EXECUTIVE SUMMARY

The California Coronary Artery Bypass Graft (CABG) Outcomes Reporting Program is the largest public reporting program on CABG surgery outcomes in the United States.

The *California Report on Coronary Artery Bypass Graft Surgery, 2007-2008 Hospital and Surgeon Data* presents findings from analyses of data collected from 122 California-licensed hospitals where 279 surgeons performed adult isolated CABG[1] during 2007-2008. While surgeon results for risk-adjusted mortality and hospital results for risk-adjusted post-operative stroke are based on combined 2007 and 2008 data, hospital results for risk-adjusted mortality and internal mammary artery utilization are based only on 2008 data for 120 facilities that performed adult isolated CABG surgeries.

The report presents 2008 risk-adjusted operative mortality data and 2007-2008 risk-adjusted post-operative stroke data to help evaluate hospital performance and presents 2007-2008 risk-adjusted operative mortality data to help evaluate surgeon performance. Risk adjustment is a statistical technique that allows for fair comparison of hospital outcomes even though some hospitals have sicker patients than average. Operative mortality includes all deaths that occur during the hospitalization in which the CABG surgery was performed (regardless of length of stay) and any deaths within 30 days after the surgery, no matter where they occur. Post-operative stroke is defined as a central neurologic deficit persisting more than 72 hours (2007 data) or that did not resolve within 24 hours (2008 data) after surgery.[2]

This report also provides hospital-level information on internal mammary artery (IMA)[3] usage for 2008, an additional measure of surgical quality, and examines the relationship between the number of surgeries that hospitals perform and their mortality and post-operative stroke rates.

Key findings from this report are:

2008 Mortality Findings by Hospital:

- There were 313 operative deaths among 13,957 isolated non-salvage CABG surgeries. Patients undergoing CPR on the way to the operating room (salvage cases) were excluded from the report results.

- The operative mortality rate for isolated CABG surgery in California was 2.24%, compared to 2.4% for 2007. The rates for 2006, 2005, 2004, and 2003 were 2.2%,

[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. For a complete definition of isolated CABG, see http://www.oshpd.ca.gov/HID/SubmitData/CCORP_CABG/2006AbstractTrain.pdf.

[2] The Society of Thoracic Surgeons (STS) changed its definition for post-operative stroke from "persisting for more than 72 hours" in the data collection version 2.52 to "unresolved within 24 hours" in version 2.61 in 2008. Details are available at: http://www.sts.org/sections/stsnationaldatabase/datamanagers/generalthoracicdb/datacollection/index.html.

[3] The internal mammary artery (IMA) supplies blood to the front chest wall and the breasts. It is a paired artery, with one 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.

3.2%, 3.3%, and 2.9% respectively. This represents a 24% reduction in the operative mortality rate since 2003, the first year of mandated public reporting.

- There was significant variation, from 0% to 11.2%, in hospital operative mortality rates after adjusting for patients' pre-operative health. Despite such variation, 118 of 120 hospitals (98%) performed at a rate that did not differ significantly from the statewide average.
- No hospital performed statistically significantly "Better" than the state average in terms of risk-adjusted operative mortality, but two hospitals performed "Worse" than the state average (shown in the following table alphabetically):

Hospitals with "Worse" Performance Ratings Based on Risk-adjusted Operative Mortality Rates, 2008

Hospital	Region
California Pacific Medical Center - Pacific Campus	San Francisco Bay Area & San Jose
Centinela Hospital Medical Center	Greater Los Angeles

2007-2008 Mortality Findings by Surgeon:

- There were 659 operative deaths among 28,711 isolated (non-salvage) CABG surgeries in 2007-2008.
- The operative mortality rate for isolated CABG surgery in California for 2007-2008 combined was 2.30%, compared to 2.4% for 2005-2006. The rate for 2003-2004 was 3.1%.
- There was significant variation, from 0% to 100%, in surgeon operative mortality rates after adjusting for patients' pre-operative health. Despite such variation, 269 of 279 surgeons (96%) performed at a rate that did not differ significantly from the statewide average.
- Two surgeons performed statistically significantly "Better" than the state average in terms of risk-adjusted operative mortality, while eight surgeons performed "Worse" than the state average (shown in the following table alphabetically):

Surgeons with "Better" Performance Ratings Based on Risk-adjusted Operative Mortality Rates, 2007-2008	
Surgeon	**Region**
Chaugle, Hannan	San Francisco Bay Area & San Jose
Gottner, Robert J.	Greater Los Angeles

Surgeons with "Worse" Performance Ratings Based on Risk-adjusted Operative Mortality Rates, 2007-2008	
Surgeon	**Region**
Gundry, Steven R.	Greater Los Angeles
Howden, Frederick M.	Greater San Diego
Malekmehr, Farshad	San Fernando Valley, Antelope Valley, Ventura & Santa Barbara; Greater Los Angeles
Oka, Tomomi	San Francisco Bay Area & San Jose
Peck, Eric A.	Central California
Perelman, Michael	Greater San Diego
Talieh, Yahya J.	Central California
Yokoyama, Taro	Greater Los Angeles

2007-2008 Stroke Findings by Hospital:

- 411 of the 28,711 patients (1.43%) who underwent isolated CABG surgery experienced a post-operative stroke, similar to the national rate of 1.4% reported by the Society of Thoracic Surgeons.[4]

- There is wide variation in post-operative stroke rates among hospitals after adjusting for patients' pre-operative conditions. Hospital risk-adjusted post-operative stroke rates ranged from 0% to 6.1%, and 115 of 122 hospitals (94%) performed at a rate that did not differ significantly from the statewide average.

[4] Shahian DM, O'Brien SM, Filardo G, et al. The Society of Thoracic Surgeons 2008 cardiac surgery risk models: part 1—coronary artery bypass grafting surgery. Ann Thorac Surg 2009; 88:S2-22.

- One hospital performed "Better" than the state average on post-operative stroke, and six hospitals performed "Worse" than the state average (shown in the following table alphabetically):

Hospitals with "Better" Performance Ratings Based on Risk-adjusted Post-operative Stroke Rates, 2007-2008	
Hospital	**Region**
Alta Bates Summit Medical Center - Summit Campus	San Francisco Bay Area & San Jose

Hospitals with "Worse" Performance Ratings Based on Risk-adjusted Post-operative Stroke Rates, 2007-2008	
Hospital	**Region**
Bakersfield Memorial Hospital	Central California
Dominican Hospital	San Francisco Bay Area & San Jose
Good Samaritan Hospital - San Jose	San Francisco Bay Area & San Jose
Providence Tarzana Medical Center	San Fernando Valley, Antelope Valley, Ventura & Santa Barbara
Scripps Memorial Hospital - La Jolla	Greater San Diego
Tri-City Medical Center	Greater San Diego

2008 Internal Mammary Artery (IMA) Usage Findings by Hospital:

- The IMA is the preferred conduit for CABG surgery of the left anterior descending (LAD) artery. Hospitals with high rates of IMA use are providing high quality of care to their patients. California had a 95.9% IMA usage rate in 2008, compared to 89.6% for 2003. The rates for 2007, 2006, 2005, and 2004 were 93.7%, 93.3%, 92.4%, and 90.1% respectively.[5]

- Five California hospitals had IMA usage rates that were significantly lower than the state average and were given "low" performance ratings. There is no consensus on what an optimum usage rate should be, so performance ratings were not given for very high rates. The lower performing hospitals are listed in the following table alphabetically:

[5] The increase in the statewide IMA usage rate from 93.6% in 2007 to 95.8% in year 2008 is partly due to excluding patients who did not have the left anterior descending (LAD) artery bypassed from the denominator. This was a new exclusion criterion for 2008, and if not used, the statewide IMA usage rate would be 94.4%.

Hospitals with "Low" IMA Usage, 2008	
Hospital	**Region**
Antelope Valley Hospital	San Fernando Valley, Antelope Valley, Ventura & Santa Barbara
Beverly Hospital	Greater Los Angeles
Enloe Medical Center	Sacramento Valley & Northern California Region
St. Helena Hospital	San Francisco Bay Area & San Jose
Sutter Medical Center of Santa Rosa	San Francisco Bay Area & San Jose

Effect of Hospital Volume on CABG Outcomes

- A small, but statistically significant association was found between hospitals' isolated CABG surgery volume and their risk-adjusted operative mortality rates.

- No statistically significant association was found between hospitals' CABG surgery volume (either isolated or total CABG surgery) and their risk-adjusted post-operative stroke rates.

Percutaneous Coronary Intervention vs. CABG Utilization and Outcomes Findings

- In California, utilization of percutaneous coronary interventions (PCIs), such as angioplasty with stent insertion, increased by 14% from 1997 to 2009, peaking in 2005 when total PCI volume reached 60,709. Since then utilization has dropped each year, with 50,704 procedures performed in 2009.

- Between 1997 and 2009, the number of isolated CABG surgeries dropped by 53%, and the observed in-hospital mortality rate for isolated CABG surgeries decreased from 3.1% to 1.7%. However, the observed in-hospital mortality rate for PCIs increased from 1.7% to 1.9%, surpassing in-hospital mortality for isolated CABG surgery in California for the first time.