

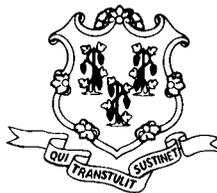
CONNECTICUT DEPARTMENT OF  
**PUBLIC HEALTH**

Keeping Connecticut Healthy

THE QUALITY OF CARE ADVISORY COMMITTEE/  
CARDIAC CARE DATA COMMITTEE  
TO THE GOVERNOR AND GENERAL ASSEMBLY

**AN ACT CONCERNING IMPROVEMENT  
OF CARDIAC CARE**

DECEMBER 1, 2007



State of Connecticut  
Department of Public Health  
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## Executive Summary

Public Act 05-167, *An Act Concerning the Improvement of Cardiac Care*, expanded the responsibilities of the existing Quality in Health Care Advisory Committee to include “examining and evaluating (A) possible approaches that would aid in the utilization of an existing data collection system for cardiac outcomes, and (B) the potential for state-wide use of a data collection system for cardiac outcomes, for the purpose of continuing the delivery of quality cardiac services in the state.” The ultimate goal is to ensure that Connecticut residents have access to first-rate cardiac services statewide.

A Cardiac Care Data Committee was formed in the Spring of 2006 to review and evaluate existing cardiac care data collection systems, including the Office of Health Care Access (OHCA) Cardiac Data Registry, national data registries, CMS’ *Hospital Compare*, American Heart Association’s *Get with the Guidelines*, and other states’ cardiac care systems.

The Cardiac Care Data Committee focused on mortality outcomes for the common heart procedures of coronary artery bypass grafting (CABG) and percutaneous coronary intervention (PCI), often referred to as angioplasty. Over the last 10 years (1996 to 2005), isolated CABG procedures in Connecticut have declined more than 40%, whereas PCI procedures have increased nearly 20%. During that same time, in-hospital mortality rates have slowly declined for CABG procedures from 2.9% to 2.6%, while mortality rates for PCI have remained relatively stable around 1.5%. These improvements have occurred in Connecticut without public reporting. Studies from other states with public reporting of cardiac outcomes have indicated that consumers do not appear to use such outcome information in choosing their providers. Transparency of provider performance, however, appears to encourage internal hospital quality improvement efforts.

Several new cardiac programs in Connecticut have received Certificate-of-Need approval in recent years. Danbury Hospital, Waterbury Area Heart Center (St. Mary’s Hospital and Waterbury Hospital), and Stamford Hospital were approved for elective angioplasty/open heart surgery programs. Lawrence & Memorial Hospital, The Hospital of Central Connecticut at New Britain General, Greenwich Hospital, and New Milford Hospital were approved for emergency angioplasty programs. These hospitals are required to submit data to OHCA’s Cardiac Data Registry, whereas cardiac programs already in existence prior to 2004 are not subject to mandatory reporting.

Based upon its meetings and discussions, the Cardiac Care Data Committee recommends the following:

*In the context of current trends towards creating public value and transparency in health care, publicly reported comparisons of cardiac outcomes is a desirable goal. As such it is the recommendation of the Committee that the State should collect patient-level data from all cardiac surgery programs in Connecticut, using the Society of Thoracic Surgeons’ data collection instrument. The State should also collect patient-level data from all hospitals performing PCI, using the American College of Cardiology National Cardiovascular Data Registry. The State should report annually on risk-adjusted 30-day mortality for CABG surgery and PCI procedures by hospital. The State should contract with an organization with clinical and statistical expertise to collect, process, edit, audit, analyze, risk-adjust, and report on cardiac care data. A Cardiac Care Advisory Board should be created to provide oversight on clinical and statistical considerations, and two Data Adjudication Committees, one for cardiac surgery and a second for percutaneous coronary interventions should be created to review selected cases. Funding will be needed to implement and sustain these recommendations.*

## **INTRODUCTION**

Public Act 05-167, *An Act Concerning the Improvement of Cardiac Care*, amended C.G.S. 19a-127(l) and expanded the responsibilities of the Quality in Health Care Advisory Committee. The Advisory Committee, in addition to its previous responsibilities, was tasked with “examining and evaluating (A) possible approaches that would aid in the utilization of an existing data collection system for cardiac outcomes, and (B) the potential for state-wide use of a data collection system for cardiac outcomes, for the purpose of continuing the delivery of quality cardiac services in the state.” The legislation recognizes that funding may be needed in order to implement the Committee’s recommendations.

The legislative directive for reviewing cardiac outcomes data collection systems is compatible with, but does not mandate, the creation of “report cards” that compare providers.

A Cardiac Care Data Committee, chaired by the DPH Healthcare Systems Branch Chief, was formed in the Spring of 2006 to review and evaluate existing cardiac care data collection systems, including the Office of Health Care Access (OHCA) Cardiac Data Registry, national data registries, CMS *Hospital Compare*, American Heart Association’s *Get with the Guidelines*, and other states’ systems. Meetings and discussions were held to review issues including data elements to collect, timeliness of data collection, auditing parameters, analytic methodology for risk-adjustment, information to be reported to the public, and costs and funding strategies.

## **BACKGROUND**

### **Quality in Health Care and Heart Disease**

Quality health care has become a high priority at the national and state levels. Greater emphasis is being placed on transparency and public accountability, thereby increasing the demand for information about healthcare providers’ performance. Because of its considerable public health burden, heart disease has figured prominently in public reporting efforts.

### **Heart Disease Procedures**

Common procedures for the treatment of heart disease include cardiac surgery and percutaneous coronary intervention (PCI), previously known as percutaneous transluminal coronary angioplasty (PTCA).

*Cardiac surgery* means surgery on the heart and the thoracic great vessels. Examples include coronary artery bypass grafts (CABG), heart valve repair or replacement, heart transplantation, surgery of the thoracic aorta, repair of congenital heart defects, and minimally invasive heart surgery. CABG surgery is the longest standing and most common focus of currently available public report cards.

*Percutaneous Coronary Intervention* is a medical procedure intended to open obstructed coronary arteries. Typically an interventional cardiologist performs PCI by threading a slender balloon tipped tube – a catheter – through blood vessels leading to the diseased artery, whereby the balloon is inflated, compressing the plaque and widening the narrowed coronary artery so that the blood can flow more easily to the heart. It is often accompanied by the insertion of an expandable metal stent.

Of the 30 non-Federal, adult, acute care hospitals in Connecticut, there are currently 11 hospitals approved to provide cardiac surgery and 15 with approval for angioplasty. Of these, 3 surgical programs and 7 angioplasty programs were approved by OHCA during the last four years. Waterbury and St. Mary's Hospitals were approved jointly as one program for cardiac surgery and one program for angioplasty.

Over the last 10 years in Connecticut, the number of PCI procedures has been increasing while the number of CABG procedures has been decreasing. PCI volume grew from 6,007 cases in 1996 to 7,170 cases in 2005 after approaching 8,000 cases in 2003 (Figure 1). The number of discharges with an isolated CABG procedure dropped from 4,275 in 1996 to 2,469 in 2005.

## **Outcomes**

Outcome can be defined as the measurable result of an episode of health care. Types of outcomes include mortality rates, length of hospital stay, resource utilization, morbidity rates (e.g. complication rates or major adverse cardiac events, such as myocardial infarction or revascularization), patient functional status after treatment, and patient satisfaction. Typically consumers are most interested in mortality outcomes, that is, whether they will live or die should they have a procedure.

Time frames for looking at outcomes can vary. They can range from in-hospital results prior to discharge, within 30 days of surgery, within 30 days of admission, within 60 days of surgery, within 6 months of surgery, etc.

Assuming the outcome of interest is mortality, mortality rates traditionally have focused on (a) in-hospital mortality, regardless of when it occurs; (b) 30-day post-surgical all-cause mortality, regardless of where it occurs; and (c) operative mortality, defined as either (a) or (b). The collection of in-hospital mortality is the most convenient and allows for its validation with administrative data sources. While longer intervals provide a more comprehensive and clinically relevant picture, and their use alleviates pressure on physicians to "game the system" by discharging patients who then die, their value is hindered by the difficulty in collecting and subsequently validating the data elements due to limited resources and the transient nature of patients.

## **CABG Surgery & PCI Mortality**

Ironically CABG mortality was lower in 1980 than in 2005, because at that time the majority of cases were elective, single vessel bypasses, and not even offered to elderly patients. By 1985, mortality rates peaked above 8% as more complex operations were offered to higher risk populations. Since then there has been a progressive decline down to 2.2% based upon data from the Society of Thoracic Surgeons.<sup>1</sup> In Connecticut, the unadjusted in-hospital mortality rate has decreased from 2.9% in 1996 to 2.6% in 2005 (Figure 2).

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<sup>1</sup> Rosamond W, Flegal K, Friday G, et al. Heart disease and stroke statistics – 2007 update: A report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. *Circulation*;115:e69-e171.

Figure 1.

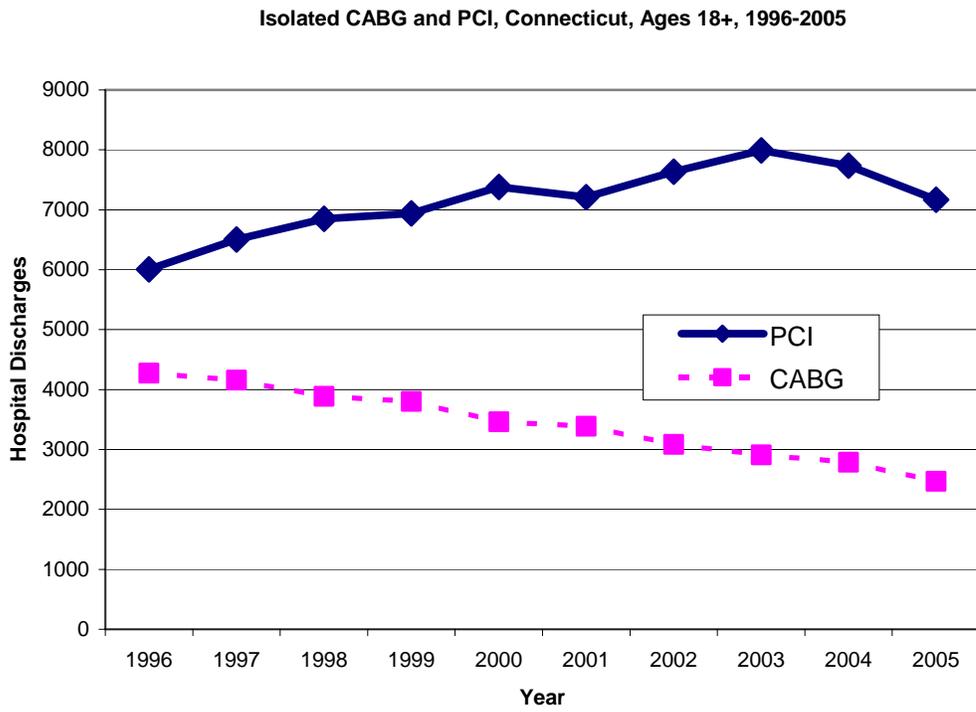
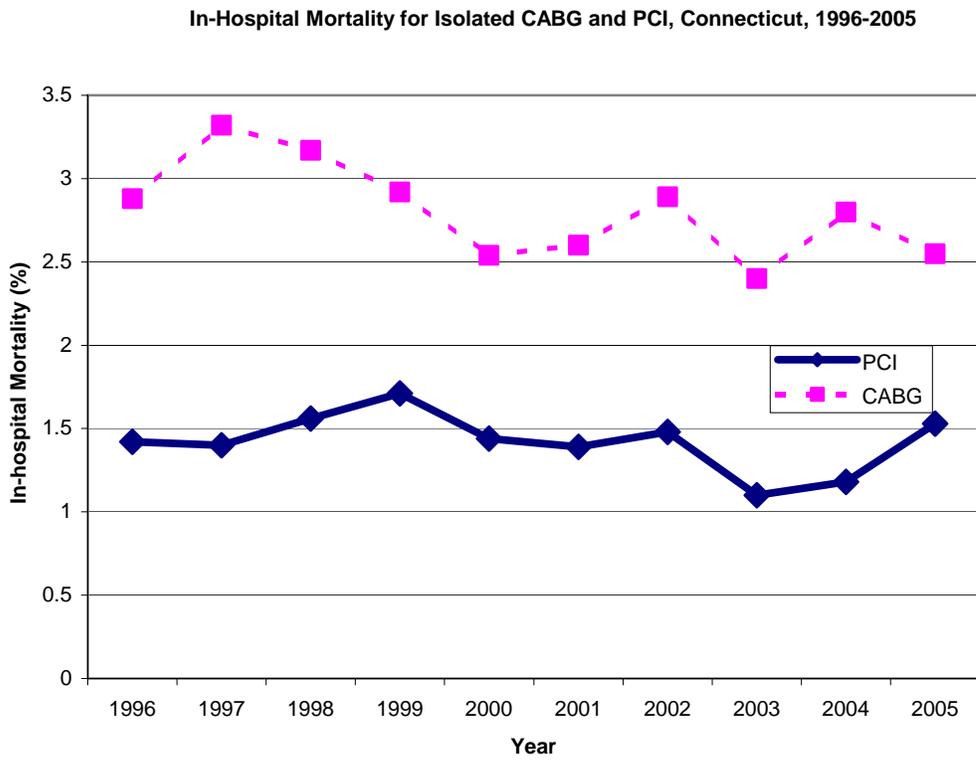


Figure 2.



Source: DPH, Hospital Discharge Abstract and Billing Database.

There is ongoing disagreement as to why mortality rates are decreasing. Quality improvement activities may be one explanation. Use of the Veterans Affairs and Society of Thoracic Surgeons National Databases has led researchers to suggest that “routine feedback of risk-adjusted data on local performance heightens awareness and leads to self-examination and self-assessment, which in turn improves quality and outcomes.”<sup>2</sup> That is, survival rates appear to improve through implementation of best-practices and sustained quality-improvement efforts, which may or may not be accelerated through public reporting.<sup>3</sup> Public reporting, however, would not explain the downward mortality trend in Connecticut.

CABG patients admitted through the emergency department or transferred in from other hospitals tend to have higher mortality rates than those referred for elective procedures. In Connecticut, there has been a decrease in the percentage of CABG patients admitted through the emergency department or transferred in from other hospitals. Between 1996 and 2005, the percentage decreased from 50% to 45%, which may or may not explain some of the decline in mortality during that period (DPH analysis).

Other possible reasons for the decline in CABG mortality include improvements in technology, use of new pharmacologic agents with more predictable results, the formation of cardiac surgical teams, improvements in the coordination of care, and implementation of quality improvement programs.<sup>4</sup>

PCI mortality rates are lower than CABG rates. In Connecticut, PCI in-hospital mortality rates have remained relatively stable around 1.5% between 1996 and 2005.

### **Confidential Continuous Quality Improvement and/or Public Accountability (“Report Cards”)**

Continuous Quality Improvement (CQI) relies on the professionalism of peers to foster self-improvement confidentially through identification and adoption of best practices.

Public accountability uses the market impact of “report cards” to force provider reform, despite the fact that consumers tend not to choose providers based on outcome data. Hospital market share has been largely unaffected by local public reporting initiatives.<sup>5</sup> The future impact of public reporting on patient decisions regarding where to obtain cardiac care remains to be seen. It is more likely that transparency of provider performance will heighten providers’ awareness and will catalyze hospitals’ quality improvement activities, which, in turn, benefits all patients. However, a major concern regarding public reporting of mortality is the risk that physicians will turn away high-risk patients who might tarnish their results. Despite evidence from New York that the risk-adjustment scheme gives adequate compensation for taking on high-risk patients,

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<sup>2</sup> Grover FL, Shroyer ALW, Hammermeister K, et al. A decade’s experience with quality improvement in cardiac surgery using the Veterans Affairs and Society of Thoracic Surgeons National Databases. *Annals of Surgery* 2001;234(4):464-474.

<sup>3</sup> Guru V, Fremes SE, Naylor CD, et al. Public versus private institutional performance reporting: what is mandatory for quality improvement? *American Heart Journal* 2006;152:573-578.

<sup>4</sup> Ferguson TB, Hammill BG, Peterson ED, et al. for the STS National Database Committee. A decade of change – risk profiles and outcomes for isolated coronary artery bypass grafting procedures, 1990-1999: a report from the STS National Database Committee and the Duke Clinical Research Institute. *Annals of Thoracic Surgery* 2002;73:480-489.

<sup>5</sup> Jha AK, Epstein AM. The predictive accuracy of the New York State coronary artery bypass surgery report-card system. *Health Aff (Millwood)*. 2006;25:844-855.

surgeons and cardiologists may still have reason and ability to avoid intervening on these patients.

The creation of a Cardiac Care Advisory Committee is needed to provide oversight to the public reporting process and to give guidance on the use and impact of new technologies and therapies. Such an advisory body, in conjunction with strict data auditing, is consistent with other states' public reporting efforts. Having such a group helps to ensure fairness among providers and to lend credibility to the process. The use of surgeons and cardiologists as advisors and case reviewers is costly, but is critical to the ongoing utility of the process. Adequate funding to support this activity should be secured.

## **EXISTING DATA COLLECTION SYSTEMS**

Because various data collection instruments already exist, the Cardiac Care Data Committee decided early on not to develop a new "home grown" data base. Data systems that were considered follow:

### **Administrative data (hospital discharge abstract and billing data)**

The Connecticut Office of Health Care Access (OHCA) collects hospital discharge data from all non-Federal, short-term, acute care hospitals in Connecticut as required under Section 19a-654 of the Connecticut General Statutes (C.G.S). These data are shared with the Department of Public Health pursuant to Section 19a-7 C.G.S. Data include personal characteristics of patients, administrative items such as admission and discharge dates, billing information in the form of charges, and medical information about patients, including diagnoses and procedures coded to the International Classification of Diseases, 9<sup>th</sup> Revision, Clinical Modification.

Several states currently use administrative data to publicly report on cardiac surgical outcomes, mainly because the data are accessible and relatively inexpensive to use. Critics argue that administrative data are generated for reimbursement purposes, not for purposes of clinical research and outcomes, and therefore their use as a substitute for clinical data should be cautioned. Other limitations that have been identified are: administrative data may be incomplete, may not differentiate between pre-existing conditions and complications of surgery, and generally do not include important factors related to the severity of illness, and deaths that occur after hospital discharge.<sup>6</sup> However, Krumholz, et al. recently derived an administrative claims model for hospital risk-standardized 30-day acute-myocardial-infarction mortality rates that appears to be a good surrogate for estimates from a medical record model.<sup>7</sup>

### **State of Connecticut, Office of Health Care Access Cardiac Data Registry**

The Cardiac Data Registry was created in 2004 by the Office of Health Care Access (OHCA) to monitor new cardiac programs in the state. These programs received Certificate-of-Need approval to provide emergency angioplasty, elective angioplasty, and/or open heart surgery. Danbury Hospital, Waterbury Area Heart Center (St. Mary's Hospital and Waterbury Hospital), and Stamford Hospital were approved for elective angioplasty/open heart surgery programs.

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<sup>6</sup> Steinbrook R. Public report cards – Cardiac surgery and beyond. *N Engl J Med* 355;18:1847-1848.

<sup>7</sup> Krumholz HM, Wang U, Mattera JA, et al. An administrative claims model suitable for profiling hospital performance based on 30-day mortality rates among patients with an acute myocardial infarction. *Circulation* 2006;113:1683-1692.

Lawrence & Memorial Hospital, The Hospital of Central Connecticut at New Britain General, Greenwich Hospital, and New Milford Hospital were approved for primary angioplasty programs. To monitor their compliance with nationally-recognized performance standards, providers regularly submit specific clinical data to the Registry. Cardiac programs established before 2004 are not required to participate in the Registry.

## **National Cardiac Registries**

### ***Society of Thoracic Surgeons (STS) National Adult Cardiac Surgery Database (NCD)***

The STS NCD is a national quality-improvement initiative of the Society of Thoracic Surgeons designed to improve the quality of care for patients undergoing cardiothoracic surgery. The STS NCD was established in 1989 and has evolved since then to become one of the largest single-specialty databases in the world, covering data from more than 600 U.S. cardiac programs on approximately 230,000 cardiac surgical procedures annually, of which more than half (i.e., 150,000) are isolated coronary artery bypass procedures. The STS NCD contains a comprehensive set of core variables with standardized data definitions.

Most hospitals in Connecticut that perform cardiac surgery currently participate in the STS NCD or are in the process of doing so. (See Table 1). Those hospitals providing data to OHCA's Cardiac Data Registry are also requested to participate in the STS NCD and to submit their results from STS to OHCA as part of their CON compliance.

### ***American College of Cardiology (ACC) – National Cardiovascular Data Registry (NCDR), Cardiac Catheterization and PCI Registry***

Consistent with the STS NCD, the ACC-NCDR<sup>TM</sup> CathPCI Registry is a national, voluntary cardiovascular data registry composed of diagnostic cardiac catheterizations and interventional PCI procedures harvested from participating facilities across the U.S. It is a comprehensive measurement system linked to ACC clinical practice guidelines and performance measures that rely on a set of nationally recognized standardized data elements and definitions. Since institutions began enrollment in the ACC-NCDR<sup>TM</sup> in November 1998, it has grown to represent 462 participants in 2005. During 2005, data were collected on approximately 600,000 diagnostic cardiac catheterizations and 300,000 PCI procedures.

Most hospitals in Connecticut that perform PCI procedures currently participate in the ACC-NCDR<sup>TM</sup> CathPCI Registry or are in the process of doing so. (See Table 1). Those hospitals providing data to OHCA's Cardiac Data Registry are also requested to participate in the ACC-NCDR<sup>TM</sup> and to submit their results from ACC to OHCA as part of their CON compliance.

### **American Heart Association's "Get With the Guidelines"**

The American Hospital Association's "Get With the Guidelines" (GWTG) is a hospital-based discharge program for coronary patients, to ensure that patients are discharged according to set guidelines, i.e., with appropriate medications and counseling, in an effort to prevent cardiovascular events and stroke. GWTG is a patient management tool focused on care parameters rather than outcomes.

**Table 1. Status of Participation in National Cardiac Data Registries for Connecticut Hospitals Performing PCI or CABG**

Hospital	ACC/NCDR CathPCI Registry	STS Adult Cardiac Surgery Database
Bridgeport Hospital	Not until 1/2008	Yes
Danbury Hospital <sup>CON</sup>	Yes	Yes
Greenwich Hospital <sup>CON</sup>	No, but plan to purchase software	Surgery not performed
Hartford Hospital	Yes	Yes
Hospital of St. Raphael	Yes	Yes
John Dempsey Hospital	Yes	Yes
Lawrence & Memorial Hospital <sup>CON</sup>	Yes	Surgery not performed
New Milford Hospital <sup>CON</sup>	Yes	Surgery not performed
Saint Francis Hospital & Medical Center	Yes	Yes
Saint Mary's Hospital <sup>CON</sup>	Yes	Yes
Saint Vincent's Medical Center	Funds not available	Yes
Stamford Hospital <sup>CON</sup>	No	Starting program
The Hospital of Central Connecticut <sup>CON</sup>	Yes	Surgery not performed
Waterbury Hospital <sup>CON</sup>	Yes	Yes
Yale-New Haven Hospital	Information system under implementation	Yes

<sup>CON</sup> indicates that hospital has recently been approved through the Certificate of Need process by OHCA for PCI or CABG. The hospital is required to participate in OHCA's Cardiac Data Registry and is encouraged to participate in the ACC/NCDR or STS registries.

### Centers for Medicare and Medicaid (CMS) Hospital Compare

*Hospital Compare* is a web-based tool to help consumers find information on how well hospitals care for patients with certain medical conditions, such as heart attack, heart failure, and pneumonia. It was created as part of a national quality initiative to assure quality health care for all Americans through accountability and public disclosure. The information is intended to help consumers compare the quality of care hospitals provide. Hospital Compare was created through the efforts of CMS and organizations that represent hospitals, doctors, employers, accrediting organizations, other Federal agencies and the public.

Initial hospital performance measures focused on processes of care, i.e., recommended actions that a hospital ought to be providing to a patient – for example, providing a medication, such as aspirin, to a patient upon admission to a hospital after a heart attack.

Beginning in June 2007, new measures that are focused on outcomes, i.e., mortality, are also being reported. Specifically, risk-adjusted, 30-day mortality rate comparisons for patients admitted to hospitals (including all Connecticut hospitals) with acute myocardial infarction or heart failure are publicly available. However, outcomes related to specific procedures, such as CABG and PCI, are not being reported.

### **Other States' Cardiac Data Reporting Systems**

Public reporting of cardiac outcomes, primarily pertaining to CABG surgery, exists in several other states (Table 2). In 1990, New York became the first state to report such data publicly. Pennsylvania and New Jersey also began such reporting in the 1990s. California passed legislation in 2001 to change its CABG-reporting system from a voluntary program to a mandatory one. Massachusetts recently implemented a public reporting system that provides mortality results for both CABG and PCI. California, Massachusetts, and New Jersey use clinical data from the Society of Thoracic Surgeons' adult cardiac database. New York uses similar data. Pennsylvania uses administrative data supplemented by clinical data, and Florida and Texas use only administrative data.

New York, New Jersey, Pennsylvania, California, and Massachusetts publicize patient death rates not only for hospitals, but also for individual surgeons.

In Washington, the nonmandatory, physician-led Clinical Outcomes Assessment Program (COAP) has universal statewide participation and releases CABG and PCI data to participating hospitals but not publicly. Accountability is achieved, according to the program, by requiring any hospital with significantly poorer results than the state average to submit improvement plans. Persistence of outlier status on certain measures in successive years places a hospital's participation status at risk, as listed on the website. In response to increased pressure for full public disclosure, COAP "has provided clear statements of its compliance criteria and has publicly reported the compliance status of hospitals."<sup>8</sup> This raises the question of "whether, with transparent systems in place to maintain standards, it is necessary to publish a list of names, or can the public good be served just as well by the knowledge that appropriate mechanisms are in place and independently regulated."<sup>9</sup>

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<sup>8</sup> Goss JR, Maynard C, Aldea GS, et al. Effects of a statewide physician-led quality-improvement program on the quality of cardiac care. *Am Heart J* 2006;151:1033-42.

<sup>9</sup> Keogh B, Spiegelhalter D, Bailey A, Roxburgh J, Magee P, Hilton C. The legacy of Bristol: public disclosure of individual surgeons' results. *BMJ* 2004;329:450-4.

**Table 2. Public Reporting of Cardiac Surgical Outcomes by State**

State	Data Type (Administrative, Clinical)	Outcomes Reported	Reporting Level (Hospital (H), Physician (P))	Risk-adjustment Algorithm
California	Clinical	In-hospital mortality 30-day post-surgical mortality	H,P	Hierarchical logistic regression
Colorado	Administrative	In-hospital mortality 30-day readmissions	H	3M APR-DRG
Florida	Administrative	In-hospital mortality 30-day readmissions	H	3M APR-DRG
Massachusetts	Clinical	In-hospital mortality 30-day post-surgical mortality	H,P	Hierarchical logistic regression
New Jersey	Clinical	In-hospital mortality 30-day post-surgical mortality 30-day readmissions	H,P H	Logistic regression on 14 variables
New York	Clinical	In-hospital mortality 30-day post-surgical mortality	H,P	Logistic regression
Oregon	Clinical	In-hospital mortality 30-day post-surgical mortality	H	Bayesian method
Pennsylvania	Both	In-hospital mortality 30-day post-surgical mortality 7-day readmissions 30-day readmissions Post-surgical LOS	H,P	Logistic regression (MediQual's Atlas Outcomes)
Texas	Administrative	In-hospital mortality	H	3M APR-DRG
Virginia	Administrative	In-hospital mortality 30-day readmissions	H	3M APR-DRG

## **RISK-STRATIFICATION**

Crude mortality fails as a measure of quality comparisons when there are major variations in the severity of the pre-operative clinical condition among patients treated at different hospitals. Some patients are more likely to survive an operation than others, depending on factors such as age and their general health. Hospitals that treat more high-risk patients will appear to have worse results than those who treat patients who are considered relatively low risk. Presenting outcomes with no allowance for inherent risk factors could create a culture in which there is a reluctance to treat patients who are considered high risk. To adequately compare outcomes at different hospitals, it is necessary to adjust for differences in the case mix of patients across hospitals. Conversely, no risk-adjustment model is perfect.

In light of the increasing demand for public reporting of cardiac care outcomes, the American Heart Association identified a set of seven attributes that any risk-adjustment approach should consist of, as follows:<sup>10</sup>

1. Clear and explicit definition of an appropriate patient sample.
2. Clinical coherence of model variables.
3. Sufficiently high-quality and timely data.
4. Designation of an appropriate reference time before which covariates are derived and after which outcomes are measured.
5. Use of an appropriate outcome and a standardized period of outcome assessment.
6. Application of an analytical approach that takes into account the multilevel organization of data.
7. Disclosure of the methods used to compare outcomes, including disclosure of performance of risk-adjustment methodology in derivation and validation samples.

## **CARDIAC CARE DATA COMMITTEE ACTIVITIES**

The first meeting of the Cardiac Care Data Committee was held on April 25, 2006. The Committee reviewed Public Act 05-167. The Office of Health Care Access (OHCA) Commissioner described the current reporting requirements of cardiac care data for certificate of need (CON) compliance. OHCA had created a set of the data elements required to be submitted from hospitals that had been recently approved to perform full cardiac services and/or angioplasty. The data are used to monitor new cardiac services in the state. Providers regularly submit specific data to OHCA as mandated by law. Committee members agreed to invite the 15 hospitals that perform adult cardiac procedures to participate on the Committee.

At the May 25, 2006 meeting, the intent of Public Act 05-167 was clarified to indicate that its purpose is for public reporting. Hospitals identified their participation, if any, in data submission to the Society of Thoracic Surgeons (STS) database and/or the American College of Cardiology National Cardiovascular Data Registry (ACC/NCDR). A Committee member gave a presentation on reporting for open-heart surgery and angioplasty. This led to a discussion that included concerns about the costs of data submission to STS and ACC/NCDR, manpower costs to harvest cardiac data, a mechanism to ensure that data collected is accurate, and a mechanism to report high risk cases (i.e., review by an advisory panel). There was a decision to pursue information

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<sup>10</sup> Krumholz HM, Brindis RG, Brush JE, et al. Standards for statistical models used for public reporting of health outcomes: An American Heart Association scientific statement from the Quality of Care and Outcomes Research Interdisciplinary Writing Group. *Circulation*. 2006;113:456-462.

from other states in order to review what types of reporting are being utilized. The Committee agreed to seek guest speakers for subsequent meetings to obtain information on public reporting. The Committee also discussed the need to report risk-adjusted cardiac data.

At the June 22, 2006 and September 14, 2006 meetings, the Committee discussed the possibility of meeting with the Northern New England Cardiovascular Disease Study group, since this group collected information about the management of cardiovascular disease in Maine, New Hampshire, and Vermont. After discussion, the Committee decided not to pursue this group since it was not expanding to include other states. The Committee did not wish to consider a “homegrown” system for data collection, since many Connecticut hospitals already report to the ACC, STS, OHCA and/or C-Port Registries. The C-Port Registry has very specific data for that research trial only and does not have statewide applicability. A concern was raised regarding the protection of data that may be submitted to the Department of Public Health, and whether the data would be available under the Freedom of Information Act (FOIA).

During the December 14, 2006 meeting, the Committee heard a presentation from the American Heart Association about the “Get with the Guidelines” cardiac modules. These modules were more focused on care parameters resembling clinical pathways and less on data collection. Also reviewed were the Massachusetts cardiac data collection system in conjunction with the Massachusetts Data Analysis Center (Mass-DAC), which is the data-coordinating center responsible for collecting and analyzing data for all adults undergoing cardiac surgery or a cardiac intervention at Massachusetts hospitals. Mass-DAC is affiliated with Harvard Medical School and is under contract with the Massachusetts Department of Public Health.

The Committee reviewed New Jersey’s cardiac surgery report and a presentation was given by one of the Committee members on the American Heart Association Scientific Statement on Standards for Statistical Models Used for Public Reporting of Health Outcomes during the January 18, 2007 meeting. A letter was sent to all thirty-one hospitals on January 31, 2007 to inform them of the Committee’s progress toward the Legislative goal of evaluating and recommending a data collection system for cardiac outcomes to enhance quality of care and to provide public reporting. The letter also encouraged all members to attend the following meeting because the Committee intended to choose data collection instruments to be recommended for use in Connecticut.

During the February 15, 2007 meeting, Mass-DAC staff presented an overview of the Massachusetts experience on cardiac data reporting and summarized components of their data collection and analysis. During this meeting Committee members voted to recommend the ACC/NCDR and the STS data collection systems, as used by the Massachusetts Department of Public Health.

At the March 15, 2007 meeting, the Committee reviewed a list of Connecticut hospitals, which perform PCI and/or CABG procedures and participate in the STS and/or ACC/NCDR registries. A state matrix fact sheet on public reporting of cardiac surgery outcomes by other states was also reviewed. Costs and funding for data verification and analysis were discussed. The need for a data analysis center for data management and the need for this contracted service to go through the “request for proposal” (RFP) process was discussed. The Committee drafted and sent a letter to all Connecticut hospitals informing them of the Committee’s work, and requesting information on each hospital’s current cardiac care data collection efforts in order to assess the potential burden on the hospitals should mandatory data collection be implemented.

During the April 12, 2007 meeting, a list of Legislators was distributed so Committee members could speak to their legislators and/or representatives about the Committee's work. A Committee member also presented a comparison of one Connecticut hospital's data set and Mass-DAC's data sets. A discussion was held of specific recommendations for public reporting, which included a hierarchical risk model, auditing parameters, contractors, state comparisons, plan for outlier data, information to be reported to the public, costs of implementation, and the need for a contracted full-time data manager. The Committee determined that the data manager needed to be part of the data collection process, which would include site visits, chart audits, and answering questions from facilities. The data manager preferably would be an employee of a data collection center. The group agreed to collect data from the hospital CEO's on staffing costs of implementation.

Subsequent summertime meetings were held in June and August to review and modify draft copies of this report.

A copy of the final report was presented to the members of the Quality in Health Care Advisory Committee at their October 10, 2007 quarterly meeting, where it was accepted.

## **COSTS**

Implementation of a data collection system has resource implications for hospitals performing cardiac procedures and for the State. Some hospitals have already made substantial investments in staff and software.

Hospitals need staff to coordinate data collection activities within their cardiac programs. Experienced cardiac RNs usually perform this function, at an average annual cost of approximately \$85,000 plus benefits per FTE. Depending on the case volume, two to five FTEs are needed by hospitals that perform cardiac surgery and PCI. To participate in the national registries maintained by the STS and the ACC, annual fees around \$3,500 are required. In addition, hospitals contract with vendors to install software interfaces that are compatible with the data in the national registries. On an annual basis, hospitals may, therefore, accrue costs between \$200,000 and \$500,000. Although many of Connecticut's hospitals have resources already in place, incremental costs will be incurred to collect 30-day mortality data for PCI, because this is not collected in the ACC NCDR.

The Committee estimates implementation costs to the State of approximately \$1 million the first year and \$750,000 annually thereafter. Funding streams must be sustainable to allow for the fact that it will be several years before the first report is produced, with annual reports to follow thereafter. Much of the funding is needed to contract with an organization to receive, process, edit, analyze, and report on cardiac care data. Funding is also needed for auditing purposes, for hiring a state cardiac care program coordinator, and for administrative costs.

## RECOMMENDATIONS

The Cardiac Care Data Committee puts forward the following recommendations:

- (1) The State should publicly report on risk-adjusted outcomes for coronary artery bypass graft (CABG) surgery and percutaneous coronary intervention (PCI) procedures by hospital for all hospitals performing these procedures in Connecticut. Public reporting of additional data may be reconsidered at a later time. Risk-adjustment models used for publicly reported outcomes should adhere to standards developed by the American Heart Association and endorsed by the American College of Cardiology Foundation.

**Rationale:** There is a national movement for transparency in health care, encouraging publication of performance data on providers and hospitals. Heart disease has figured prominently in public reporting efforts. CABG and PCI are common procedures used to treat heart disease. Outcomes, however, must be adjusted so that facilities that care for older or sicker patients are not penalized. Because it may take several years to have sufficient sample sizes for physician-level reporting, initial reporting should occur at the hospital level only. A major limitation of reporting on cardiac procedures in Connecticut is that not all hospitals would be included because only half of Connecticut's hospitals are approved to perform CABG and/or PCI.

- (2) The primary patient outcome to be publicly reported should consist of 30-day all-cause mortality.

**Rationale:** Patients tend to care about the results of their care, i.e., they are interested in surviving. Looking at 30-day mortality provides a more clinically relevant picture than in-hospital mortality, and it alleviates pressure on physicians to "game the system" by discharging patients who then die within a short time frame. However, data are more difficult and labor-intensive to collect and validate.

- (3) The cardiac surgery data set to be collected should consist of all data elements of the STS National Database and any supplemental data elements that may be needed. The PCI data set to be collected should consist of all data elements of the ACC/NCDR National Database and any supplemental data elements that may be needed.

**Rationale:** These national data bases contain a comprehensive set of data elements with standardized data definitions. However, the data should not necessarily be limited to registry data. For instance, Mass-DAC collects supplemental data for a compassionate use group for patients undergoing PCI (DPH, personal communication).

- (4) Each hospital with a cardiac surgery program should enroll in and fully participate in the STS National Database. Each hospital that provides PCI procedures should enroll in and fully participate in the NCDR National Database of the American College of Cardiology. Data should be submitted on all cardiac surgical and/or angioplasty cases.

**Rationale:** Most Connecticut hospitals performing cardiac surgery or angioplasty already participate in these national registries or are in the process of doing so. Many submit the results of their Registry data to the Office of Health Care Access for CON compliance purposes as well.

- (5) Pilot-testing of data collection should commence with procedures performed on July 1, 2008. Data collection for public reporting should begin on January 1, 2009. Risk-adjusted outcomes should be publicly reported on or before October 1, 2010, and annually thereafter.

**Rationale:** Start-up time is needed to promulgate legislation, contract with an outside data vendor, provide training to hospitals, and begin data collection and validation efforts.

- (6) Annual reports should compare outcomes experienced by all patients receiving the selected procedures to outcomes expected for those patients.

**Rationale:** Outcomes, in addition to being risk-adjusted, should be reported in a way that is easy to understand, such as “better than expected” or “worse than expected.”

- (7) An advisory committee should be created to provide ongoing oversight on technical and statistical considerations.

- (8) An adjudication work group must be created to review questionable cases that may be excluded from reporting. Cardiac surgeons and interventional cardiologists will need to participate on the adjudication work groups. Such representatives may rotate from the Connecticut chapters of the STS or ACC.

- (9) Periodic auditing of data at hospitals must be performed to ensure data quality. This will require hiring an independent agency to conduct random audits.

**Rationale:** Data should be audited to ensure its validity and credibility. A random sample from each cardiac program should be re-abstracted by an independent source and compared to data already submitted to ascertain and review any discrepancies. The auditing done by STS and ACC is suitable for internal hospital quality improvement use, but a greater level of review is needed for public reporting. This is consistent with other states that publicly report cardiac outcomes.

- (10) The State should contract with an organization to act as the central data repository to receive, process, edit, analyze, and report on cardiac care data submitted by the State’s acute care hospitals. All entities involved should maintain administrative procedures that ensure the confidentiality of patient-specific data.

**Rationale:** An independent organization with experience in health-care data management, statistical modeling and analysis, and consumer reporting will lend expertise, avoid conflicts of interest, and alleviate Freedom of Information issues.

- (11) Efforts to educate various constituencies should begin well in advance of public reporting.

**Rationale:** Education in the usefulness as well as limitations in public reporting of cardiac care outcomes should be targeted toward legislators prior to legislative mandates, hospital administrators and providers, the media, and consumers.

(12) The State should identify and make available the resources necessary to implement and sustain the above recommendations.

***Rationale:*** Funding is needed to hire a data vendor and auditing organization, and staff resources are needed at both the State and the hospitals to coordinate administrative, implementation, and monitoring efforts.

(13) Hospitals should be strongly encouraged not to use the publicly reported data for marketing purposes.

***Rationale:*** The goal is to have all Connecticut hospitals achieve comparably high-level results (i.e., low mortality rates).



**Substitute House Bill No. 6304**

**Public Act No. 05-167**

***AN ACT CONCERNING THE IMPROVEMENT OF CARDIAC CARE.***

Be it enacted by the Senate and House of Representatives in General Assembly convened:

Section 1. Section 19a-127l of the general statutes is repealed and the following is substituted in lieu thereof (*Effective from passage*):

(a) There is established a quality of care program within the Department of Public Health. The department shall develop for the purposes of said program (1) a standardized data set to measure the clinical performance of health care facilities, as defined in section 19a-630, and require such data to be collected and reported periodically to the department, including, but not limited to, data for the measurement of comparable patient satisfaction, and (2) methods to provide public accountability for health care delivery systems by such facilities. The department shall develop such set and methods for hospitals during the fiscal year ending June 30, 2003, and the committee established pursuant to subsection (c) of this section shall consider and may recommend to the joint standing committee of the General Assembly having cognizance of matters relating to public health the inclusion of other health care facilities in each subsequent year.

(b) In carrying out its responsibilities under subsection (a) of this

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section, the department shall develop the following for the quality of care program:

- (1) Comparable performance measures to be reported;
- (2) Selection of patient satisfaction survey measures and instruments;
- (3) Methods and format of standardized data collection;
- (4) Format for a public quality performance measurement report;
- (5) Human resources and quality measurements;
- (6) Medical error reduction methods;
- (7) Systems for sharing and implementing universally accepted best practices;
- (8) Systems for reporting outcome data;
- (9) Systems for continuum of care;
- (10) Recommendations concerning the use of an ISO 9000 quality auditing program;
- (11) Recommendations concerning the types of statutory protection needed prior to collecting any data or information under this section and sections 19a-127m and 19a-127n; and
- (12) Any other issues that the department deems appropriate.

(c) (1) There is established a Quality of Care Advisory Committee which shall advise the Department of Public Health on the issues set forth in subdivisions (1) to (12), inclusive, of subsection (b) of this section. The advisory committee shall meet at least quarterly.

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(2) Said committee shall create a standing subcommittee on best practices. The subcommittee shall advise the department on effective methods for sharing with providers the quality improvement information learned from the department's review of reports and corrective action plans, including quality improvement practices, patient safety issues and preventative strategies. The department shall, at least quarterly, disseminate information regarding quality improvement practices, patient safety issues and preventative strategies to the subcommittee and hospitals.

(d) The advisory committee shall consist of (1) four members who represent and shall be appointed by the Connecticut Hospital Association, including three members who represent three separate hospitals that are not affiliated of which one such hospital is an academic medical center; (2) one member who represents and shall be appointed by the Connecticut Nursing Association; (3) two members who represent and shall be appointed by the Connecticut Medical Society, including one member who is an active medical care provider; (4) two members who represent and shall be appointed by the Connecticut Business and Industry Association, including one member who represents a large business and one member who represents a small business; (5) one member who represents and shall be appointed by the Home Health Care Association; (6) one member who represents and shall be appointed by the Connecticut Association of Health Care Facilities; (7) one member who represents and shall be appointed by the Connecticut Association of Not-For-Profit Providers for the Aging; (8) two members who represent and shall be appointed by the AFL-CIO; (9) one member who represents consumers of health care services and who shall be appointed by the Commissioner of Public Health; (10) one member who represents a school of public health and who shall be appointed by the Commissioner of Public Health; (11) one member who represents and shall be appointed by the Office of Health Care Access; (12) the Commissioner of Public Health or said

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commissioner's designee; (13) the Commissioner of Social Services or said commissioner's designee; (14) the Secretary of the Office of Policy and Management or said secretary's designee; (15) two members who represent licensed health plans and shall be appointed by the Connecticut Association of Health Care Plans; (16) one member who represents and shall be appointed by the federally designated state peer review organization; and (17) one member who represents and shall be appointed by the Connecticut Pharmaceutical Association. The chairperson of the advisory committee shall be the Commissioner of Public Health or said commissioner's designee. The chairperson of the committee, with a vote of the majority of the members present, may appoint ex-officio nonvoting members in specialties not represented among voting members. Vacancies shall be filled by the person who makes the appointment under this subsection.

(e) The chairperson of the advisory committee may designate one or more working groups to address specific issues and shall appoint the members of each working group. Each working group shall report its findings and recommendations to the full advisory committee.

(f) The Commissioner of Public Health shall report on the quality of care program on or before June 30, 2003, and annually thereafter, in accordance with section 11a-4, to the joint standing committee of the General Assembly having cognizance of matters relating to public health and to the Governor. Each report on said program shall include activities of the program during the prior year and a plan of activities for the following year.

(g) On or before April 1, 2004, the Commissioner of Public Health shall prepare a report, available to the public, that compares all licensed hospitals in the state based on the quality performance measures developed under the quality of care program.

(h) (1) The advisory committee shall examine and evaluate (A)

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possible approaches that would aid in the utilization of an existing data collection system for cardiac outcomes, and (B) the potential for state-wide use of a data collection system for cardiac outcomes, for the purpose of continuing the delivery of quality cardiac care services in the state.

(2) On or before December 1, 2007, the advisory committee shall submit, in accordance with the provisions of section 11-4a, the results of the examination authorized by this subsection, along with any recommendations, to the Governor and the joint standing committee of the General Assembly having cognizance of matters relating to public health.

[(h)] (i) The Department of Public Health may seek out funding for the purpose of implementing the provisions of this section. Said provisions shall be implemented upon receipt of said funding.

Approved July 1, 2005