

THE STATE OF CARDIAC REVASCULARIZATION OUTCOMES REPORTING:



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The State of Cardiac Revascularization Outcomes Reporting:

Executive Summary

The State of Cardiac Revascularization Outcomes Reporting serves as a resource for the California Coronary Artery Bypass Graft (CABG) Outcomes Reporting Program's (CCORP) Clinical Advisory Panel and program staff as they consider future strategies and objectives for publicly reporting cardiac revascularization outcomes. Based on information from interviews and program websites, this report describes efforts of other states (Massachusetts, New Jersey, New York, and Pennsylvania) that publicly report cardiac revascularization outcomes. It also presents the perspectives of 17 California stakeholders (representing consumers, payers, purchasers, providers, and researchers) about CCORP's progress, challenges, and opportunities. The key findings are as follows:

- California is unique in its reporting of internal mammary artery usage and post-operative stroke, whereas other states are unique in their reporting of readmission rates, average length of stay, average hospital charges, and aggregate hospital-acquired infections related to CABG surgery. California plans to join New York and Pennsylvania in reporting CABG with valve surgery outcomes in the coming years.
- California is beginning to explore publicly reporting percutaneous coronary intervention outcomes (using clinical data) through a pilot project housed at the Department of Public Health. Although it lags behind the four leading states (including New Jersey, which has three years of data available for its first public report), California stakeholders strongly support measuring and reporting PCI outcomes to comprehensively assess cardiac revascularization care in the state.
- California's CABG surgery medical record auditing process is similar to New York's process where a sample of hospitals is audited based on suspected over- or under-reporting of risk factors or their status as preliminary or near outliers. A small number of randomly selected hospitals is also audited. California audits all isolated CABG deaths in the selected hospitals and the number of patient records selected within a hospital is proportional to its isolated CABG volume (typically 40-160 cases). These practices are consistent with best practices nationally.
- California stakeholders urged CCORP to re-invigorate its efforts to educate and communicate with consumers and payers, while still offering data that can be used by hospitals and surgeons for quality improvement.
- Establishing criteria for and measuring appropriateness of cardiac revascularization remains relatively unexplored across all states. OSHPD and CCORP have an opportunity to further develop and apply measures of appropriateness, especially given the interest of several stakeholders who offered their support during interviews.
- Despite the barriers posed by challenging state budgets, CCORP's colleagues in Massachusetts, New Jersey, New York, and Pennsylvania are interested in participating in a shared learning network to support their programs and to apply best practices. This cohort of program leaders believes there is much to be learned from each others' experiences despite program differences across states.

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BACKGROUND

The California CABG Outcomes Reporting Program (CCORP) was established by legislation in 2001³ and is housed within California's Office of Statewide Health Planning and Development (OSHDP). Using clinical data submitted by hospitals (based on definitions established by the Society of Thoracic Surgeons), CCORP publicly reports risk-adjusted hospital- and surgeon-specific outcomes of CABG surgery. Since CCORP's inception, CABG surgery mortality rates have declined by almost 25% (as of 2007). In its 2005-2006 public report, CCORP included internal mammary artery (IMA) usage rates and the 2007 public report will present rates of post-operative stroke for the first time. CCORP anticipates that future reports will include mortality rates associated with combined CABG and valve surgery. The authorizing statute does not specifically charge OSHDP with data collection and publication of outcomes related to a more common cardiac revascularization procedure: percutaneous coronary intervention (PCI), also known as angioplasty or stenting. The current legal opinion is that additional authorizing legislation is required to enable OSHDP to collect PCI registry data from all hospitals.

DATA SOURCES

This report includes information from:

- Massachusetts, New Jersey, New York, and Pennsylvania websites for their respective cardiac revascularization outcomes reporting programs.
- 60-minute interviews with those state program representatives.
- 15- to 60-minute interviews with 17 California stakeholders who represent consumers, payers, purchasers, providers and researchers.

¹ CCORP defines operative mortality as all deaths occurring in-hospital or death occurring anywhere after discharge, but within 30 days of CABG surgery.

² State of California, Office of Statewide Health Planning and Development. *The California Report on Coronary Artery Bypass Graft Surgery 2005-2006 Hospital and Surgeon Data*, Sacramento, CA: Office of Statewide Health Planning and Development, March 2009. Available at www.oshpd.ca.gov.

³ SB 680 (Figueroa), Chapter 898, October 14, 2001.

STATE CARDIAC REVASCULARIZATION OUTCOMES REPORTING EFFORTS

Cardiac revascularization includes both CABG surgery (performed by cardiothoracic surgeons) and PCI (performed by interventional cardiologists). The sources of data used to measure the quality of care for these procedures differ as do some of the variables used for risk-adjustment. Therefore, this report presents CABG reporting efforts separately from PCI reporting efforts.

STATE CABG OUTCOMES REPORTING EFFORTS

Four states, in addition to California, lead the nation in publicly reporting cardiac revascularization outcomes at the hospital and/or physician level: Massachusetts, New Jersey, New York, and Pennsylvania. Based on information from each of the four state's websites and interviews with program officers, California's program compares favorably in its methods for rigorous statistical analysis and data auditing. *Appendix C: Summary of State CABG Outcome Measures Publicly Reported* provides comparative information about the measures that each state publicly reports as of June 2010.

All states interviewed have experienced a drop in isolated-CABG surgery mortality since public reporting began (Table 1). Program similarities extend to rigorous auditing programs and use of clinical advisory groups. However, their methodologies for calculating outcomes differ. Although all states report isolated CABG mortality, their definitions of mortality differ (i.e., 30-day all-cause mortality vs. in-hospital mortality). They also report different secondary outcomes such as non-isolated CABG outcomes, readmission rates, hospital acquired infection (HAI) rates, and internal mammary artery (IMA) usage. Additionally, states diverge in their definitions of data elements. New York differs so substantially from Society of Thoracic Surgeons (STS) definitions in some cases that it receives pressure from hospitals to harmonize its definitions and data submission process with STS. Pennsylvania has relied on a vendor's proprietary software for data processing and management, and for risk-adjusting outcomes (although this will change in 2010 due to new statutory requirements).

Table 1: Summary of State CABG Surgery Outcomes Reporting Programs

	CA	MA	NJ	NY	PA
Program authorization	Legislative	Legislative	Regulatory	Regulatory	Legislative
Most recently reported 30-day CABG mortality rate	2.22% (2005-2006)	1.38% (2007-2008)	2.0% (2007)	1.92% (2005-2007)	2.4% (2007)
Isolated CABG Hospital Surgeon	✓ ✓	✓ ✓	✓ ✓	✓ ✓	✓ ✓
Non-isolated CABG Hospital Surgeon	Anticipate inclusion in future reports	-- --	Considering measuring/reporting	✓ ✓	✓ ✓
Other reported CABG-related measures	IMA usage; post-operative stroke	--	R-A LOS; statewide HAI related to CABG surgery	--	readmission within 7 and 30 days; avg. LOS; avg. charge; aggregate HAI

R-A=risk-adjusted; LOS=length of stay; HAI=hospital-acquired infection; IMA=internal mammary artery

State program officers (*Appendix A: Interview Respondents*) answered 10 questions during one-hour interviews about their state's current and future plans for reporting cardiac revascularization outcomes (*Appendix B: Interview Guide*). Table 2 provides a summary of each state's program characteristics.

- **No states plan to eliminate or revise their programs due to decreased CABG surgery mortality rates.** Each state contends with a budget crisis, which may provide a greater impetus for program change than decreased mortality rates.
- **None of the actions or efforts of national and professional organizations regarding CABG quality measures directly influence state program decisions.** Although state program officers noted that they evaluate new CABG-related measures as needed, the measurement efforts by organizations such as the National Quality Forum (NQF), Centers for Medicare and Medicaid Services (CMS), STS, and the Agency for Healthcare Research and Quality (AHRQ) do not drive their decisions.
- **No state program plans to add or retire quality measures at this time.** New Jersey is considering adding readmission rates to its public report, but needs to develop a methodology to attribute readmissions to the proper hospital. The interest in readmissions stems from in-state pressure as well as activity at the national level through the Centers for Medicare and Medicaid Services and a 2009 report issued by the National Association of Health Data Organizations. In addition, New Jersey recently added risk-adjusted average length of stay to its public report, along with statewide infection rates for deep-sternal wounds, leg wounds, thoracotomy wounds, septicemia, urinary tract, and pneumonia. New York and Massachusetts reported frustration with the timeliness of public reports due to delays inherent to including out-of-state deaths. However, these states do not plan to change their definition of 30-day mortality. Pennsylvania limits its mortality rate calculations to in-state deaths, and therefore experiences shorter delays in generating public reports.
- **State program officers noted other program changes such as modifying risk factors annually or perhaps adopting a hierarchical risk modeling approach.** New York uses data elements unique to its program rather than those based on the STS registry. According to the program officer, elements and definitions were developed over many years in collaboration with providers and the cardiac advisory panel to ensure there are clearly defined elements that use accessible documentation in medical records. This approach assures that reporting can be objectively audited. New York recently added hematocrit and post-operative temperature as a temporary module because preliminary research findings indicated that these intermediate outcome measures may be linked to higher CABG mortality. The results from this module will not be publicly reported, but can be used by hospitals for quality improvement. By contrast, the data elements and definitions used in Massachusetts and New Jersey are generally consistent with those used by STS. Pennsylvania has used a three-pronged approach to data collection and validation: 1) hospitals submitted demographic information, charges, and diagnosis and procedure codes on a quarterly basis to the state; 2) hospitals were required to use proprietary software (*MediQual Atlas Outcomes*TM) to abstract key clinical findings from medical records; and 3) in-state death certificate data were obtained to identify post-discharge deaths. Recent legislation now prohibits the state from requiring hospitals to use a single state-selected vendor for data abstraction. Pennsylvania has issued a Request

for Information to identify potential vendors that hospitals can select to submit their laboratory data for use in risk-adjusting patient outcomes.

- **No state programs are considering using composite measures to report CABG surgery outcomes.** Some program officers replied that they do not collect enough process measures to create a composite, and others noted that combining process and outcomes measures would be methodologically difficult and perhaps inappropriate. Another officer noted that, although STS developed a composite, it has not yet been endorsed for public reporting. Massachusetts reported that its theoretical and empirical comparison of composite measures of all-cause hospital mortality created by various vendors (which would include CABG surgery mortality) is under review by senior administrators.
- **When asked about unique aspects of their state's program, all program officers cited decreased mortality rates and rigorous auditing and data validation processes.** The auditing process appears to be similar among the four states, although the number of medical records audited per hospital varies (Table 2). For example, New Jersey currently samples 100 medical records per hospital and audits all elements whereas New York performs on-site audits of six hospitals (2008). New Jersey excludes salvage cases from its analysis as determined by a clinical panel of cardiologists and cardiac surgeons. For all New York hospitals, medical record documentation reviews are conducted for all cases diagnosed as having cardiogenic shock, hepatic failure, unstable condition, or stent thrombosis. Also, New York identifies risk factors suspected to be over-reported and reviews medical records of all cases reported as having those risk-factors. Massachusetts similarly verifies all CABG and valve surgery patients who died within 30 days of surgery and all cases coded with shock or myocardial infarction (within 24 hours) prior to surgery, emergent or salvage status, severe chronic lung disease, or an ejection fraction less than 30%. Pennsylvania performs medical record audits for pre-operative cardiogenic shock or acute renal failure. Two program officers also mentioned excellent communication and cooperation with hospitals as another unique aspect of their programs. They believe these positive relationships assist with the successful public reporting of cardiac revascularization outcomes.
- **Some states report using their data to promote quality improvement efforts by hospitals, to publish research in the peer-reviewed literature, to facilitate "smart purchasing" decisions by payers and providers, and to educate consumers.** Massachusetts, New York, and Pennsylvania report a significant amount of raw data (most of which is not publicly reported) to hospitals for quality improvement efforts. Using its data, New York reported creating a well-received risk-assessment scorecard for cardiac surgeons to assess pre-operative risk. New York also reported extended discussions with insurance companies about whether participation in the program is sufficient for "Center of Excellence" designation. New Jersey reported anecdotally that a hospital severed its contract with a low performing physician group, and Pennsylvania noted that a large employer sends the public report to its employees.
- **The five year outlook for state programs is varied.** Three of the four states are funded through line items in the state budget. (Like California, the Massachusetts program is supported by hospital fees unrelated to the general budget). Because budgets have been cut up to 47%, states are looking for creative funding sources. New York may cut back on some aspects of reporting in all three of its cardiac registries (adult cardiac surgery, pediatric congenital cardiac surgery and PCI). Should additional funding become

available, they would like to link their existing pediatric registry to a newly revised adult registry to support long term outcomes research using the same metrics. Pennsylvania awaits recommendations from its technical advisory group and its Health Care Cost Containment Council (PHC4) for collecting lab data to incorporate into its cardiac surgery analysis. In Massachusetts, a pending decision regarding publicly reporting physician-specific outcomes for PCI likely will affect the public reporting of cardiothoracic surgeon outcomes. If Massachusetts decides *not* to report interventionalist-specific outcomes, in the interest of parity, it may stop reporting cardiothoracic surgeon-specific outcomes.

- **The two states reporting volume and mortality rates of non-isolated CABG surgery did not describe any technical problems or concerns.** New York includes three years of data in its analysis of risk-adjusted mortality rates for isolated CABG, valve surgery only, or valve surgery with CABG at the hospital and surgeon levels. Pennsylvania's detailed public report includes the aforementioned categories plus total valve surgery. Massachusetts and New Jersey do not report non-isolated CABG, but New Jersey would like to do so in the future. Developing a risk-adjustment methodology remains a challenge to their implementing this measure.

Table 2a. State Cardiac Surgery Outcomes Program Characteristics

	California <i>CABG Outcomes Reporting Program</i>	Massachusetts <i>Adult Coronary Bypass Graft Surgery</i>	New Jersey <i>Cardiac Surgery</i>	New York¹ <i>Adult Cardiac Surgery</i>	Pennsylvania <i>Cardiac Surgery Report</i>
Program Administrator	Office of Statewide Health Planning and Development	Department of Public Health and Mass-DAC ²	Office of Health Care Quality Assessment Department of Health and Senior Services	New York Department of Health	Pennsylvania Health Care Cost Containment Council (PHC4)
Program Authorization	Legislative	Legislative	Regulatory	Regulatory	Legislative
Program Established	2001	2002	1994	1989	1986
Program Funding Source	Fee levied on hospitals	Fee levied on hospitals	State budget line item	State budget "cardiac services" line item	State budget line item for PHC4 ³
Approximate* Number of Hospitals Participating	120 hospitals	14 hospitals	18 hospitals	30 hospitals	60 hospitals
Approximate* Number of Surgeons Participating	284 surgeons	60 surgeons	70 surgeons	200 surgeons	195 surgeons
Reporting Frequency (by year of reported data)	Annually 2003-2006 (1998-2003 voluntary hospital participation)	Annually 2002–2008	Annually 1994–2007	Annually 1989–2007 (each report spans 3 years of data)	Annually 2002–2007 (also 1990-95; 2000)
Number of outliers reported in most recent report	<ul style="list-style-type: none"> • 5 hospitals better • 2 hospitals worse than state average 	None	3 hospitals worse than state average (none better)	<ul style="list-style-type: none"> • <i>CABG 2007</i>: 2 hospitals above and 1 below state average • <i>Valve 2005-07</i>: 3 hospitals above and 3 below state average 	<ul style="list-style-type: none"> • "Higher than expected" and "Lower than expected" reported for 16 possible measures at hospital or surgeon level • No single composite used to report hospital or surgeon outlier
Reporting Style of Results (Rank/Rating)	Rates and ratings of "Better", "Worse" and "Not Different"	Numerical point estimates	Rates	Rates	Symbol Rating

* Hospital and physician counts vary year to year based on eligibility (i.e., licensing, requisite number of procedures, etc.) for all state programs.

¹ NY also reports on Pediatric Congenital Cardiac Surgery (1997-1999 and 2002-2005).

² Mass-DAC: Massachusetts Data Analysis Center, Harvard Medical School, Department of Health Care Policy

³ Additional revenue obtained through data sales.

Table 2b: State Cardiac Surgery Outcomes Program Characteristics: Key Measures and Data

	California	Massachusetts	New Jersey	New York*	Pennsylvania
Key Measures	Hospital and Surgeon <ul style="list-style-type: none"> • Volume • Risk-adjusted isolated CABG operative mortality rate • Observed mortality rate • Estimated mortality rate • IMA usage rate (hospital only) • Post-operative stroke rate (2007 report-hospital only) 	Hospital <ul style="list-style-type: none"> • Volume • Risk-standardized 30-day all cause mortality rates for isolated CABG surgery • Unadjusted 30-day mortality rate (hospital) Surgeon <ul style="list-style-type: none"> • Risk-standardized 30-day mortality incidence rate 	Hospital <ul style="list-style-type: none"> • Volume • Risk-adjusted isolated CABG operative mortality rate (in-hospital and 30 day mortality) • Risk-adjusted LOS • Statewide HAI infection rates during CABG admission Surgeon <ul style="list-style-type: none"> • Volume • Observed mortality rate • Expected Mortality rate • Risk-adjusted mortality rate • Risk-adjusted LOS 	Hospital and Surgeon <ul style="list-style-type: none"> • Volume • Raw deaths • Observed mortality rate • Estimated mortality rate • Risk-adjusted isolated CABG operative mortality rate • Risk-adjusted rate for Isolated CABG, or Valve or Valve/CABG 	Hospital and Surgeon <p>4 "reporting groups" use ratings and risk-adjustment¹</p> <ul style="list-style-type: none"> • In-hospital/30 day operative mortality for: <ul style="list-style-type: none"> • isolated CABG • valve w/ CABG • valve without CABG • total valve <p>All 4 groups also report:</p> <ul style="list-style-type: none"> • 7-day readmission • 30-day readmission • Post-surgical LOS • Average case-mix adjusted hospital charge (hospital only) • Average Medicare payment (hospital only) • Aggregate hospital acquired infections (hospital only)
Data Sources	Online "CORC" data submission; STS NCD; Death data ³	<ul style="list-style-type: none"> • Hospital cardiac surgery data submitted using STS Cardiac Surgery data collection instrument² • Hospital-submitted data verified using: <ul style="list-style-type: none"> ○ State ER/inpatient administrative data ○ State vital statistics³ 	<ul style="list-style-type: none"> • Patient-level clinical data submitted electronically quarterly • The <i>Open Heart Surgery Registry</i> of NJ Department of Health and Senior Services (which follows STS registry) • State vital statistics 	<ul style="list-style-type: none"> • Hospital clinical data submitted electronically to state • Hospital administrative discharge data (for validation purposes) • Death data⁴ 	<ul style="list-style-type: none"> • Hospital clinical data submitted electronically to PHC4⁵ • Hospital administrative discharge data • Death data⁶
Data Audits	Medical record audits of suspected outlier hospitals and those under- or over-reporting risk factors, plus small random sample. About 40-160 cases audited per selected hospital, including all isolated CABG deaths	Medical record audits conducted by MA cardiac surgeons and data managers. A mix of census of "high-risk" variables and a random sample of other variables examined	Medical record audits (100 cases/hospital)	On-site medical record audits of 6 programs (2008); audits of all cases diagnosed as shock, unstable, or stent thrombosis	Medical record audits for pre-operative cardiogenic shock or acute renal failure

Footnotes to Table 2b:

* In 2006, the New York Department of Health began to exclude cases of cardiogenic shock from public reports (367 cases 2004-2006).

Note: Hospital and surgeon counts vary year to year based on eligibility (i.e., licensing, requisite number of procedures, etc.) for all state programs.

¹ "Other" open heart procedures performed without CABG or valve are not included.

² Massachusetts used 293 variables in Q3-Q4 '07 and 349 variables Q1-Q2 '08.

³ Death certificate data obtained from state Mortality Index Database and National Death Index.

⁴ Death data obtained from the National Center for Health Statistics, Department of Health and Bureau of Vital Statistics and NY City Department of Mental Health and Hygiene.

⁵ Starting in 2011, statutory changes require PHC4 to collect data without the use of a single vendor. Future data submissions will go directly to PHC4.

⁶ The Department of Public Health excludes out-of-state deaths.

STATE PERCUTANEOUS CORONARY INTERVENTION (PCI) OUTCOMES REPORTING EFFORTS

Of the five states reporting CABG surgery outcomes, three (Massachusetts, New York, and Pennsylvania) publicly report hospital-specific PCI outcomes. New Jersey has been collecting clinical data since 2007 and uses the unpublished data to enforce PCI volume and quality requirements. California is the only state that does not collect clinical data for PCI procedures. Tables 3a and 3b summarize the states' program characteristics and key measures for reporting PCI outcomes.

Massachusetts, New York, and Pennsylvania publicly report PCI mortality and volume at the hospital level and New York also publishes mortality at the cardiologist level. Due to mandated data collection for regulatory enforcement of volume requirements and quality of PCI services, New Jersey is poised to publicly report risk-adjusted PCI mortality at the hospital and cardiologist level pending advisory panel recommendations and funding for PCI data audits. For several years, the New Jersey Certificate of Need and Healthcare Facility Licensure Program has been collecting data based on ACC registry elements with some adaptation of measures to state regulatory needs. PCI volume is already publicly reported in New Jersey.

As mentioned earlier, Massachusetts is considering adding cardiologist-specific PCI mortality to its public report. Since 1995, New York has reported operator-specific risk-adjusted in-hospital/30 day PCI mortality rates and associated risk factors. Data for all cases, primary cases, and elective cases are reported annually and for three-year periods. Because of the huge growth in other percutaneous procedures, New York is now considering measuring outcomes after transcatheterization valve repair and replacement.

Pennsylvania's *Hospital Performance Report* is unique in reporting hospital-specific average length of stay (with short and long outlier rates and ratings) and average charges for PCI, in addition to hospital-specific operative mortality.

Table 3a. State PCI Outcomes Program Characteristics

	Massachusetts Adult Percutaneous Coronary Intervention	New Jersey	New York Percutaneous Coronary Interventions	Pennsylvania Hospital Performance Report
Program Administrator	Massachusetts Department of Public Health and Mass-DAC ¹	Certificate of Need and Healthcare Facility Licensure Program and Office of Health Care Quality Assessment ²	New York Department of Health	Pennsylvania Health Care Cost Containment Council (PHC4)
Program Authorization	Legislative	Regulatory	Regulatory	Legislative
Program Established	2003	None ³	1991	2000
Program Funding Source	Fee levied on hospitals	State budget line item	State budget "cardiac services" line item	State budget line item for PHC4 & data sales
Approximate* Number of Hospitals Participating	24 hospitals (2008)	56 hospitals (2009)	53 hospitals (2007)	70-75 hospitals (2007) ⁴
Approximate* Number of Physicians Participating	Physician-specific data are collected, but not publicly reported	--	380	--
Reporting Frequency (by year of reported data)	Annually beginning in 2003; ongoing (reports span 2 years of data)	--	Annually beginning in 1995; ongoing (reports span 3 years of data)	Annually beginning in 2000 with quarterly updates; ongoing ⁵
Number of outliers reported in most recent report	None	--	2 better than state average (2007)	6 hospitals higher than state average mortality rate, but changes with on-line quarterly update (2009 Summer)
Report Style (Rank/Rating)	Numerical point estimates	Not published ⁶	Rates	Symbol rating and rates

Note: California does not report PCI outcomes. A 10-hospital pilot study is slated to begin in 2010 through the state's Department of Public Health.

* Hospital and physician counts vary year to year based on eligibility (i.e., licensing, requisite number of procedures, etc.) for all state programs.

¹ Massachusetts Data Analysis Center, Harvard Medical School, Department of Health Care Policy.

² Office of Health Care Quality Assessment resides in the Department of Health and Senior Services.

³ New Jersey started collecting detailed clinical data in 2007 for outcomes assessment of hospitals and cardiologists and is considering public reporting.

⁴ One of +40 procedures/treatments reported in the Hospital Performance Report; only PCIs with a principal diagnosis of AMI are reported.

⁵ Hospital Performance Reports are online and span one year of data using rolling quarterly data.

⁶ No PCI outcomes reported, however volume of diagnostic, elective, primary, and total PCI reported numerically by hospital.

Table 3b. State PCI Outcomes Program Characteristics: Key Measures and Data

	Massachusetts Adult Percutaneous Coronary Intervention	New Jersey	New York Percutaneous Coronary Interventions	Pennsylvania Hospital Performance Report
Key Measures	For hospitals: <ul style="list-style-type: none"> • Volume • Hospital-specific risk standardized in-hospital all-cause mortality rates • Unadjusted in-hospital mortality rate 	--	For hospitals and cardiologists*: <ul style="list-style-type: none"> • Volume • In-hospital/30 day risk-adjusted mortality rate (single year) • In-hospital/30 day risk-adjusted mortality rate (3 year) for all cases, non-emergency cases, and emergency cases (hospital only) • In-hospital/30 day observed mortality rate (3 year) for all cases and non-emergency cases • In-hospital/30 day expected mortality rate (3 year) all cases and non-emergency cases 	For hospitals*: <ul style="list-style-type: none"> • Volume • In-hospital risk-adjusted mortality • Average risk-adjusted LOS • Risk-adjusted LOS outlier cases (short) • Risk-adjusted LOS outlier cases (long) • Average charge (case-mix adjusted)
Data Sources	<ul style="list-style-type: none"> • Hospital PCI data submitted using ACC-NCDR data collection instrument/software (137 variables in FY 2008/09) • Hospital-submitted data verified using: <ul style="list-style-type: none"> ○ State ER/inpatient administrative data ○ Death data¹ 	Clinical data from the New Jersey <i>Cardiac Catheterization Registry</i> (NJCCDR) ²	<ul style="list-style-type: none"> • Hospital clinical data submitted electronically to state • Hospital administrative discharge data (for validation purposes) • Death data³ 	<ul style="list-style-type: none"> • Hospital clinical data submitted electronically to PHC4 • Hospital administrative discharge data
Data Audits	Medical record audits: mix of census of "high-risk" variables and a random sample of other variables	Data audits paid for by hospital for situations where cases are deemed ineligible by the state	On-site medical record audits of 10 programs (2008); audits of all cases of shock, unstable, and stent thrombosis	Medical record audits for pre-operative cardiogenic shock or acute renal failure
Hospital PCI Volume reported	Yes	Yes	Yes	Yes ⁴
Hospital Average LOS	--	--	--	Yes ⁵

Footnotes to Table 3b:

*Hospital and physician counts vary year to year based on eligibility (i.e., licensing, requisite number of procedures, etc.) for all state programs.

¹Death certificate data obtained from state Mortality Index Database and National Death Index.

²Registry data shared with the NJ Department of Health and Senior Services; PCI data collection occurs to enforce volume requirements as well as quality of PCI services.

³Obtained from the National Center for Health Statistics; Department of Health and Bureau of Vital Statistics; NYC Department of Mental Health and Hygiene

⁴Aggregate reported in annual report; detailed data provided on website.

⁵Reported as risk-adjusted by percent and rating. LOS outliers are reported as actual, greater than expected, and expected.

NCDR=National Cardiovascular Data Registry instrument

LOS=Length of stay

APPROPRIATENESS OF CARDIAC REVASCULARIZATION

Another component to measuring the quality of cardiac revascularization care relates to the appropriateness of the chosen intervention (i.e., PCI, CABG surgery, or medical therapy). Multiple professional societies collaborated on establishing appropriateness criteria for coronary revascularization in 2009 (Patel, et al. 2009). Measuring appropriateness is of interest to most states, but only New York has begun to collect the necessary data elements (per ACC criteria) to determine the appropriateness of a given cardiac procedure. Started in 2009, New York's research project on appropriateness will study access to care and diagnostic catheterization by using pre-catheterization risk factors, procedure information, and catheterization findings with short term outcomes. Ultimately, New York would like to link its study findings to the PCI registry to learn about long term outcomes. The program officer acknowledged hospital concerns about the difficulty of obtaining certain data elements, such as stress-test results, and the additional data collection burden. New York has no plans to publicly report this measure.

Massachusetts will refrain from measuring appropriateness until the ACC releases specific guidelines. In the interim, Massachusetts reported that it will continue identifying and excluding (after data collection) procedures that meet its "compassionate use criteria." A review committee (physicians, medical ethicist, religious leaders, etc.) considers for exclusion cases in which CABG was performed under exceptional circumstances, such as coma or ongoing cardiopulmonary resuscitation (CPR), current ST-elevation myocardial infarction (STEMI), aortic aneurysm, shock, and emergent/salvage status.

New Jersey's regulatory process allows it to assess appropriateness based on the four-tiered facility regulations enforced by its Department of Certificate of Need and Healthcare Facility Licensure. The Health Care Quality Assessment office reviews PCI data to identify facilities that may be operating outside of their scope of licensure, and reports this finding to the Department of Certificate of Need for enforcement. The state may require a full facility audit (paid for by the facility) and, if violations are found, a corrective plan of action. The program officer feels that this regulatory review process helps New Jersey address the appropriateness of care issue.

FACTORS USED IN RISK-ADJUSTMENT

Risk factors are used by each state to adjust for variation in demographics and severity of illness, but the specific risk factors differ among states. States note that the risk factors in each model may change year to year based on which factors prove to be significant predictors of mortality. The most recent public reports issued by California, Massachusetts, New Jersey, New York, and Pennsylvania show that the factors universally used to risk-adjust CABG surgery mortality are

myocardial infarction (MI) within 24 hours, ejection fraction (<30), diabetes, renal failure (with or without dialysis), and peripheral vascular disease. Risk factors unique to individual states included COPD, extensive atherosclerosis, arrhythmia, three-diseased vessels, prior PCI or history of CABG/valve surgery. California, Massachusetts, New Jersey, and Pennsylvania risk adjusted for cardiogenic shock. New York excluded cardiogenic shock cases, but adjusted for unstable hemodynamic state. Additionally, New York and Massachusetts specifically reported that they excluded shock cases from PCI analysis and analyzed non-emergent PCI cases separately (defined as no history of MI within 24 hours and not hemodynamically unstable).

CALIFORNIA STAKEHOLDER OPINION

Twenty-one individuals representing purchasers, payers, providers, researchers, and consumers were contacted for interviews about the future of public reporting of cardiac revascularization procedures in California. The stakeholders meet two important criteria: they are part of the stakeholder community served by OSHPD, and are familiar with the CCORP reports. Seventeen stakeholders shared their opinions regarding the future of the program (*Appendix A: Interview Respondents*). Stakeholders responded to four questions about recommending changes to CCORP, adding new quality measures, and whether OSHPD should report PCI outcomes (*Appendix B: Interview Guide*).

CABG SURGERY OUTCOMES REPORTING

Stakeholders were complimentary of CCORP's development of rigorous methodology and implementation of fair and balanced reporting. However, due to the declining mortality rates and the low number of outliers identified, stakeholders from all respondent groups noted the declining utility of current and future reports. Little differentiation in quality among hospitals and surgeons prevents stakeholders from using the data to choose providers, to select centers of excellence for preferred contracting, and to target quality improvement efforts.

Suggestions for Future Programmatic Changes

When asked what changes, if any, CCORP should consider for future reports, more than one stakeholder suggested the following changes. (Note: some of these suggestions may have already been considered or implemented by CCORP).

- **Expand/refocus reporting efforts to include PCI and valve procedures**
 - Isolated CABG mortality has become “uncommon” and decision makers need more relevant data to inform their decisions.
- **Improve timeliness of reports**
 - Consider using only in-state death statistics to calculate 30-day mortality in place of the final state death file, which delays reports considerably.
- **Improve discrimination among hospital and physician performance**
 - Study the CHART⁴ methodology to expand from 3 to 5 (or 6) rating categories to identify variation.
 - Report national data (in tables and graphs) as a benchmark to determine if California hospitals and physicians perform differently than the national average (and other leading states).

⁴ CHART=California Hospital Assessment and Reporting Taskforce

- **Improve consumer communication/education**
 - Provide more consumer education and outreach, starting in communities with lower performing hospitals.
 - Make reports more readily available on the website; they are perceived as buried too deeply in the OSHPD website.
- **Establish term limits for CAP members**
 - Current members' service is greatly appreciated, but fresh perspectives on the CAP would benefit the program.
 - Add consumer and payer representatives to the CCORP advisory panel to broaden stakeholder input into the program.

Suggestions for New Process or Quality Measures

Stakeholders also were asked to recommend new process or quality measures for CCORP to consider. More than one stakeholder suggested that the program:

- **Add valve surgery** (CCORP plans to add a CABG + valve category in future reports, but does not have statutory authority to collect valve surgeries in which CABG was not performed.)
- **Analyze complications of care from CABG surgery** (Post-operative stroke rates were added to CCORP's 2007 report and other complication measures are being developed.)
- **Use composite measures**
 - Surgical process measures, such as CABG-related SCIP (Surgical Care Improvement Project) metrics from the Centers for Medicare and Medicaid Services (e.g., aspirin administration, appropriate beta-blocker administration, etc.)
 - A composite measure that reflects "all or nothing" (similar to Minnesota's diabetes care composite where just 13% of diabetic plan members at baseline received the bundle of services, but performance increased to 30% after public reporting).
- **Report rates of hospital-acquired infections (HAI) such as mediastinitis or leg wounds**
- **Report patient-reported functional health outcomes**
 - Factors related directly to surgery (reduction in angina) and its complications.
 - Pacific Business Group on Health (PBGH)⁵ is exploring with the American College of Cardiology (ACC) the addition of a functional health status module to its NCDR⁶ (pre-/post-intervention). Examples of this type of measurement are more prevalent in the UK than the US.
- **Report average length of stay (LOS) with outliers** (CCORP is working on development of a risk-adjusted LOS measure for potential hospital reporting.)
- **Consider other comorbidities in risk adjustment methodology**
 - E.g., liver failure, cirrhosis, ESRD, etc.
- **Report readmission rates** (CCORP is working on development of a risk-adjusted measure of unplanned readmissions for potential hospital reporting.)
- **Use longer term outcomes (90-, 365-day outcomes)**

⁵ Pacific Business Group on Health is a California-based business coalition of approximately 50 purchasers working to improve cost and quality of health care.

⁶ NCDR=National Cardiovascular Data Registry, which documents process and outcome of care in catheterization labs.

- **Create criteria for and report appropriateness (of cardiac revascularization)**
 - Both over- and under-use should be included.
 - ACC *cathPCI Registry* opened in 2009 and some elements may be useful for determining appropriateness of revascularization; however, only a handful of the 225 case scenarios in the *cathPCI Registry* are identified as inappropriate, which may limit its utility. A clinical review panel could recommend specific criteria to CCORP to tailor public reports for California.

Other suggestions from single respondents included repackaging data from CMS to run National Quality Forum-endorsed measures; relying on the state patient discharge dataset to reduce the reporting burden on hospitals; purchasing the STS⁷ (voluntary) registry data instead of mandating participation in CCORP (the availability of national benchmarks and richer sets of potential risk factors and complications need to be balanced with bias introduced by voluntary participation); reporting other high cost/high volume conditions or elective procedures, including hospital acquired infections. To accomplish some of these changes, stakeholders suggested formalizing a partnership with STS and/or ACC registries. Additionally, representatives of each professional organization interviewed expressed interest in working with the program to improve its reporting efforts.

STAKEHOLDER VIEWS ABOUT PCI OUTCOMES REPORTING

With the decline in CABG-surgery mortality, and an increasing volume of PCI procedures in California, a majority of stakeholders stated that PCI outcomes reporting is very important to ascertaining the quality of cardiac revascularization care in California. All stakeholders believe that OSHPD should have the authority to publish PCI outcomes. As mentioned in the *Background* section of this report, current interpretation of existing law precludes OSHPD from measuring PCI outcomes using clinical data, therefore OSHPD would require additional legislative authority to collect the necessary data to report on PCI outcomes in the manner recommended by professional societies such as the ACC. However, hospital-level reports on PCI mortality using OSHPD's administrative data from the Patient Discharge Data file are currently published and available at <http://www.oshpd.ca.gov/>. Some stakeholders suggested that CCORP use the new ACC *cathPCI* registry data, while others noted that the registry includes many more data elements than are needed (because of numerous quality improvement elements) for mortality-only reporting. Other stakeholders encouraged OSHPD to partner with CA-ACC⁸ and act as auditor of CA-ACC registry data.

INNOVATIVE PROJECTS IDENTIFIED BY CALIFORNIA STAKEHOLDERS

Through the interview process, stakeholders cited several innovative projects for the program staff and CAP to consider as potential resources.

- *Appropriateness research:* Stakeholders suggested reviewing ongoing work in the UK and Canada on measuring appropriateness to determine whether California can incorporate such measures into a public report.
- *Shared Care Project:* A quality improvement initiative between the ACC and PBGH to reduce regional variation in use of coronary revascularization (through appropriate use criteria) and to encourage optimal use of cardiac procedures (through shared decision making). Due in 2012, the project will create a method for combining ACC registry data and claims data to assess the validity of appropriateness criteria and further refine criteria to allow better identification of appropriate and inappropriate cases.

⁷ STS=Society of Thoracic Surgeons

⁸ California American College of Cardiologists

- *STS and Consumers Union*: STS and Consumer Reports' Health Ratings Center will provide outcomes data for U.S. cardiac surgical groups and hospitals online at www.ConsumerReportsHealth.org. "The cardiac surgical outcomes ratings will be based on an established multi-dimensional scoring system developed and implemented by STS. The composite quality measure focuses on coronary artery bypass graft surgery, the most common adult cardiac surgical procedure, and factors in 11 individual components of care, including mortality rates, pre-operative care, and post-operative complications⁹."
- *Virginia Cardiac Surgery Quality Initiative*: This is a voluntary collaborative of hospitals that upload STS and billing data to a repository where data are matched, saved, and blinded. Hospitals can run reports (with no volume or other identifiers) using NQF measures to compare their facility performance to another hospital or to the state average. The purpose of this initiative is to foster a "best practices" environment by encouraging leaders to share innovations with their counterparts.
- *NHLBI¹⁰ grant to STS and ACC*: These organizations received a grant to study merging patient records from both registries for longitudinal follow up to study appropriateness of care. A stakeholder suggested that CCORP could partner with grant recipients to have California data pulled for examination or that the program could partner with state payers to collect similar data for future reporting.
- *California Cardiac Surgery and Intervention Project*: The CA-STS¹¹ (with funding from by the Blue Shield Foundation, CHCF, and CA-STS) and UC Irvine will produce reports in 2010 using hospital-specific readmission data from OSHPD's Patient Discharge Dataset (PDD) and data from STS and ACC registries (see Californiacardiacsurgery.com). Reports about cardiac surgery and PCI procedures performed between 1997 and 2008 include risk-adjusted data for 90-day and one-year post-hospital readmission for death, acute MI, reintervention for any cardiac surgery, PCI procedure, and stroke. Providers will not be individually identified.
- CA-STS and CA-ACC proposed a joint study of "concordant decision making" to determine what impact collaborative decision making has on long term outcomes of cardiac interventions. The proposal, submitted in 2010, cites use of OSHPD's PDD to track readmissions and re-interventions.

CONCLUSIONS

- CCORP is widely respected nationally and by California stakeholders for its rigorous data quality standards and measurement of isolated-CABG surgery outcomes.
- California is unique in its reporting of IMA usage and post-operative stroke, whereas other states are unique in their reporting of readmission rates, average length of stay, average hospital charges, and aggregate hospital acquired infections related to CABG surgery. California plans to join New York and Pennsylvania in reporting CABG + valve surgery outcomes in the coming years.
- California is beginning to explore publicly reporting PCI outcomes (using clinical data) through a pilot project housed at the Department of Public Health. Although it lags behind the

⁹ "The Society of Thoracic Surgeons Collaborates with Consumers Union" Press release. January 25, 2010. <http://www.sts.org/documents/pdf/annmtg/2010AM/press46AMconsumersunion.pdf>

¹⁰ NHLBI=National Heart, Lung, and Blood Institute of the National Institutes of Health

¹¹ California Society of Thoracic Surgeons

four leading states (including New Jersey, which has three years of data available for its first public report), California stakeholders strongly support measuring and reporting PCI outcomes to comprehensively assess cardiac revascularization care in the state. PBGH and CHCF representatives offered their assistance to strategize on pushing PCI reporting to the forefront of public reporting efforts in California, including obtaining legislative authority, if necessary.

- California's CABG surgery medical record auditing process is similar to New York's process where a sample of hospitals are audited based on suspected over- or under-reporting of risk factors or their status as preliminary or near outliers. A small number of randomly selected hospitals are also audited. California audits all isolated CABG deaths in the selected hospitals and the number of patient records selected within a hospital is proportional to its isolated CABG volume (typically 40-160 cases). These practices are consistent with best practices nationally.
- California stakeholders urged CCORP to re-invigorate its efforts to educate and communicate with consumers and payers, while still offering data that can be used by hospitals and surgeons for quality improvement. Examples include publishing separate reports detailing methodologies and rationales for inclusion and exclusion of variables considered for reporting would help inform stakeholders as well as posting reports more visibly on the OSHPD website.
- Establishing criteria for and measuring appropriateness remains relatively unexplored across all states. OSHPD and CCORP have an opportunity to further develop and apply measures of appropriateness, especially given the interest of several stakeholders who offered their support during interviews. CCORP may want to consult further with New York in 2010-2011 to learn more about their data collection and analytic experience with this subject.
- Despite the barriers posed by challenging state budgets, CCORP's colleagues in Massachusetts, New Jersey, New York, and Pennsylvania are interested in participating in a shared learning network to support their programs and to apply best practices. This cohort of program leaders believes there is much to be learned from each others' experiences despite program differences across states.

Appendices

Appendix A: Interview Respondents

California Stakeholders

Consumer Advocates

- Tom Moore (Community Campaign for Quality Care)
- Maribeth Shannon (California Health Care Foundation)
- Laurie Sobel (Consumers Union)

Payer/Purchasers

- David Hopkins (Pacific Business Group on Health)
- Dr. Neil Solomon (HealthNet)

Providers

- Dr. Ralph Brindis (American College of Cardiologists-California)
- Dr. Joseph Carey
- Ed Fonner (Society of Thoracic Surgeons-California)
- Dr. Frederick Grover (University of Colorado, Health Sciences Center)
- Dr. Ronald Kaufman (Tenet Healthcare-California)
- Dr. Jeffery Milliken (University of California, Irvine)
- Debby Rogers (California Hospital Association)

Researchers

- Dr. Robert Brook (RAND)
- Cheryl Damberg (RAND)
- Dr. R. Adams Dudley (University of California, San Francisco)
- Dr. Patrick Romano (University of California, Davis)
- Dr. Bruce Spurlock (California Hospital Assessment and Reporting Taskforce)

State Cardiac Revascularization Reporting Programs

Massachusetts

- Gail Palmeri (Program Manager, Hospitals, Department of Public Health)
- Ann Lovett (Mass-DAQ)
- Sharon-Lise Normand (Mass-DAQ)

New Jersey

- Emmanuel Noggoh (Director, Health Care Quality Assessment, Department of Health and Senior Services)
- Abate Mammo (Program Manager, Health Care Quality Assessment, Department of Health and Senior Services)

New York

- Paula M. Waselauskas, (Administrator, Cardiac Services Program, Department of Health)
- Kimberly Cozzens (Cardiac Initiatives Research Manager, Cardiac Services Program, Department of Health)

Pennsylvania

- Constance E. Roland (Research Manager, Pennsylvania Health Care Cost Containment Council)
- Jane Keck (Research Manager, Pennsylvania Health Care Cost Containment Council)

Appendix B: Interview Guides for California Stakeholders and Program Officers of State Cardiac Reporting Programs

Interview Guide for California Stakeholders

- 1) Would you like to see California's coronary artery bypass outcomes reporting program changed (i.e., expanded, eliminated, refocused, etc.)? Please explain.
- 2) Should new outcome measures be considered? Why? Please describe the measures.
- 3) Should new process measures be considered? Why? Please describe the measures.
- 4) Given that it will require legislation for OSHPD to report percutaneous coronary intervention (PCI) rates for hospitals and physicians using clinical registry data, are there interim steps toward that goal that seem worth pursuing? Or, are there alternatives to mandated reporting that you think would significantly improve the quality of PCI procedures in the state?

Interview Guide for State Cardiac Reporting Programs

General Programmatic Questions

- 1) Your state has experienced a decrease in CABG volume and mortality rates since your program started—has your state considered revising the cardiac outcomes reporting program due to this decrease, or for any other reason? Please explain. (i.e., pressure to do more or less analysis and reporting, self-assessment of outcomes reporting program, looking to national guidelines for direction, recent changes in laws/regulations, etc.)
- 2) Are NQF/CMS actions regarding CABG measures impacting your program's future plans for reporting? Why or why not?
- 3) Is your program considering adding new or retiring outcomes measures? Why? Please describe the measures.
- 4) Is your program considering adding new or retiring process measures (including composite measures)? Why? Please describe the measures.
- 5) What do you consider special about your state's cardiac outcomes reporting program?
- 6) Please give some examples of how your analyses are being used beyond public reporting (e.g., P4P, health plan designation of cardiac centers of excellence, etc.).
- 7) Where do you see your program in the next 2 to 5 years?

Specific Measures Your program May Have Considered or Uses Now

- 8) **For states (considering) reporting percutaneous coronary intervention (PCI)**, please tell me about the process your program went through to start reporting PCI mortality rates (regulatory actions, stakeholder concerns/responses to the initiative, data or methodology concerns and how these were addressed).
- 9) California is considering creating measures to assess the appropriateness for cardiac revascularization, both possible overuse and underuse.
 - a) Has this type of measure been discussed in your program? Please explain.
 - b) Does your program use (or plan to use) a similar measure? Why or why not?
 - c) **(If measure available:** Are the results publicly available? Please describe the process your program went through to implement these measures. *[If appropriate: Can you forward any measure documentation to me?]*
- 10) Please describe the **technical** problems or concerns with reporting the volume and mortality rates of non-isolated CABG (i.e., minimum number needed; confidence intervals, number of years of data, risk model type, etc).
 - a) Did you/do you currently encounter resistance by hospitals to report non-isolated CABG data?
 - b) How did your program accommodate those concerns?

Appendix C: Summary of State CABG Outcome Measures Publicly Reported

State CABG Program Measures Publicly Reported					
	California	Massachusetts ^a	New Jersey ^b	New York ^c	Pennsylvania ^d
Hospital Specific					
Most recent release	2006	2008	2007	2007	2007
Volume	✓	✓	✓	✓	✓
Risk-adjusted Isolated CABG Operative (or 30 day-all cause) Mortality	✓	✓	✓	✓	✓
Number of years of data used in calculation	1 year	1 year	--	1 year/3 year	1 year/2 years
Minimum # of cases for inclusion	No minimum required	1 case for risk-adjusted 30-day mortality	--	No minimum required	30 or more cases over 1 year/2 years
Risk-adjusted Operative Mortality for Isolated CABG and Valve only and Valve-CABG	--	--	--	✓	--
Risk-adjusted in-hospital and 30-day operative mortality					
Risk-adjusted Valve w/ CABG	--	--	--	--	✓
Risk-adjusted Valve w/out CABG	--	--	--	--	✓
Risk-adjusted Total Valve	--	--	--	--	✓
Aggregate Risk-adjusted in-hospital mortality	--	--	--	--	✓
Number of years of data used for rate calculation	--	--	--	--	1 year and 2 year
Minimum # of cases for inclusion	--	--	--	--	30 or more cases over 1 year/two years
Average hospital charge (for those w/ at least 13 cases)	--	--	--	--	✓
Risk-adjusted isolated CABG	--	--	--	--	✓
Risk-adjusted Valve w/ CABG	--	--	--	--	✓

State CABG Program Measures Publicly Reported con't.					
	California	Massachusetts ^a	New Jersey ^b	New York ^c	Pennsylvania ^d
Risk-adjusted Valve w/out CABG	--	--	--	--	✓
Risk-adjusted Total Valve	--	--	--	--	✓
Statewide HAI during CABG admission	--	--	✓	--	✓
Post-surgical LOS (risk-adjusted)	--	--	✓	--	✓
Readmissions (7 day and 30 day)	--	--	--	--	✓
IMA usage (1 year)	✓	--	--	--	--
Post-operative stroke rates (2 years)	✓	--	--	--	--
Surgeon Specific					
Volume	✓	✓	✓	✓	✓
Risk-adjusted Isolated CABG Operative (or 30-day all cause) Mortality	✓	✓	✓	✓	✓
Risk-adjusted in-hospital mortality	--	--	--	--	✓
Number of Years of data	2 years	3 years	--	3 years	2 years
Minimum # of cases for inclusion	No minimum required	>10 surgeries over 3 years	--	200+ cardiac surgeries in 3 years or at least one surgery in each of the 3 years	At least 30 cases over 1 year/2 years
30-day mortality					
Risk-adjusted isolated CABG	--	--	--	--	✓
Risk-adjusted Valve w/ CABG	--	--	--	--	✓
Risk-adjusted Valve w/out CABG	--	--	--	--	✓
Risk-adjusted Total Valve	--	--	--	--	✓
7-day readmissions					
Risk-adjusted isolated CABG	--	--	--	--	✓
Risk-adjusted Valve w/ CABG	--	--	--	--	✓
Risk-adjusted Valve w/out CABG	--	--	--	--	✓
Risk-adjusted Total Valve	--	--	--	--	✓

State CABG Program Measures Publicly Reported con't.					
	California	Massachusetts ^a	New Jersey ^b	New York ^c	Pennsylvania ^d
30-day readmissions					
Risk-adjusted isolated CABG	--	--	--	--	✓
Risk-adjusted Valve w/ CABG	--	--	--	--	✓
Risk-adjusted Valve w/out CABG	--	--	--	--	✓
Risk-adjusted Total Valve	--	--	--	--	✓
Post-surgical LOS					
Risk-adjusted isolated CABG	--	--	✓	--	✓
Risk-adjusted Valve w/ CABG	--	--	--	--	✓
Risk-adjusted Valve w/out CABG	--	--	--	--	✓
Risk-adjusted Total Valve	--	--	--	--	✓
Note: Facility and surgeon counts can vary year to year based on eligibility (i.e., licensing, requisite number of procedures, etc.)		^a Variables considered optional and not harvested by STS are harvested by Mass-DAC		NY also reports observed and expected mortality rates for isolated CABG. It reports by hospital with surgeons listed below and by surgeon with hospitals listed below	^d Different risk factors were included in risk adjustment models for readmission metric. Readmission, LOS, and inhospital/30 day mortality reported for all 4 cardiac reporting groups.

APPENDIX D: CLINICAL ADVISORY PANEL (CAP) MEMBERS OF CCORP

Chair

Robert Brook, M.D., Sc.D., F.A.C.P.
Vice President of RAND Corporation and Director, RAND Health
Professor of Medicine and Public Health, UCLA

Members

Andrew B. Bindman, M.D.
Professor of Medicine, Health Policy,
Epidemiology & Biostatistics
University of California, San Francisco

Ralph G. Brindis, M.D., M.P.H., F.A.C.C.
Regional Senior Advisor for
Cardiovascular Disease
Northern California Kaiser Permanente

Cheryl L. Damberg, Ph.D.
Director of Research
Pacific Business Group on Health
Senior Researcher, RAND Corporation

Timothy Denton, M.D., F.A.C.C.
Attending Cardiologist
High Desert Heart Institute

Coyness L. Ennix, Jr., M.D.
Cardiac Surgery
Alta Bates Summit Medical Center

Keith D. Flachsbart, M.D.
Division of Cardiothoracic Surgery
Kaiser Permanente Medical Center,
San Francisco

Frederick L. Grover, M.D.
Professor and Chair
Department of Surgery
University of Colorado, Health Sciences
Center

James MacMillan, M.D.
Valley Heart Surgeons

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