

The California Report on Coronary Artery Bypass Graft (CABG) Surgery 2015-2016: 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 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 2015-2016: Hospital and Surgeon Data* provides quality ratings for the 126 California-licensed hospitals performing adult isolated CABG¹ or CABG + Valve² surgery and 276 surgeons performing adult isolated CABG surgery during 2015 and 2016. Hospital results for isolated CABG operative mortality and internal mammary artery (IMA)³ utilization are based on calendar year 2016 data. Hospital results for CABG + Valve operative mortality, isolated CABG post-operative stroke and isolated CABG 30-day readmission, and surgeon results for isolated CABG operative mortality are based on combined 2015-2016 calendar year data to increase statistical reliability.

The outcome measures are risk-adjusted, a statistical technique that enables fair comparison of hospitals and surgeons 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). This definition was revised starting with 2015 data. Readers should exercise caution when comparing operative mortality rates in this report to those in previous years.
- *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 includes 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* only includes patients who had CABG surgeries and were readmitted (to any California hospital) within 30 days of being discharged from the operating hospital. This measure only applies to 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 a 60-day review period to submit statements to CCORP for inclusion in this report. Two hospitals submitted comment letters, which can be viewed by the hospital name with * in this report. These statements may help readers understand the concerns of healthcare providers regarding their performance information.

CCORP also provided each surgeon with a preliminary report containing the risk-adjusted models, explanatory materials, and results. Surgeons were given a 30-day review period to submit statements to CCORP for inclusion in this report. Surgeons who felt that their operative mortality results did not reflect the quality of care provided were able to submit appeals requesting a review along with information supporting their position to OSHPD. Three appeals were forwarded to the CCORP Clinical Advisory Panel (CAP) for a final decision. CAP concurred with one appeal.

Hospital Operative Mortality Findings

2016 Isolated CABG Operative Mortality

The operative mortality rate for isolated CABG surgery in California was 2.37 percent (305 deaths after 12,867 procedures) in 2016. This rate is slightly lower than the rate reported for 2015 (2.50 percent). Overall, the 2016 rate represents a 18.56 percent reduction since 2003 (2.91percent), the first year of mandated public reporting.

- After adjusting for patients' pre-operative health conditions, 96.03 percent of all hospitals performed within the statistically acceptable range of the state average. Two hospitals were rated "**Better**" than the state average operative mortality rate (John Muir Medical Center - Concord Campus and Mercy General Hospital).
- After adjusting for patients' pre-operative health conditions, three hospitals were rated "**Worse**" than the state average operative mortality rate (North Bay Medical Center, Rideout Memorial Hospital, and UC Davis Medical Center).

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.

2015-2016 CABG + Valve Operative Mortality

The operative mortality rate for CABG + Valve surgery in California was 4.93 percent in 2015-2016 (237 deaths after 4,805 procedures). This rate decreased by 9.04 percent from 2014-2015 when the rate was 5.42 percent. This decrease is noted with caution due to the 2015 change to the definition of operative mortality.

- After adjusting for patients' pre-operative health conditions, two hospitals were rated **"Better"** than the state average operative mortality rate (Kaiser Foundation Hospital - Sunset and Keck Hospital of University of Southern California).
- After adjusting for patients' pre-operative health conditions, two hospitals were rated **"Worse"** than the state average operative mortality rate (Desert Regional Medical Center and St. John's Regional Medical Center).

2015-2016 Hospital Post-Operative Stroke Findings

The post-operative stroke rate for isolated CABG surgery in California was 1.50 percent (369 strokes after 25,443 procedures) in 2015-2016. This represents a 14.50 percent increase in California's average post-operative stroke rate from 2014-2015 when the rate was 1.31 percent. This represents an 4.90 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, one hospital was rated **"Better"** than the state average post-operative stroke rate (Kaiser Foundation Hospital - Fontana).
- Three hospitals were rated **"Worse"** than the state average post-operative stroke rate (Glendale Memorial Hospital and Health Center, St. John's Regional Medical Center, and Stanford Hospital).

2015-2016 Hospital Readmission Findings

The statewide hospital 30-day readmission rate was 11.43 percent (2,531 readmissions out of 22,136 patients) for patients who underwent isolated CABG surgery in 2015-2016, were discharged alive, and could be followed-up via hospital patient discharge data. This represents a slight decrease from the rate for 2014-2015 (11.50 percent).

- After adjusting for patients' pre-operative health conditions, seven hospitals were rated **"Better"** than the state average (Community Hospital of the Monterey Peninsula, Kaiser Foundation Hospital – Fontana, Kaiser Foundation Hospital - San Francisco, Kaiser Foundation Hospital – Santa Clara, Mercy General Hospital, Santa Rosa Memorial Hospital - Montgomery, and St. Jude Medical Center).
- After adjusting for patients' pre-operative health conditions, seven hospitals were rated **"Worse"** than the state average (Bakersfield Heart Hospital, California Pacific Medical Center - Pacific Campus, Hollywood Presbyterian Hospital, Los Angeles County/Harbor - UCLA Medical Center, North Bay Medical Center, St. Francis Medical Center and Valley Presbyterian Hospital).

2016 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 97.89 percent in 2016, 97.49 percent in 2015, and 89.56 percent⁵ in 2003.

- Two of 126 California hospitals (Antelope Valley Hospital and Palmdale Regional Medical Center) were rated “**Low**” with IMA usage rates significantly lower than the state average. Both hospitals have had low IMA usage rates historically: Antelope Valley Hospital was rated “**Low**” from 2008 to 2016 except 2011. Palmdale Regional Medical Center was rated “**Low**” from 2013 to 2016.

2015-2016 Surgeon Operative Mortality Findings

The statewide operative mortality rate was 2.44 percent (619 deaths after 25,366 procedures) for the 276 surgeons who performed isolated CABG surgery in 2015-2016. This is an increase from 2.13 percent in 2013-2014.

- Three surgeons performed “**Better**” than the state average operative mortality rate (Drs. John R. Dein, Richard J. Kaplon, Henry L. Zhu).
- Twelve surgeons performed “**Worse**” than the state average operative mortality rate (Drs. Wen Chen, Patrick K. Griffith, Guy G. Lemire, Alan E. Malki, Ricardo J. Morenocabral, Pavel V. Petrik, Li Poa, Raymond Silva, Larry H. Smith, Dominic J. Tedesco, Syam P. Vunnamadala, Taro Yokoyama).

For detailed results by hospital, please see [California Hospital Performance Ratings for Coronary Artery Bypass Graft \(CABG\) Surgery by Region, 2016](#). For detailed results by surgeon name, please see [California Surgeon Performance Ratings for Coronary Artery Bypass Graft \(CABG\) Surgery, 2015-2016](#). For information on research methods and statistical results, please see the *Technical Note for the California Report on Coronary Artery Bypass Graft Surgery 2015-2016: 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.