

## Trends in Cardiac Care in California, 1988 to 2008

### Part I: Trends in Utilization and Resources



#### Executive Summary

Acute heart attacks have been a leading cause of death in the U.S. and in California for many decades although, for a variety of reasons, mortality rates recently began to drop. This report looks at whether patient demand for hospital-based cardiac care has declined and how the supply of specialized cardiovascular facilities and physicians has responded. It compares twenty-year trends from 1988 through 2008 in hospitalizations for acute heart attacks, use of the main hospital-based treatments for coronary artery disease, the number of licensed cardiac care facilities, and the number of physicians who are board certified for cardiac care over these years.

#### Findings include:

- The number of hospitalizations for heart attack gradually increased over the past twenty years in California, even though the rate of heart attacks per 1,000 people in the population dropped.
- The use of coronary artery bypass graft (CABG) surgery peaked in the mid to late 1990s while the use of percutaneous transluminal coronary angioplasty (PTCA) peaked between 2004 and 2006.
- The number of cardiac operating rooms and cardiac catheterization laboratories licensed by California hospitals continued to increase, in spite of declines in the number of CABG and PTCA procedures. OSHPD data show that hospitals have compensated by increasing the use of these facilities for procedures other than CABG and PTCA.
- The number of board certified cardiologists also continued to increase. Information about how or whether they have compensated by caring for other types of patients is not currently available.

#### Background

Nationally the prevalence of coronary artery disease (CAD) has been declining over recent decades, as have mortality rates for “heart attack” (acute myocardial infarction, AMI).<sup>1</sup> These trends may be attributable to improvements in medical and surgical treatments<sup>2,3</sup>, as well as declining prevalence of risk factors for CAD. For example, in California, the percentage of the population that smokes daily declined from 12.7% in 1995 to 8.9% in 2008.<sup>4</sup>

The use of CABG to restore circulation to the heart muscle increased steadily until the mid-1990s then began to decline as improvements in PTCA were introduced such as use of

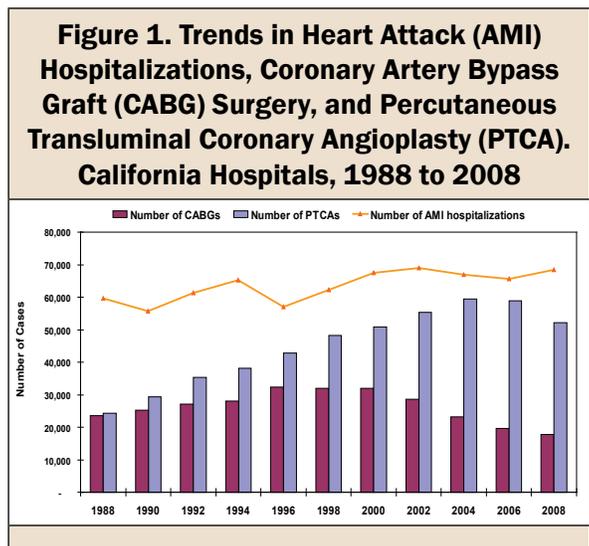
clot-preventing drugs within the stents. The early 1990s saw the introduction of effective cholesterol-lowering drugs, known as statins, and stents to extend the length of time coronary arteries remain open after the procedure.

CABG was once among the most frequently performed surgical procedures nationally (aside from childbirth-related procedures), but there has been a significant decline in its use. Reasons for this drop might include falling rates of CAD in the population and/or the increased use of PTCA interventions (with the utilization of CABG surgery for the more complex cases).<sup>5</sup> The shift toward the use of PTCA has decreased demand for specialized cardiac services facilities, reduced the need for the services of cardiothoracic surgeons, and raised concerns that falling patient numbers will result in poorer outcomes.<sup>6,7</sup>

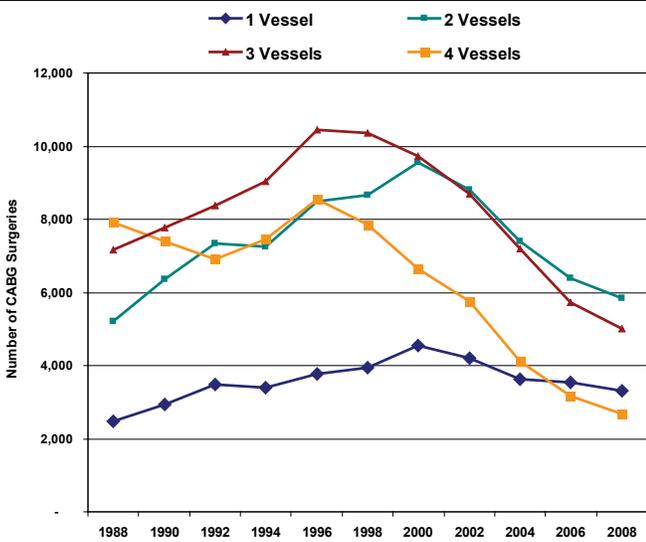
This report uses California hospital data reported to the Office of Statewide Health Planning and Development (OSHPD) to describe trends over the past two decades in number of hospitalizations related to AMI, CABG and PTCA procedures, and the numbers of licensed cardiac treatment facilities (see Technical Notes). In addition, it used data from the American Board of Medical Specialties to report trends in the numbers of physicians that are board certified in cardiology specialties in the state.

#### Trends in AMI Hospitalizations and CABG and PTCA Procedures

**Number.** The actual number of hospitalizations reported per year for AMI increased 14.7% during the two decades covered by this report, from 59,655 in 1988 to 68,424 in 2008,



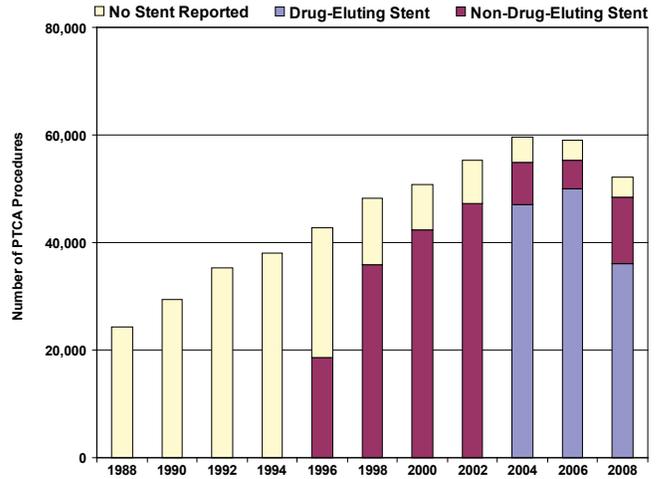
**Figure 2. Number of CABG Surgeries, by Number of Vessels Involved. California Hospitals, 1988 to 2008**



although the rate per 1,000 people in California declined 15%, from 2.1 to 1.8. The number of CABG surgeries performed in California hospitals increased 36.6% between 1988 and 1996 (from 23,604 to 32,248 annually), then declined 45% to 17,705 procedures in 2008. In contrast, the number of PTCA procedures more than doubled between 1988 and 2004, rising from 24,255 to 59,511. After 2004 these numbers dropped, reaching 52,089 in 2008. (Figure 1, Tables 1 and 2)

The decline in number of CABG surgeries began in 1996 for 3-vessel and 4-vessel procedures. For 1-vessel and 2-vessel cases the decline began later, in 2000 (Figure 2, and Table 1). For PTCA procedures there was rapid adoption of stents, and later drug-eluting stents containing anti-coagulation materials to prevent blood clots from forming around the stents, as these improved methods became available. (Figure 3, Table 1)

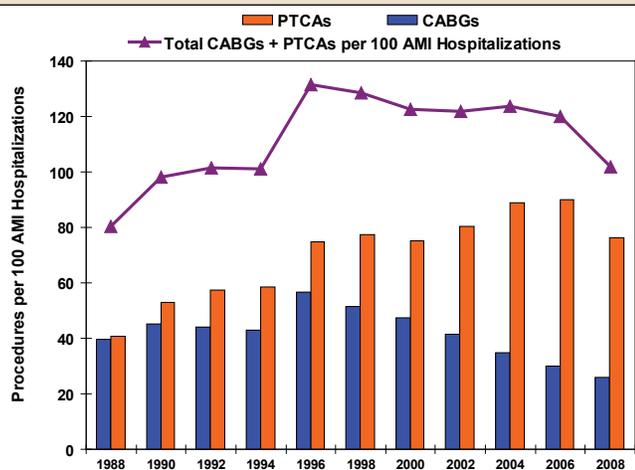
**Figure 3. Number of PTCA Procedures that Involved Placement of a Stent, by Type of Stent. California Hospitals, 1988 to 2008**



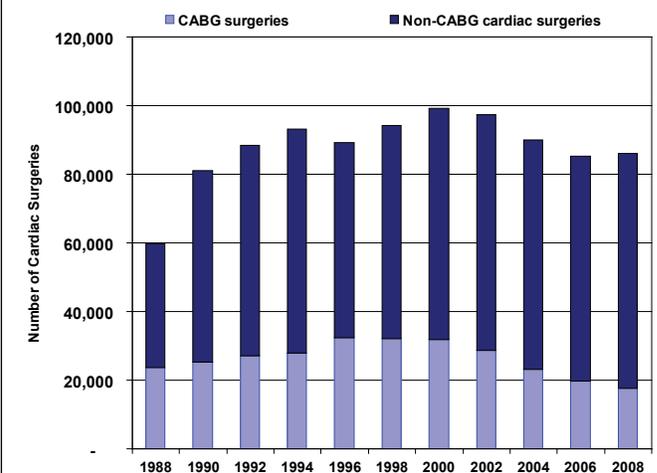
**Relationship of Procedure Number to Numbers of AMI Hospitalizations.** The number of CABGs performed per 100 AMI hospitalizations increased up to the year 1996, and then began a steady decline. The number of PTCAs performed per 100 AMI hospitalizations increased steadily until about 2006. After that year, their use began to decline also. (Figure 4, Table 3)

During the twenty years covered by this report the PTCA procedure did not simply replace CABG surgery. Instead, its use led to a net increase in the number of cardiac procedures. Combined, the total number of CABG procedures plus PTCA procedures per 100 AMI hospitalizations was about 100 in 1994, then increased to more than 130 in 1996 and remained between 120 and 130 until dropping back to just over 100 in 2008. (Figure 4, Table 3)

**Figure 4. Number of CABG and PTCA Procedures per 100 AMI Hospitalizations in California Hospitals, 1988 to 2008**



**Figure 5. Number of Cardiac Surgeries Performed in California Hospitals, 1988 to 2008**



## Cardiac Care Capacity and Utilization

**Cardiac Operating Rooms.** CABG surgeries accounted for 40% of all cardiac surgery in 1988 and only 20% by 2008. The total number of cardiac surgeries, including both CABG and non-CABG procedures, had little net change from 1992 onward. (Figure 5, Table 4)

The number of cardiac operating rooms licensed by California hospitals rose from 193 in 1988 to 287 in 2008 (a 49% increase). This upward trend may have leveled off beginning in 2004. If all types of cardiac surgery are included, there were 309 surgeries per cardiac operating room in 1988; this utilization rate rose to 402 by 1992, and then gradually declined back to 300 by 2008. Considering CABG surgery alone, there were about 120 CABGs per operating room per year up to the year 2000 and this utilization rate dropped to 62 per room by 2008. (Figure 6, Table 4)

**Cardiac Catheterization Laboratories.** Between 1988 and 2000 the total number of therapeutic (for treatment rather than for diagnosis) cardiac catheterizations performed in California hospitals, including both PTCAs and non-PTCAs, increased dramatically (216%) from 29,461 to 93,141. After 2004 the number increased just 5% more, reaching 99,377 in 2008. PTCAs accounted for 82% of all the hospital-based therapeutic catheterizations in 1988, but only 52% by 2008. (Figure 7, Table 4)

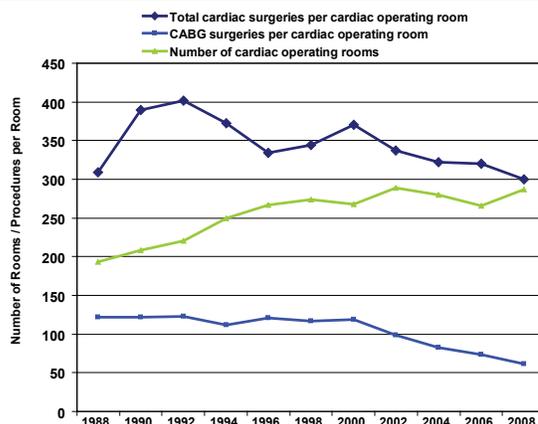
The number of hospital-based cardiac catheterization laboratories increased 79% between 1988 and 2008, from 213 to 382 statewide. If all types of therapeutic cardiac catheterization are included, the utilization rate rose from 138 procedures per catheterization lab in 1988 to 299 by the year 2000. Thereafter, the rate declined by 13%, to 260 in 2008. Considering PTCAs only, the utilization rate increased 53% between 1988 and 2004, rising from 114 to 175 per catheterization lab per year. After 2004 the rate began to decline, falling to 136 per lab in 2008. (Figure 8, Table 4)

## Supply of Physicians and Surgeons with Cardiology Specialization

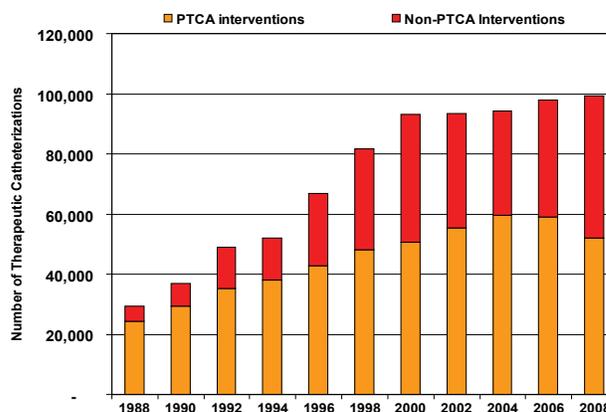
From 1996 to 2008 the number of physicians who were board certified in cardiovascular disease increased 36% (from 1,634 to 2,226) and the number board certified in interventional cardiology increased 73% from 2002 to 2008 (from 286 to 494).<sup>8</sup> The number of cardiac surgeons performing CABG in California was 302 from 2003 through 2004 and 6% lower (284) from 2005 through 2006.<sup>9</sup> (Table A)

However, the demand for these specialties appears to have declined in relation to the supply of physicians. The number of AMI hospitalizations per physician declined 11% for cardiovascular disease specialists (from 35 to 31) and the number of PTCAs per interventional cardiologist declined 45% (from 193 to 105 per physician) for those years with data available. The number of CABG surgeries per surgeon was 76.9 in 2004 and 69.2 in 2006, a reduction of 10% despite the decline in the number of surgeons performing this procedure. (Table A)

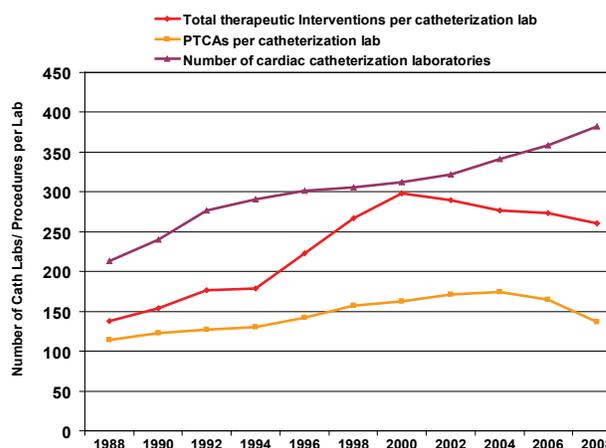
**Figure 6. Number of Cardiac Operating Rooms and their Utilization for Cardiac Surgery. California Hospitals, 1988 to 2008**



**Figure 7. Number of PTCAs and Other Therapeutic Cardiac Catheterizations Performed in California Hospitals, 1988 to 2008**



**Figure 8. Number of Cardiac Catheterization Laboratories and their Utilization for PTCA and Other Therapeutic Interventions. California Hospitals, 1988 to 2008**



**Table A: Supply of Board Certified Cardiology Specialist Physicians in California, 1996-2008**

		1996	1998	2000	2002	2004	2006	2008	% Change
<b>Number of Physicians Board Certified</b>	Board Certified in Cardiovascular Disease*	1,634	1,731	1,879	1,974	1,949	2,068	2,226	36.2
	Board Certified in Interventional Cardiology				286	414	451	494	72.7
	Cardiac Surgeon**					302	284		---
<b>Number of Cardiac Cases and Procedures</b>	AMI Hospitalizations	57,061	62,316	67,426	68,901	66,878	65,553	68,424	19.9
	CABGs	32,248	32,024	31,913	28,576	23,220	19,647	17,705	-45.1
	PTCAs	42,762	48,140	50,755	55,270	59,511	58,968	52,089	21.8
<b>AMI Hospitalizations per Physician</b>	AMI Hospitalizations per CVD Physician	34.9	36.0	35.9	34.9	34.3	31.7	30.7	-12.0
	AMI Hospitalizations per Interventional Cardiologist				240.9	161.5	145.4	138.5	-42.5
	AMI Hospitalizations per Cardiac Surgeon					221.5	230.8		---
<b>Procedures per Physician</b>	CABGs per Cardiac Surgeon					76.9	69.2		---
	PTCAs per Interventional Cardiologist				193.25	143.75	130.75	105.44	-45.4

\*From American Board of Medical Specialties. Available at: <http://shopping.netsuite.com/s.nl/c.362273/sc.2/.f>.

\*\*From OSHPD surgeon-level reports on coronary artery bypass graft surgery. Available at: [http://www.oshpd.ca.gov/HID/Products/Clinical\\_Data/CABG/Index.html](http://www.oshpd.ca.gov/HID/Products/Clinical_Data/CABG/Index.html)

## Summary

This analysis of California hospital patient data found that during the past two decades there has been a decline in the rate of AMI hospitalizations per 1,000 people in the population. However, the number of AMI cases requiring hospitalization each year has steadily increased.

In California, the use of CABG surgery began to decline in 1996. Use of PTCA continued to increase until 2004, when it too began to decline. The use of PTCA, especially after the introduction of stents, did not simply replace CABG surgery as a treatment choice. From 1996 onward there was a steady increase in the total numbers of procedures—CABGs plus PTCAs—that were performed per 100 AMI hospitalizations, suggesting that patients were receiving more procedures overall.

PTCA use began to decline between 2004 and 2006. This decline is consistent with reports published elsewhere showing that revascularization procedures (such as CABG and PTCA) sometimes offer no advantage over medical treatment of stable coronary artery disease (that is, treatment by medications).<sup>10</sup>

During the twenty years covered by this report, the number of cardiac operating rooms and of cardiac catheterization laboratories continued to increase. At the same time, their use for CABG surgeries has been dropping since about 1998 and for PTCAs since about 2006. However, that does not mean they are being under-utilized; the number of other procedures performed in these specialized facilities appears to have increased to compensate.

The number of specialized cardiac physicians also continued to increase faster than the volume of AMI hospitalizations. However, it appears that the number of cardiac surgeons may have declined. Data were not available to assess how their caseloads may be changing.

## Technical Notes

**Data Sources.** The analyses were carried out using data from the following sources:

1. Hospital Patient Discharge Data (PDD) for even-numbered years, 1988 to 2008, collected by the Office of Statewide Health Planning and Development. Data for AMI patients and numbers of hospital-based CABG surgeries and PTCA procedures.
2. Annual Utilization Hospital Report (AUHR), for even-numbered years, 1988 to 2008, collected by the Office of Statewide Health Planning and Development. Cardiac operating rooms and cardiac catheterization laboratories. Cardiac surgeries and cardiac catheterization procedures.
3. Annual Reports, American Board of Medical Specialties. Counts of physicians, online at: <http://shopping.netsuite.com/s.nl/c.362273/sc.2/.f>.
4. *Coronary Artery Bypass Graft Surgery in California: 2003-2004 Hospital & Surgeon Data*. Sacramento, 2007. And *Coronary Artery Bypass Graft Surgery in California: 2005-2006 Hospital & Surgeon Data*. Sacramento, 2009. Office of Statewide Health Planning and Development. Counts of physicians performing CABG surgery in California. Available at: [http://www.oshpd.ca.gov/HID/Products/Clinical\\_Data/CABG/index.html](http://www.oshpd.ca.gov/HID/Products/Clinical_Data/CABG/index.html)). There are small differences between these reports and the present Health Facts report in frequencies of CABG and PTCA procedures. These are due to exclusion of patients under age 18 from the former.
5. California Department of Finance, Demographic Unit. Population estimates for use in calculating population rates.

**Exclusions.** The following were not included in the analyses:

- Admissions for birth or child delivery (MDC 14 or 15)
- Cases that were transferred to another hospital (disposition = 05), to avoid double-counting of patients reported by two facilities

**Coding of AMI, CABG, PTCA.** Cases of AMI were identified by the following ICD-9 diagnosis codes, in the principal or any secondary diagnosis field:

- For 1988 Data: 410.1, 410.2, 410.3, 410.4, 410.5, 410.6, 410.7, 410.8, 410.9.
- For 1990 to 2008 Data: 410.01, 410.11, 410.21, 410.31, 410.41, 410.51, 410.61, 410.71, 410.81, 410.91.

CABG surgeries were identified by the following ICD-9 procedure codes: 36.10, 36.11, 36.12, 36.13, 36.14, 36.15, 36.16, 36.17, 36.19. Those with surgical procedures in addition to CABG (that is, the non-isolated CABG surgeries) were included because they would constitute utilization of cardiac operating rooms. PTCA procedures were identified by the following ICD-9 procedure codes: 36.00, 36.01, 36.02, 36.03, 36.05, 36.06, 36.07, 36.09, 00.66. Insertion of a stent was identified by procedure code: 36.06 and insertion of a drug-eluting stent by code: 36.07.

All analyses were completed using SAS, version 9.2.

**Hospitalizations per Patient.** In this Health Facts report the term “hospitalization” refers to a single episode of admission to a hospital, followed by a discharge. Some patients have more than one hospitalization in a given year. In this report we show trends and rates for the numbers of hospitalizations, rather than for numbers of individual patients. We used this approach because: (1) the patient identifiers that are needed to link up multiple hospitalizations for individual patients only became available in 1994 and (2) upon analysis we found there was very little difference in average number of admissions per year between males and females or between different age and race/ethnic groups. On average, AMI patients had 1.15 hospitalizations per year, varying between 1.11-1.28 during the years 1994 and 2008, depending on age, gender, or population group.

## Acknowledgements

Mary Tran, Ph.D., M.P.H., conducted analyses of OSHPD patient data. Karen Henderson conducted analyses of Annual Utilization data. Editorial review and graphic design were contributed by Ron Spingarn, Jonathan Teague, Irene Borgfeldt, Victoria Stehl, and David Byrnes of the Office of Statewide Health Planning and Development’s Healthcare Information Division. Valuable consultation about CABG data was provided by Holly Hoegh, Ph.D. This is one of a series of OSHPD Health Facts prepared by the Office of Statewide Health Planning and Development’s Healthcare Information Division ([www.oshpd.ca.gov](http://www.oshpd.ca.gov)). The Healthcare Information Division and its publications and services are available at [www.oshpd.ca.gov/HID/DataFlow](http://www.oshpd.ca.gov/HID/DataFlow).

## References

- <sup>1</sup> *NHLBI Morbidity and Mortality Chart Book*. Bethesda, MD: National Heart, Lung, and Blood Institute; 2004.
- <sup>2</sup> Lightwood JM, Glantz SA. Declines in Acute Myocardial Infarction after smoke-free laws and individual risk attributable to secondhand smoke. *Circulation*. 2009;120:1373-79.

<sup>3</sup> Cardiovascular Health Branch, CDC. Achievements in public health, 1900-1999: Decline in deaths from heart disease and stroke—United States, 1900-1999. *MMWR*. 1999;48(30):649-656.

<sup>4</sup> California Behavior Risk Factors Surveillance Survey [online database]. Sacramento, CA: Survey Research Group. Available at: <http://apps.nccd.cdc.gov/brfss/>.

<sup>5</sup> Hannan EL, Racz MJ, Gold J, Cozzens K, Stamato NJ, Powell T, Hibberd M, Walford G. Adherence of catheterization laboratory cardiologists to American College of Cardiology/American Heart Association Guidelines for percutaneous coronary interventions and coronary artery bypass graft surgery. *Circulation*. 2010;121:267-75.

<sup>6</sup> Roberts CS. Oversupply of cardiothoracic surgeons: Its consequences and correction. *CTSnet* (Cardiothoracic Surgery Network). 2004. Available at: <http://www.ctsnet.org/sections/newsandviews/inmyopinion/articles/article-7.html>.

<sup>7</sup> Wilson CT, Fisher ES, Welch HG, Siewers AE, Lucas FL. U.S. Trends in CABG Hospital Volume: The effect of adding cardiac surgery programs. *Health Affairs*. 2007;26(1):162-68.

<sup>8</sup> Counts of Board Certified physicians were obtained from the American Board of Medical Specialties. Reports online at: <http://shopping.net-suite.com/s.nl/c.332673/sd.2/f>.

<sup>9</sup> Office of Statewide Health Planning and Development. *Coronary Artery Bypass Graft Surgery in California: 2003-2004 Hospital & Surgeon Data*. Sacramento, 2007. And *Coronary Artery Bypass Graft Surgery in California: 2005-2006 Hospital & Surgeon Data*. Sacramento, 2009. Available at: [http://www.oshpd.ca.gov/HID/Products/Clinical\\_Data/CABG/index.html](http://www.oshpd.ca.gov/HID/Products/Clinical_Data/CABG/index.html).

<sup>10</sup> Boden WE, O'Rourke RA, Teo KK, Martigan PM, Maron DJ, Kostuk WJ, Knudtson M, Dada M, Casperson P, Harris CL, Chaitman BT, Shaw L, Gosselin G, Nawaz S, Title LM, Gau G, Blaustein AS, Booth DC, Bates ER, Spertus JA, Berman DS, Mancini GBJ, Weintraub WS. Optimal medical therapy with or without PCI for stable coronary disease. *N Engl J Med*. 2007;365.



# APPENDIX

**Table 1. Number of Patient Encounters For AMI, CABG, and PTCA, 1988-2008**

		1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008
All Hospitalizations		3,596,722	3,711,793	3,712,055	3,625,489	3,632,167	3,725,422	3,816,887	3,916,363	3,957,640	3,997,182	4,017,998
		<b>1988</b>	<b>1990</b>	<b>1992</b>	<b>1994</b>	<b>1996</b>	<b>1998</b>	<b>2000</b>	<b>2002</b>	<b>2004</b>	<b>2006</b>	<b>2008</b>
AMI Patient	Hospitalizations	59,655	55,765	61,397	65,231	57,061	62,316	67,426	68,901	66,878	65,553	68,424
Encounters:	Emergency Room (ER) Visits										1259	1299
	Ambulatory Surgery Center (ASC) Visits										329	635
		<b>1988</b>	<b>1990</b>	<b>1992</b>	<b>1994</b>	<b>1996</b>	<b>1998</b>	<b>2000</b>	<b>2002</b>	<b>2004</b>	<b>2006</b>	<b>2008</b>
CABGs:	Total	23,604	25,237	27,029	27,970	32,248	32,024	31,913	28,576	23,220	19,647	17,705
	Non-isolated CABG	880	781	895	937	1,094	1,091	978	932	885	754	731
	Isolated CABG	22,724	24,456	26,134	27,033	31,154	30,933	30,935	27,644	22,335	18,893	16,974
	No CABG	3,573,118	3,686,556	3,685,026	3,597,519	3,599,919	3,693,398	3,784,974	3,887,787	3,934,420	3,977,537	4,000,293
		<b>1988</b>	<b>1990</b>	<b>1992</b>	<b>1994</b>	<b>1996</b>	<b>1998</b>	<b>2000</b>	<b>2002</b>	<b>2004</b>	<b>2006</b>	<b>2008</b>
	1 Vessel	2,487	2,938	3,470	3,400	3,761	3,951	4,538	4,188	3,628	3,544	3,295
	2 Vessels	5,222	6,348	7,334	7,264	8,490	8,659	9,554	8,810	7,388	6,378	5,840
	3 Vessels	7,161	7,764	8,384	9,023	10,443	10,355	9,718	8,686	7,191	5,718	5,018
	4 Vessels	7,905	7,392	6,912	7,447	8,553	7,864	6,649	5,744	4,109	3,172	2,682
	No CABG	3,573,118	3,686,556	3,685,026	3,597,519	3,599,919	3,693,403	3,784,975	3,887,789	3,934,421	3,977,536	4,000,293
		<b>1988</b>	<b>1990</b>	<b>1992</b>	<b>1994</b>	<b>1996</b>	<b>1998</b>	<b>2000</b>	<b>2002</b>	<b>2004</b>	<b>2006</b>	<b>2008</b>
PTCAs:	Total	24,255	29,437	35,337	38,056	42,762	48,140	50,755	55,270	59,511	58,968	52,089
	Drug-Eluting Stent								19	46,985	50,052	36,099
	Non-Drug-Eluting Stent					18,537	35,792	42,411	47,278	8,012	5,210	12,319
	No Stent Reported	24,255	29,437	35,337	38,056	24,225	12,348	8,344	7,973	4,514	3,706	3,671
	No PTCA	3,572,467	3,682,356	3,676,718	3,587,433	3,589,405	3,677,282	3,766,132	3,861,093	3,898,129	3,938,214	3,965,909

Emergency Room (ER), Ambulatory Surgery Center (ASC), and Percutaneous Transluminal Coronary Angioplasty (PTCA) data for some years not available.

**Table 2. Hospitalizations per 10,000 Population, 1988-2008**

	1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008
For AMI	21.01	18.70	19.81	20.69	17.85	18.96	19.77	19.47	18.31	17.54	17.89
For CABG	8.31	8.46	8.72	8.87	10.09	9.74	9.36	8.07	6.36	5.26	4.63
For PTCA	8.54	9.87	11.40	12.07	13.38	14.65	14.88	15.61	16.29	15.77	13.62

**Table 3. Procedures per 100 AMI Hospitalizations, 1988-2008**

	1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008
CABGs	39.57	45.26	44.02	42.88	56.51	51.39	47.33	41.47	34.72	29.97	25.88
PTCAs	40.66	52.79	57.55	58.34	74.94	77.25	75.28	80.22	88.98	89.95	76.13
Combined CABGs + PTCAs	80.2	98.0	101.6	101.2	131.5	128.6	122.6	121.7	123.7	119.9	102.0

**Table 4. Capacity and Utilization of Cardiac Operating Rooms and Catheterization Laboratories, 1988-2008**

	1988	1990	1992	1994	1996	1998	2000	2002	2004	2006	2008
AMI Hospitalizations	59,655	55,765	61,397	65,231	57,061	62,316	67,426	68,901	66,878	65,553	68,424
<b>CABG</b>	<b>1988</b>	<b>1990</b>	<b>1992</b>	<b>1994</b>	<b>1996</b>	<b>1998</b>	<b>2000</b>	<b>2002</b>	<b>2004</b>	<b>2006</b>	<b>2008</b>
CABG Surgeries (from PDD*)	23,604	25,237	27,029	27,970	32,248	32,024	31,913	28,576	23,220	19,647	17,705
Non-CABG Cardiac Surgeries (AUHR** total minus CABGs reported to PDD)	36,051	55,765	61,397	65,231	57,061	62,316	67,426	68,901	66,878	65,553	68,424
Total Cardiac Surgeries	59,655	81,002	88,426	93,201	89,309	94,340	99,339	97,477	90,098	85,200	86,129
Cardiac Operating Rooms	193	208	220	250	267	274	268	289	280	266	287
	<b>1988</b>	<b>1990</b>	<b>1992</b>	<b>1994</b>	<b>1996</b>	<b>1998</b>	<b>2000</b>	<b>2002</b>	<b>2004</b>	<b>2006</b>	<b>2008</b>
Cardiac surgeries per cardiac operating room (from AUHR)	309.1	389.4	401.9	372.8	334.5	344.3	370.7	337.3	321.8	320.3	300.1
CABG surgeries per cardiac operating room (from PDD)	122.3	121.3	122.9	111.9	120.8	116.9	119.1	98.9	82.9	73.9	61.7
Number of cardiac operating rooms (from AUHR)	193	208	220	250	267	274	268	289	280	266	287
Percent of cardiac surgeries were CABG	39.6	31.2	30.6	30.0	36.1	33.9	32.1	29.3	25.8	23.1	20.6
<b>PTCA</b>	<b>1988</b>	<b>1990</b>	<b>1992</b>	<b>1994</b>	<b>1996</b>	<b>1998</b>	<b>2000</b>	<b>2002</b>	<b>2004</b>	<b>2006</b>	<b>2008</b>
PTCA Interventions (from PDD)	24,255	29,437	35,337	38,056	42,762	48,140	50,755	55,270	59,511	58,968	52,089
Non-PTCA Interventions (AUHR total minus PTCAs reported to PDD)	5,206	7,618	13,648	13,950	24,154	33,405	42,386	38,108	34,686	38,868	47,288
Total Therapeutic Interventions	29,461	37,055	48,985	52,006	66,916	81,545	93,141	93,378	94,197	97,836	99,377
Total Diagnostic Catheterizations	116,045	129,306	143,203	139,222	158,530	173,616	182,286	170,775	165,696	167,023	162,473
Cardiac Catheterization Laboratories	213	240	277	291	301	306	312	322	341	358	382
	<b>1988</b>	<b>1990</b>	<b>1992</b>	<b>1994</b>	<b>1996</b>	<b>1998</b>	<b>2000</b>	<b>2002</b>	<b>2004</b>	<b>2006</b>	<b>2008</b>
Therapeutic Interventions per Cath Lab (from AUHR)	138.3	154.4	176.8	178.7	222.3	266.5	298.5	290.0	276.2	273.3	260.1
PTCAs per Cath Lab (from PDD)	113.9	122.7	127.6	130.8	142.1	157.3	162.7	171.6	174.5	164.7	136.4
Number of Cardiac Catheterization Laboratories	213	240	277	291	301	306	312	322	341	358	382
Percent of Therapeutic Interventions were PTCA	82.3	79.4	72.1	73.2	63.9	59.0	54.5	59.2	63.2	60.3	52.4

\*Patient Discharge Data (PDD); \*\*Annual Utilization Hospital Report (AUHR).



**Edmund G. Brown Jr.**  
Governor, State of California

**Diana S. Dooley**  
Secretary, California Health & Human Services Agency

**David M. Carlisle, M.D., Ph.D.**  
Director, Office of Statewide Health Planning & Development

**oshpd** Office of Statewide Health  
Planning and Development

400 R Street, Suite 250, Sacramento, CA 95811  
[www.oshpd.ca.gov](http://www.oshpd.ca.gov)