	75	90.67%	Low
	Bakersfield Memorial Hospital	87	98.85%	Acceptable
	Community Regional Medical Center - Fresno	122	100.00%	Acceptable
	Dameron Hospital	76	100.00%	Acceptable
	Doctors Medical Center	258	98.45%	Acceptable
	Fresno Heart And Surgical Hospital	224	100.00%	Acceptable
	Kaweah Delta Medical Center	182	98.35%	Acceptable
	Marian Regional Medical Center	73	100.00%	Acceptable
	Memorial Medical Center - Modesto	110	98.18%	Acceptable
	Saint Agnes Medical Center	195	97.44%	Acceptable
	St. Joseph's Medical Center of Stockton	199	98.49%	Acceptable
San Fernando Valley, Antelope Valley, Ventura & Santa Barbara	Adventist Health Glendale	123	100.00%	Acceptable
	Antelope Valley Hospital	1	100.00%	Acceptable
	Community Memorial Hospital - San Buenaventura	72	98.61%	Acceptable
	French Hospital Medical Center	64	100.00%	Acceptable
	Glendale Memorial Hospital And Health Center	98	97.96%	Acceptable
	Los Robles Hospital And Medical Center	54	98.15%	Acceptable
	Northridge Hospital Medical Center	63	100.00%	Acceptable
	Providence Holy Cross Medical Center	51	100.00%	Acceptable
	Providence Saint Joseph Medical Center	53	100.00%	Acceptable
	Providence Tarzana Medical Center	33	100.00%	Acceptable
	Santa Barbara Cottage Hospital	80	100.00%	Acceptable
	St. John's Regional Medical Center	59	94.92%	Acceptable
	Valley Presbyterian Hospital	40	97.50%	Acceptable
West Hills Hospital And Medical Center	32	100.00%	Acceptable	
Greater Los Angeles	Adventist Health White Memorial	62	100.00%	Acceptable
	Beverly Hospital	19	100.00%	Acceptable
	California Hospital Medical Center - Los Angeles	47	100.00%	Acceptable
	Cedars Sinai Medical Center	159	100.00%	Acceptable
	Centinela Hospital Medical Center	15	100.00%	Acceptable

Table G-1: Hospital Internal Mammary Artery Usage Results by Region, 2018

Region	Hospital	Isolated CABGs*	Percent IMA Use	Rating†
State		12,056	98.64%	
Greater Los Angeles (continued)	Emante Health Inter-Community Hospital	120	100.00%	Acceptable
	Garfield Medical Center	145	95.17%	Acceptable
	Good Samaritan Hospital - Los Angeles	80	100.00%	Acceptable
	Henry Mayo Newhall Hospital	28	100.00%	Acceptable
	Hollywood Presbyterian Medical Center	44	95.45%	Acceptable
	Huntington Memorial Hospital	101	100.00%	Acceptable
	Kaiser Foundation Hospital - Los Angeles	696	99.86%	Acceptable
	Keck Hospital of University of Southern California	59	98.31%	Acceptable
	Lakewood Regional Medical Center	97	97.94%	Acceptable
	Los Angeles County/Harbor - UCLA Medical Center	68	100.00%	Acceptable
	Los Angeles County/University of Southern California Medical Center	47	100.00%	Acceptable
	Memorialcare Long Beach Medical Center	141	95.04%	Acceptable
	Methodist Hospital of Southern California	48	95.83%	Acceptable
	PIH Health Hospital - Downey	36	94.44%	Low
	PIH Health Hospital - Whittier	46	91.30%	Low
	Providence Little Company of Mary Medical Center - Torrance	100	98.00%	Acceptable
	Providence St. John's Health Center	19	94.74%	Low
	Ronald Reagan UCLA Medical Center	126	99.21%	Acceptable
	St. Francis Medical Center	42	100.00%	Acceptable
	St. Mary Medical Center - Long Beach	65	95.38%	Acceptable
St. Vincent Medical Center	47	95.74%	Acceptable	
Torrance Memorial Medical Center	64	100.00%	Acceptable	
Inland Empire, Riverside & San Bernardino	Desert Regional Medical Center	94	100.00%	Acceptable
	Desert Valley Hospital	27	100.00%	Acceptable
	Eisenhower Medical Center	107	100.00%	Acceptable
	Kaiser Foundation Hospital - Fontana	248	99.19%	Acceptable
	Loma Linda University Medical Center	191	95.29%	Acceptable
	Loma Linda University Medical Center - Murrieta	113	98.23%	Acceptable
	Pomona Valley Hospital Medical Center	89	100.00%	Acceptable
	Riverside Community Hospital	164	97.56%	Acceptable
	San Antonio Regional Hospital	123	99.19%	Acceptable
	St. Bernardine Medical Center	236	99.15%	Acceptable
	St. Mary Medical Center - Apple Valley	66	100.00%	Acceptable
	Temecula Valley Hospital	87	94.25%	Low
Orange County	AHMC Anaheim Regional Medical Center	101	100.00%	Acceptable
	Anaheim Global Medical Center	38	100.00%	Acceptable
	Fountain Valley Regional Hospital And Medical Center - Euclid	69	95.65%	Acceptable
	Hoag Memorial Hospital Presbyterian	147	99.32%	Acceptable

Table G-1: Hospital Internal Mammary Artery Usage Results by Region, 2018

Region	Hospital	Isolated CABGs*	Percent IMA Use	Rating†
State		12,056	98.64%	
Orange County (continued)	Memorialcare Orange Coast Medical Center	75	100.00%	Acceptable
	Memorialcare Saddleback Medical Center	42	95.24%	Acceptable
	Mission Hospital Regional Medical Center	121	100.00%	Acceptable
	Orange County Global Medical Center	38	100.00%	Acceptable
	St. Joseph Hospital - Orange	91	98.90%	Acceptable
	St. Jude Medical Center	67	100.00%	Acceptable
	UC Irvine Medical Center	57	100.00%	Acceptable
	West Anaheim Medical Center	30	100.00%	Acceptable
Greater San Diego	Alvarado Hospital Medical Center	21	95.24%	Acceptable
	Grossmont Hospital	67	100.00%	Acceptable
	Palomar Health Downtown Campus	70	100.00%	Acceptable
	Scripps Memorial Hospital - La Jolla	316	100.00%	Acceptable
	Scripps Mercy Hospital	82	100.00%	Acceptable
	Sharp Chula Vista Medical Center	64	100.00%	Acceptable
	Sharp Memorial Hospital	80	97.50%	Acceptable
	Tri-City Medical Center - Oceanside	44	97.73%	Acceptable
	UCSD Health La Jolla - Jacobs Medical Center & Sulpizio Cardiovascular Center	153	99.35%	Acceptable

* Only includes first-time non-cardiogenic shock isolated CABGs where the operative status was elective or urgent. Cases where LAD was not by-passed or not by-passable were excluded.

† Low Rank: IMA usage rate for a hospital is less than 94.80%, i.e. two standard deviations (0.0196x1.96) below the hospital statewide average IMA rate (98.64%).

Appendix A: Definition of Terms

All CABG Cases: The total number of isolated and non-isolated CABG cases submitted to CCORP. To improve statistical reliability, some measures combine data from two years.

Hospital Operative Mortality for isolated CABG: 2018

Hospital Operative Mortality for CABG + Valve: 2017 – 2018

Hospital Post-Operative Stroke: 2017 – 2018

Hospital 30-Day Hospital Readmission: 2017 – 2018

Non-isolated CABG cases not in the CABG+valve cohort are excluded from the performance rating calculations.

Isolated CABG Cases: The number of isolated CABG cases submitted to CCORP during the time period indicated for the outcome listed above. All patients in salvage operative status are excluded from the isolated CABG cases, thus only isolated CABG cases without salvage operative status are used to calculate performance ratings.

CABG+Valve Cases: The number of CABG cases performed that included aortic valve replacement, mitral valve repair or replacement or a combination thereof.

Isolated CABG Outcomes:

Operative Mortality (hospital): The number of operative deaths for isolated CABG cases for 2018. The number of deaths includes 1) all deaths that occur during the hospitalization in which the CABG surgery was performed up to 90 days; and 2) all deaths after transfer to another acute care center up to 90 days, and 3) any deaths within 30 days after the surgery (no matter where they occurred).

Post-Operative Stroke: The number of post-operative strokes that were unresolved after 24 hours for isolated CABG cases for 2017 – 2018 data.

30-Day Readmission: (for Isolated CABG Cases Discharged Alive where the patient could be followed via OSHPD's hospital Patient Discharge Data (PDD) file. Patients in salvage operative status, patients who were transferred to acute care, or patients who left against medical advice were excluded). The number of hospital readmissions within 30 days of being discharged from the hospital where an isolated CABG operation was performed, irrespective of the hospital to which they were readmitted for 2017 - 2018. All-cause unplanned readmissions that occur within 30 days of discharge to the hospital that performed the initial CABG surgery are considered an outcome. Readmission was attributed to the hospital performing the initial CABG surgery.

CABG+Valve Outcome:

Operative Mortality: The number of operative deaths for CABG+valve cases for 2017 - 2018. CABG+valve cases are defined as CABG surgery with aortic valve replacement, mitral valve repair or replacement or a combination thereof. The number of deaths includes 1) all deaths that occur during the hospitalization in which the CABG surgery was performed up to 90 days; and 2) all deaths after transfer to another acute care center up to 90 days, and 3) any deaths within 30 days after the surgery (no matter where they occurred).

Observed CABG Outcome Rate:

Observed Isolated CABG Mortality Rate The ratio of observed number of isolated CABG operative mortality deaths to number of isolated CABG cases multiplied by 100.

Observed CABG+valve Mortality Rate The ratio of observed number of CABG+valve operative mortality deaths to number of CABG+valve cases multiplied by 100:

Observed Post-Operative Stroke Rate The ratio of observed number of post-operative strokes to number of isolated CABG cases multiplied by 100.

Observed 30-Day Readmission Rate The ratio of observed number of 30-day readmissions to number of isolated CABG cases multiplied by 100.

Observed CABG Outcome Rate = Observed Outcomes/# of CABG Cases × 100.

Expected CABG Outcome Rate:

Expected Isolated CABG Mortality Rate The ratio of expected number of isolated CABG operative mortality deaths (predicted for a provider after risk adjusting for the provider's patient population) to number of isolated CABG cases multiplied by 100.

Expected CABG+valve Mortality Rate The ratio of expected number of CABG+valve operative mortality deaths (predicted for a provider after risk adjusting for the provider's patient population) to number of CABG+valve cases multiplied by 100.

Expected Post-Operative Stroke Rate The ratio of expected number of post-operative strokes (predicted for a provider after risk adjusting for the provider's patient population) to number of isolated CABG cases multiplied by 100.

Expected 30-Day Readmission Rate The ratio of the expected number of 30-day readmissions (predicted for a provider after risk adjusting for the provider's patient population) to number of isolated CABG cases multiplied by 100.

Expected CABG Outcome Rate = Expected Outcomes/# of CABG Cases × 100.

Risk-Adjusted Outcome Rate (95% CI): The risk-adjusted mortality rate (RAMR) is calculated by multiplying the California state average CABG mortality rate by the provider's relevant Observed/Expected ratio. The 95% confidence interval was estimated for the risk-adjusted rate. The lower and upper confidence limits are calculated using Poisson exact confidence interval calculations.

The risk-adjusted post-operative stroke rate (RASR) is calculated by multiplying the California state average CABG post-operative stroke rate by the provider's relevant Observed/Expected ratio. The 95% confidence interval was estimated for the risk-adjusted rate. The lower and upper confidence limits are calculated using Poisson exact confidence interval calculations.

The risk-adjusted 30-day readmission rate (RARR) is obtained by multiplying the California state average CABG 30-day readmission rate by the provider's relevant Observed/Expected ratio. The 95% confidence interval was estimated for the risk-adjusted rate. The lower and upper confidence limits are calculated using Poisson exact confidence interval calculations.

Performance Rating: The performance rating is based on a comparison of each provider's risk-adjusted outcome rate and the California observed outcome rate. This is a test of statistical significance. A provider is classified as "**Better**" if the upper 95% confidence limit of its rate falls below the California observed rate. A provider is classified as "**Worse**" if the lower 95% confidence limit of its outcome rate is higher than the California observed rate. A provider is classified as "**Average**" if the California outcome rate falls within the confidence interval of the provider's risk-adjusted outcome rate.

Appendix C: Acknowledgments

The California Coronary Artery Bypass Graft (CABG) Outcomes Reporting Program (CCORP) is funded by the Office of Statewide Health Planning and Development's California Health Data and Planning Fund.

This report represents the contributions of many individuals. Hospital staff dedicated time and resources to collect, report, and review the data for analysis. Hospitals provided ongoing feedback on the design of the program, which is vital to its success, and members of the CCORP Clinical Advisory Panel provided oversight and policy guidance for data collection and analysis. OSHPD's Healthcare Analytics Branch provided expertise in report concept, editing, and design. The California Department of Public Health provided Vital Statistics files needed for identifying post-surgery deaths after discharge. CCORP also benefited from collaboration with the Society of Thoracic Surgeons and its California Chapter to coordinate and improve data quality.

CCORP reflects the efforts and significant contributions of the following individuals:

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