

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

Coronary artery bypass graft (CABG) surgery is one of the most expensive and common cardiac surgeries performed in California. Improved medical interventions and quality improvement efforts have contributed to a declining mortality rate over the last 15 to 20 years. However, post-operative death and major complications (e.g. stroke, surgical site infections) still occur at rates that can and should be reduced. The intent of this report is to help improve quality outcomes and appropriateness of CABG surgery by informing consumers, hospitals, surgeons and others about the performance of hospitals and surgeons.

The *California Report on Coronary Artery Bypass Graft (CABG) Surgery 2017-2018: Hospital and Surgeon Data* provides quality ratings for the 124 California-licensed hospitals performing adult isolated CABG¹ or CABG + Valve² surgery and 283 surgeons performing adult isolated CABG surgery during 2017 and 2018. Hospital results for isolated CABG operative mortality and internal mammary artery (IMA)³ utilization are based on calendar year 2018 data. Hospital results for CABG + Valve operative mortality, isolated CABG post-operative stroke, isolated CABG 30-day readmission, and surgeon results for isolated CABG operative mortality are based on combined 2017-2018 calendar year data to increase statistical reliability.

The outcome measures are risk-adjusted, a statistical technique that enables fair comparison of hospitals even though some treat sicker patients.

- Isolated CABG operative mortality 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/or deaths within 30 days after the surgery (no matter where they occurred).
- CABG + Valve operative mortality includes all deaths as defined above.
- Post-operative stroke is defined as a central neurologic deficit that occurred after the surgery and did not resolve within 24 hours. This measure only applies to isolated CABG surgeries.

¹ Isolated CABG surgery refers to heart bypass surgery without other major surgery, such as heart or lung transplantation, valve repair, etc. performed concurrently with the bypass procedure. Patients undergoing CPR en route to the operating room are excluded.

² CABG + Valve surgery refers to heart bypass surgery that also combines with repair or replacement of the mitral valve and/or aortic valve. Patients with salvage operative status are excluded.

³ The internal mammary artery (IMA) supplies blood to the front chest wall and the breasts. It is a paired artery, running on each side of the inner chest. Evidence shows that the IMA, when grafted to a coronary artery, is less susceptible to obstruction over time and remains fully open longer than vein grafts.

- *Hospital readmission* includes all-cause unplanned readmission that arise from acute clinical events requiring urgent rehospitalization within 30 days of being discharged alive following isolated CABG surgeries.

Also included in this report is the IMA utilization rate for hospitals. Research shows that high rates of IMA use result in long-term graft patency and improved patient survival, making it an important process measure of surgical quality.⁴

The California CABG Outcomes Reporting Program (CCORP) provided each hospital with a preliminary report containing the risk-adjusted models, explanatory materials, and results for all hospitals. Hospitals were given 60 days to review the report and submit a statement if they believe their risk-adjusted outcomes do not accurately reflect the quality of care provided. For the 2017-2018 report, no hospital statements were received.

CCORP also provided each surgeon with a preliminary report containing the risk-adjusted models, explanatory materials, and results. Surgeons were given 30 days to review their results, and those who felt their operative mortality results did not reflect the quality of care provided could submit statements for OSHPD review. For this report, all statements were resolved at OSHPD and no statements were forwarded to the CCORP Clinical Advisory Panel (CAP) for a final decision.

Hospital Operative Mortality Findings

2018 Isolated CABG Operative Mortality

The operative mortality rate for isolated CABG surgery in California was 2.44 percent (312 deaths after 12,789 procedures) in 2018. This rate is higher than the rate reported for 2017 (2.22 percent). Overall, the 2018 rate represents a 16.15 percent reduction since 2003 (2.91 percent), the first year of mandated public reporting.

- After adjusting for patients' pre-operative health conditions, 96.75 percent of all hospitals performed within the statistically acceptable range of the state average. No hospital was rated "**Better**" than the state average operative mortality rate.
- After adjusting for patients' pre-operative health conditions, four hospitals were rated "**Worse**" than the state average operative mortality rate (Hollywood Presbyterian Medical Center, Palomar Health Downtown Campus, Scripps Mercy Hospital, and St. Bernardine Medical Center).

2017-2018 CABG + Valve Operative Mortality

The operative mortality rate for CABG + Valve surgery in California was 5.17 percent in 2017-2018 (224 deaths after 4,331 procedures). This rate increased by 11.66 percent from 2016-2017 when the rate was 4.63 percent.

⁴ IMA utilization was assessed only for first-time, isolated CABG surgeries where the operative status was elective or urgent and the left anterior artery was bypassed.

- After adjusting for patients' pre-operative health conditions, 96.72 percent of all hospitals performed within the statistically acceptable range of the state average. No hospital was rated "**Better**" than the state average operative mortality rate.
- After adjusting for patients' pre-operative health conditions, four hospitals were rated "**Worse**" than the state average operative mortality rate (Memorial Medical Center – Modesto, Memorialcare Long Beach Medical Center, North Bay Medical Center, and Palomar Health Downtown Campus).

2017-2018 Hospital Post-Operative Stroke Findings

The post-operative stroke rate for isolated CABG surgery in California was 1.58 percent (408 strokes after 25,838 procedures) in 2017-2018. This represents a 7.48 percent increase in California's average post-operative stroke rate from 2016-2017 when the rate was 1.47 percent. This represents a 10.49 percent increase in California's average post-operative stroke rate since 2007-2008 when the rate was 1.43 percent.

- After adjusting for patients' pre-operative health conditions, 94.35 percent of all hospitals performed within the statistically acceptable range of the state average. Two hospitals were rated "**Better**" than the state average post-operative stroke rate (Fresno Heart and Surgical Hospital and Riverside Community Hospital).
- Five hospitals were rated "**Worse**" than the state average post-operative stroke rate (Garfield Medical Center, Grossmont Hospital, Stanford Health Care, Torrance Memorial Medical Center, and West Hills Hospital and Medical Center).

2017-2018 Hospital Readmission Findings

The statewide hospital all-cause unplanned 30-day readmission rate was 11.23 percent (2,518 readmissions out of 22,407 patient discharges) for those who underwent isolated CABG surgery in 2017-2018, were discharged alive, and could be followed-up via hospital patient discharge data. This is the first report to use all-cause unplanned readmissions as the outcome. Caution should be taken when comparing readmission rates in this report to those in previous years, as readmissions in previous years only included patients readmitted with a heart-related condition, an infection or a complication likely related to the CABG surgery.

- After adjusting for patients' pre-operative health conditions, 91.12 percent of all hospitals performed within the statistically acceptable range of the state average. Four hospitals were rated "**Better**" than the state average readmission rate (Kaiser Foundation Hospital - Santa Clara, Kaiser Foundation Hospital - Los Angeles, Santa Rosa Memorial Hospital - Montgomery, and St. Jude Medical Center).
- Seven hospitals were rated "**Worse**" than the state average readmission rate (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).

2018 Hospital Internal Mammary Artery (IMA) Usage Findings

The IMA is the preferred conduit for CABG surgery of the left anterior descending artery. Hospitals with *high* rates of IMA usage are adhering to nationally recognized best practices in heart bypass surgery. There is no consensus on an optimal usage rate, so “**Better**” performance ratings are not given. The average IMA usage rate among California hospitals was 98.64 percent in 2018, 98.22 percent in 2017, and 89.56 percent⁵ in 2003.

- Six California hospitals (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) were rated “**Low**” with IMA usage rates significantly lower than the state average.

2017-2018 Surgeon Operative Mortality Findings

The statewide operative mortality rate was 2.33 percent (603 deaths after 25,838 procedures) for the 283 surgeons who performed isolated CABG surgery in 2017-2018. This is a 4.51 percent decrease from 2.44 percent in 2015-2016.

- Two surgeons performed “**Better**” than the state average operative mortality rate (Drs. Eduardo A. Tovar, Henry L. Zhu).
- Four surgeons performed “**Worse**” than the state average operative mortality rate (Drs. John C. Lin, Tom Mahendra, Raymond Silva, Taro Yokoyama).

For information on research methods and statistical results, please see the *Technical Note for the California Report on Coronary Artery Bypass Graft Surgery 2017-2018: Hospital and Surgeon Data*. <https://oshpd.ca.gov/data-and-reports/healthcare-quality/cabg-reports/>

⁵ The increase in the statewide IMA usage rate over the last 10 years is partly due to a change in the IMA measure. Beginning in 2008, patients who did not have the left anterior descending artery bypassed were excluded from the denominator.