

# Washington State's Model of Physician Leadership in Cardiac Outcomes Reporting

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**Background.** In 1993, the cardiac surgery community in Washington State opposed an effort by the state Health Care Authority (HCA) to identify "centers of excellence" for selective contracting of coronary artery bypass grafting (CABG) procedures, and proposed an alternate model that would create a statewide cardiac outcomes registry under physician governance to be used by all institutions for internal quality improvement activities.

**Methods.** A prospective pilot data collection effort, which examined preoperative and postoperative patient-reported health status, served as the basis for evaluating the capacity of a physician-led organization to develop a collaborative atmosphere and facilitate universal hospital participation.

**Results.** A surgical steering group met on a regular basis and reached consensus on governance issues, protocols for standardized data collection, and policies re-

garding data dissemination. All 14 centers that performed bypass surgery in the state participated. Patients who were surveyed reported statistically significant improvements in physical, emotional, and anginal-specific health status after bypass surgery. Baseline patient characteristics and longitudinal outcomes were compared across institutions.

**Conclusions.** Based on the feasibility of this collaborative outcomes reporting program, the HCA revised its policy regarding selective contracting and has helped to support an ongoing physician-led and -governed cardiac outcomes reporting system that is particularly notable for the subsequent integration of both CABG surgery and catheterization-based procedures into one standardized registry.

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In 1993, The Washington State Health Care Authority (HCA), which purchases health services for state employees and low-income individuals, was advised by the state legislature to designate and contract with a limited number of centers of excellence for coronary artery bypass surgery. The proposed effort, intended to ensure high-quality care for state enrollees, did not, however, identify by what criteria a center of excellence would be defined.

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For editorial comment see page 693.

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To aid in formulating the mechanism by which centers would be evaluated and selected, the HCA issued a Request for Information to hospitals and cardiothoracic surgeons asking the following question: What information should be requested from hospitals and surgeons to evaluate their abilities to implement, coordinate, and manage the delivery of complex, high-technology cardiac services?

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A prominent theme among physician respondents was the desire to increase physician input in the process and find an approach that would benefit all programs functioning in the state. Many challenged the lack of credible data needed to fairly evaluate the quality of a surgical program. They also argued that existing data on mortality rates and surgical volume alone were inadequate measures of quality, and had the potential to eliminate well-functioning programs from state contracts and to limit access to services for state enrollees. Respondents advocated that a broader array of outcome measures, such as self-reported health status, be included in an evaluation process. Virtually all respondents expressed a strong desire to avoid the politicized debates that had been observed in other cardiac surgery "report card" programs [1-3].

Based on this input, the HCA agreed to temporarily suspend the selective contracting policy, during which time an alternate proposal would be explored. The alternate proposal called for the creation of a statewide cardiac outcomes reporting program, under physician guidance, to be used by all institutions in the state to inform internal quality improvement activities. This article describes how the feasibility of this physician-led approach was evaluated.

## Patients and Methods

### *Creating a Collaborative Atmosphere*

An ad hoc group of project leaders organized two state-wide meetings in late 1993 and early 1994 to present the model of a physician-led cardiac outcomes registry. These initial meetings were characterized by considerable mistrust among many physicians and hospital administrators in attendance because of their concerns about any role the state might play as a regulator of cardiac services. However, based on the supportive leadership of the state HCA's Medical Director and the recognition by many physicians that a proactive response was in their interests, a tenuous agreement was reached on proceeding with a feasibility study.

Surgeons and administrators representing each of the 14 cardiac surgery institutions in the state were invited by ad hoc project leaders to form a Surgical Advisory Committee (SAC) to oversee the program. From within this oversight committee, a voluntary group of physicians formed a steering committee, which assumed primary leadership of the project. The committee also included input from University of Washington researchers, the Medical Director of the state HCA, and a representative from the nonprofit Foundation for Health Care Quality (an organization designed to facilitate public-private partnerships in health care). The steering committee provided periodic updates to the SAC and other interested parties, including several state health-care committees, the Washington State Medical Association, and a committee of state health plan medical directors.

Despite efforts by the project leaders to engage the broader cardiac community, many physicians remained concerned about inter-site competition and discoverability of the data. With hospitals in Washington State engaged in vigorous market competition, many were skeptical about the ability to generate a collaborative environment. Since the primary goal of this effort was to stimulate and to inform internal quality improvement activities, steering committee members unanimously agreed that a blinded process would allow institutions to participate without competitive distractions. Reports issued to individual institutions would identify only the recipient site, but the other sites would be masked. Procedures were then established to house data in a secure and confidential format. To optimize the utility of the registry for public education and research (or both), policies were developed to guide such activities. Any external uses of the data set would require steering committee approval and human subjects committee approval where indicated. Release of hospital or physician identified data could occur only with the written consent of the involved party. To protect patient confidentiality, no patient-identified data would be released.

These decisions by the steering committee proved invaluable in addressing many of the concerns raised by the medical community and in generating further support for the effort. These principles were reinforced through site visits to each institution in the state where face-to-face conversations occurred between the leader-

ship team and their colleagues. In this way, trust was generated and physicians and hospital administrators at each institution had the opportunity to actively participate in the development of the process.

### *Development of a Consensus Protocol*

The next step was to assess the mechanism for achieving standardization in data collection and reporting. This was done by developing a pilot-study protocol that focused on an outcome of interest to a wide physician and hospital community audience. Much of the work in cardiac reporting systems had focused on hospital mortality [4-7], but little information was available to providers regarding health status outcomes reported by patients after their operations. With new tools becoming available to measure patient-reported outcomes, an opportunity existed for generating preliminary statewide data in this domain, enhancing interest in the project, and modeling the steps needed to achieve consensus in data standardization.

A review of the literature supported the selection of the Medical Outcomes Study Short Form-36 (SF-36) as the primary measure of self-reported health status. The SF-36 is a 36 item, self-administered survey that characterizes health status in eight domains and two aggregate summary scores reflecting physical and emotional health. [8-9] This instrument had been well validated in diverse populations [10], including those with cardiac disease [10-13] and was gaining recognition as a standard for health status measurement. As secondary outcome measures, the steering committee also chose to include the Seattle Angina Questionnaire (SAQ), a recently developed and well-validated instrument that measures health status related to anginal severity [14]. Several supplemental questions about satisfaction with care were also included.

The leadership committee then addressed the need to obtain preoperative clinical data to gauge severity of illness. When the project began, many of the surgical programs in the state were subscribing to The Society of Thoracic Surgeons (STS) National Cardiac Surgery Database [15]; others participated in local and regional registries. Areas of incompatibility between existing systems were reconciled by the steering committee through a detailed, iterative, consensus-based process. Where data elements or definitions could not easily be reconciled, priority was given to the national STS elements given that they represented an existing profession-derived consensus process.

Having agreed upon the data collection tools, the committee then reached consensus on a variety of other methodological issues. The result was a study protocol that was approved by the University of Washington Institutional Review Board in August 1994 and by the SAC in November 1994. Briefly, each of the 14 hospitals that performed cardiac surgery in the state were asked to identify 100 consecutive patients undergoing isolated coronary artery bypass grafting (CABG) surgery. The protocol included procedures for obtaining informed consent, collecting baseline clinical data, administering

baseline health status surveys, and collecting procedural and hospital course information.

Early in the data collection effort, logistical difficulties were encountered when attempting to administer preoperative patient surveys in the setting of urgent and emergent procedures. To improve patient enrollment, a validation procedure was conducted to determine if patients could accurately recall their pre-procedure health status when asked during their recovery. Fifty patients in three institutions received the SF-12 [9] (a 12-item subset of the SF-36) before and immediately after surgical procedures with instructions to complete the survey representing their preoperative health status. Using analytic techniques described by Altman and Bland [16], patient recall of their preoperative health status was acceptable when administered between 3 and 7 days after surgical procedures. The protocol was subsequently revised to permit postprocedure enrollment for those patients unable to complete a self-administered survey before surgical procedures.

Patients were mailed surveys 6 months and 12 months after the procedure. These surveys included repeat administration of the SF-36 and SAQ, along with several questions related to satisfaction with care. Interim results were presented to the SAC with final aggregate and institution-specific results distributed to each participating institution. A final report to the state HCA presented blinded outcomes information and included a detailed evaluation of the feasibility of the effort with recommendations for future policy.

## Results

### *Results of the Pilot Data Collection Effort*

Between February 1, 1995, and June 30, 1996, all 14 cardiac surgery institutions in Washington State enrolled patients in the demonstration project (Appendix A). A total of 1,073 patients undergoing isolated CABG surgery were enrolled from the surgical centers and represented 77% of the target number. Actual enrollment across sites ranged from 37 to 107 patients. Enrollment rates ranged from a low of 18% to a high of 88% of eligible consecutive patients (100% represents complete consecutive patient enrollment). Reasons for lack of consecutive enrollment most often included logistical issues related to availability of personnel for data collection or complexities in identifying patients presenting to the system at different times and through different entry points.

The statewide hospital discharge registry in the state of Washington, known as the Commission Hospital Abstract Reporting System, was used to determine the representativeness of the study sample. Compared with the entire population of patients undergoing isolated CABG surgery in 1995 and 1996, study subjects were younger (63.9 versus 65.4 years), more likely to be male (79.6% versus 73.6%), had a shorter length of stay (6.7 versus 7.5 days), were less likely to have congestive heart failure (11.2% versus 13.8%), and were less likely to have required an intra-aortic balloon pump (3.2% versus 6.1%)

*Table 1. Characteristics of Subjects Included in the Washington State Pilot Study*

Variable	Characteristics of Aggregate Study Sample (n = 1,073)	Characteristics of Samples by Institution (Range for 14 Sites)
Age (y)	63.7	61.3-66.8*
Male	81.6	74.4-98.8**
Diabetes	21.9	16.3-29.0
Peripheral vascular disease	13.4	8.6-22.7
Cerebrovascular disease	7.5	2.3-11.7
Prior myocardial infarction	47.6	32.4-58.9*
Unstable angina	72.2	37.4-93.2***
Prior coronary artery bypass surgery	9.8	3.7-18.5
Ejection fraction < 30%	3.8	0.0-10.7
Emergency surgery	6.0	0.0-18.4***
Not married	23.6	14.8-46.2**
Social risk factors	35.5	27.3-52.5
Below high school education	16.1	6.3-26.3**
Not employed	66.1	52.3-80.9

Values as percents unless indicated. ANOVA F-Test used for comparisons by institution: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ ; Social risk factors = living alone, feeling lonely often, not enough social contact and/or not having someone to trust and confide in.

[ $p < 0.05$  for all comparisons]. These findings suggested that the patients included in the study were healthier than the overall group, an expected finding given the inability of extremely ill patients to complete baseline self-reported surveys.

After excluding known deaths (5 during the hospital course, 15 by 6 months, and 19 by 12 months), self-administered survey response rates at 6 months and at 12 months after the procedure were 83.2% and 74.6%, respectively. Initial response rates with each mailing were approximately 65%, but increased with the use of up to three reminder follow-up phone calls to nonresponders. Nonresponders at 6 months were on average younger (61.2 versus 64.1 years) and were more likely to have at least one social risk factor (42.9% versus 33.8%) compared with responders [ $p < 0.05$  for all comparisons]. Nonresponders at 12 months had a similar profile with the addition that they had a poorer mean baseline SAQ Anginal Frequency Score (53.3 versus 61.8) and were more likely to have a household income of less than \$25,000 per year (49.3% versus 39.2%) compared with responders [ $p < 0.05$  for all comparisons].

Table 1 demonstrates the preoperative characteristics of subjects enrolled in the pilot study and the range of sample characteristics among participating hospitals. Patient samples differed across institutions with respect to age, gender, prior myocardial infarction, angina type, surgical priority, marital status, and education level. The high degree of variability observed in angina type and surgical priority ( $p < 0.001$ ) was explored in a site audit performed at the end of the pilot study and identified

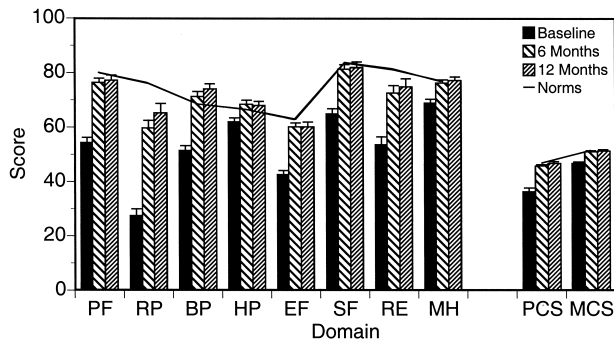


Fig 1. SF-36 scores among men before and 6 months and 12 months after CABG surgery; (PF = physical functioning; RP = role functioning-physical; BP = bodily pain; HP = health perceptions; EF = energy/fatigue; SF = social functioning; RE = role functioning-emotional; MH = mental health; PCS = physical component score; MCS = mental component score. Solid bar represents age-matched general population responses. Error bars represent 95% confidence intervals).

systematic differences in the coding of these elements. This finding suggested a need for further standardization in those elements most prone to interobserver variability and differing institutional conventions.

Figures 1 and 2 describe the eight SF-36 domain scores and two summary scores at each time point for men and women, respectively. These figures demonstrate large and statistically significant improvements between baseline and 6 months for all eight SF-36 domains. The Physical Component Score (PCS) and Mental Component Score (MCS), derived by the SF-36 developers to permit reduction of the eight domains into two summary scores without substantial loss of information, also demonstrated significant improvements between baseline and 6 months. Preoperatively, patients on average reported markedly lower levels of health status than the age-matched general population [10]; however, at 6 months and 12 months postoperatively, scores in most

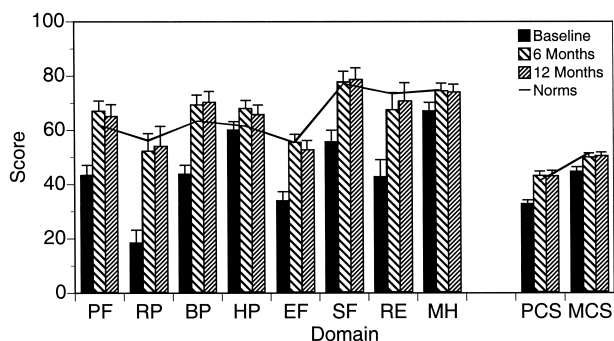


Fig 2. SF-36 scores among women before and 6 months and 12 months after CABG surgery. (PF = physical functioning; RP = role functioning-physical; BP = bodily pain; HP = health perceptions; EF = energy/fatigue; SF = social functioning; RE = role functioning-emotional; MH = mental health; PCS = physical component score; MCS = mental component score. Solid bar represents age-matched general population responses. Error bars represent 95% confidence intervals).

Table 2. Comparison of Physical Component and Mental Component Scores by Gender

Variable	Men		Women	
	No.	Mean (SEM)	No.	Mean (SEM)
<b>Physical Component Score</b>				
Baseline score***	824	36.3 (0.4)	179	32.8 (0.7)
6-month score**	666	45.5 (0.4)	147	43.0 (0.9)
Change score	633	8.7 (0.4)	139	10.4 (0.9)
<b>Mental Component Score</b>				
Baseline score	824	46.5 (0.4)	179	44.7 (0.9)
6-month score	666	50.6 (0.4)	147	49.7 (0.9)
Change score	633	3.6 (0.5)	139	5.1 (1.1)

Change Score = 6-month score - Baseline Score (for paired samples within each institution); ANOVA F-Test used for comparisons by gender: \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

domains approximated those reported by the age-matched general population.

Compared with men, women reported poorer baseline and follow-up physical component scores; however, the calculated change score for women and men was similar after surgical procedures. In the mental component score, women and men reported similar health status before and after surgical procedures and had similar calculated change scores. (Table 2).

Patients also reported significant improvements in anginal-specific health status (Fig 3). The greatest change occurred in the anginal severity score, with patients reporting a mean improvement of 48.2 points in the 6 months after surgical procedures. Emotional burden due to angina increased by an average of 39.9 points over 6 months. Satisfaction with treatment, as measured by the SAQ, was extremely high preoperatively and remained so after the procedure.

Table 3 displays baseline and 6-month physical component and mental component scores by institution. Statistically significant differences were noted across sites in baseline and 6-month follow-up PCS; however,

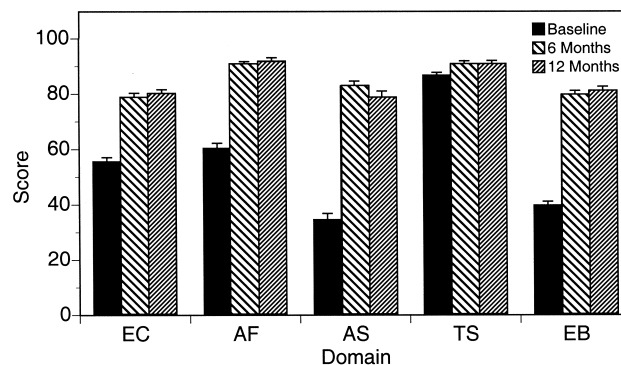


Fig 3. Seattle Angina Questionnaire scores before and 6 months and 12 months after CABG surgery. (EC = exertional capacity; AF = anginal frequency; AS = anginal severity; TS = treatment satisfaction; EB = emotional burden. Error bars represent 95% confidence intervals).

the calculated change score was similar across sites. No significant differences in baseline MCS were noted across sites; however, both 6-month follow-up and the calculated change score varied significantly across sites. The SAQ Anginal Frequency (AF) Score was also evaluated in this fashion. Baseline differences were observed in AF (Range: 47.5-69.1,  $p < 0.001$ ) and 6-month outcome (Range: 85.5-95.8,  $p = 0.007$ ). Change scores across sites ranged from 16.9 to 39.4 ( $p = 0.002$ ).

Because assessment of baseline health status was actually determined postoperatively in approximately 36% of patients, the preceding analyses were repeated using only those patients who completed the baseline health status survey before surgical procedures. This repeat analysis did not change the overall observed relationships between baseline and follow-up scores, further validating the use of retrospective collection of baseline health status within 7 days after the procedure.

Satisfaction with care was compared across institutions. No significant differences were noted across sites in degree of patient satisfaction with physicians, nurses, and hospital functions. On average 91.3%, 84.5%, and 64.0% of patients were highly satisfied with their physicians, nurses and hospitals respectively.

The analyses described in this section were ultimately included in individual site reports with the caveat that they were subject to important limitations, which were most notably due to the small sample sizes and enrollment biases. Because of the recognition that severity adjustment was important when comparing outcomes across institutions, issues relating to risk adjustment [17] were addressed by providing participants with a preliminary overview of the use of multivariate linear regression techniques in controlling for age, gender, and other significant baseline factors.

The data suggested that severity-adjusted health outcomes, particularly in the emotional health domains, differed across institutions. The finding highlighted the need to explore more rigorously how patient-reported outcomes may be useful in future quality improvement activities. Since the major objectives of this feasibility study were to assess the state's capacity for collaboration and standardized data collection and not to generate validated risk-adjustment models for health status outcomes, these preliminary multivariate analyses are not presented in this article.

#### Impact of Feasibility Study on State Policy

Upon completion of the feasibility study, the SAC and steering committee members met to review the project and consider implications for future efforts. The most important result from the feasibility study was that all hospitals implemented the study protocol in the face of a variety of competing institutional priorities and limited resources allocated for this activity. In doing so, they received preliminary yet novel information about patient self-reported outcomes up to 12 months after surgical procedures, and they became engaged participants in the process. Adherence to consecutive patient enrollment, although desirable, was a less important objective than complete hospital participation in this initial effort. The SAC concluded that further development of this physician-led approach, coupled with universal patient data capture and appropriate risk adjustment, had the potential to provide invaluable information to providers of cardiac care. Because the state had come to be viewed as a partner in the process, an unprecedented opportunity existed to create a statewide program intended to promote internal quality improvement through cooperative, not punitive, methods.

Table 3. Comparison of Physical Component and Mental Component Scores by Institutional Sample

Variable	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Number of Respondents														
Baseline	57	86	101	60	98	89	88	36	100	83	43	46	76	40
Six Month	47	71	81	39	82	76	74	28	86	72	36	32	58	31
Physical Component Score														
Baseline Score*	36.7 (1.5)	36.1 (1.2)	37.0 (1.0)	33.9 (1.2)	36.2 (1.1)	36.3 (1.0)	34.6 (1.0)	36.8 (1.6)	34.6 (1.0)	36.5 (1.2)	39.8 (1.4)	35.3 (1.5)	31.2 (1.2)	37.6 (1.7)
6-month score**	43.8 (1.6)	43.1 (1.3)	46.8 (1.1)	43.6 (1.7)	44.3 (1.1)	46.0 (1.2)	46.7 (1.2)	46.4 (2.2)	44.4 (1.4)	47.8 (1.3)	46.4 (1.6)	44.0 (1.8)	40.3 (1.5)	47.3 (1.8)
Change score	7.2 (1.8)	7.5 (1.5)	9.7 (1.2)	9.5 (1.6)	7.9 (1.2)	9.6 (1.1)	11.4 (1.2)	9.7 (1.8)	8.9 (1.2)	11.3 (1.2)	7.2 (1.7)	7.9 (2.0)	7.6 (1.4)	9.0 (1.9)
Mental component score														
Baseline score	44.0 (1.4)	46.4 (1.4)	47.1 (1.1)	47.5 (1.4)	46.6 (1.3)	45.0 (1.1)	45.9 (1.3)	47.3 (1.8)	45.8 (1.1)	49.8 (1.2)	48.1 (1.8)	45.4 (1.9)	42.5 (1.5)	44.8 (1.7)
6-month score***	48.3 (1.5)	49.0 (1.4)	53.7 (0.9)	51.3 (1.4)	50.2 (1.1)	52.0 (1.1)	51.2 (1.2)	53.5 (1.4)	50.1 (1.2)	49.5 (1.3)	55.1 (1.4)	47.8 (2.5)	45.3 (1.6)	49.7 (1.6)
Change score*	3.9 (2.1)	0.8 (1.5)	6.4 (1.3)	3.8 (1.5)	4.1 (1.3)	6.6 (1.5)	6.0 (1.5)	6.1 (1.8)	4.1 (1.2)	-1.6 (1.5)	5.5 (2.4)	1.4 (1.7)	3.5 (1.4)	3.0 (2.3)

Values represent Mean (SEM). No. of 6-month follow-up cases; Change Score = 6-month score-Baseline Score (for paired samples within each institution); ANOVA F-Test used for comparisons by institution: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

In the final report to the HCA, recommendations were detailed describing a phased approach that would establish an ongoing program to provide outcomes data on cardiac revascularization procedures. Included was a recommendation that the program be expanded to include catheterization-based procedures in an effort to better understand the full array of revascularization options used in the treatment of coronary artery disease. As envisioned, the program would first seek to obtain complete capture of baseline patient data, procedural information and short-term procedural outcomes, including complications, length of stay, and deaths for surgical and catheterization-based procedures. Reports with this information would be provided quarterly to institutions and presented in a comparison format. When logistically feasible, reports would integrate patient-reported outcomes, as modeled in the pilot study, and information on readmissions for subsequent cardiac procedures.

The HCA agreed to revise its policy on selective contracting and to support the alternate model as proposed. Beginning in 1998, HCA contracts required health plans and their respective cardiac hospitals to participate in the newly inaugurated Clinical Outcomes Assessment Program (COAP). Funding for this activity would occur through support from HCA, the Foundation for Health Care Quality, and participating hospitals. This program was certified by the State Department of Health as a "Coordinated Quality Improvement Program," which provides legal protection under state law for information used by hospitals for internal quality improvement purposes.

### Comment

The Washington State paradigm emerged from a demand for accountability in the quality of care by a large state purchaser. Had the policy of selective contracting been implemented, a number of medical centers in the state would have lost their contracts for state-funded patients without a recognized basis for defining a center of excellence. The feasibility study demonstrated that an organized physician effort had the capacity to influence state regulatory policy and to foster broad-based community support for an outcomes reporting program designed to help all institutions in the state improve care.

The principles exemplified in this program were developed based on evidence that clinical benchmarking is a powerful stimulus to quality improvement [18]. Further, the pioneering efforts by the Northern New England Cardiovascular Study Group [19], the Minnesota Society of Thoracic Surgeons [20] and the Alabama Cooperative CABG Project [21] have demonstrated that outcomes data reporting in a collaborative environment helps professionals work together and learn from each other in pursuing a common goal of quality improvement.

COAP has expanded on these principles by integrating both surgical and interventional procedures into one registry compatible with existing STS and American College of Cardiology data elements, while fostering a

collaborative approach in a highly competitive statewide market. COAP is now functioning as a physician-led collaborative organization administered under the auspices of the Foundation for Health Care Quality. The program serves the cardiac community in Washington by providing timely comparative reports to institutions that perform coronary artery bypass graft and percutaneous coronary intervention procedures.

A COAP management committee is led by cardiac surgeons and cardiologists from within the state. Subcommittees open to representatives from all participating institutions have assumed responsibility for addressing key components of the program, including policy issues, data collection and submission logistics, data definition standardization, and analytic techniques. It is anticipated that the Management Committee, working with hospitals and physician groups, will stimulate quality improvement activities in the state by facilitating organized discussion about observed variability in processes and outcomes of care. The successful implementation of COAP has added to the existing body of experience by further demonstrating that proactive physician leadership in collaboration with other agencies has the unique capacity to balance the informational needs of the medical community with those of regulatory bodies.

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## Appendix

### *Study Coordinators at Each Institution*

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#### **Sacred Heart Medical Center, Spokane, WA**

Mandya Vishwanath, MD

#### **St. Joseph Hospital, Bellingham, WA**

James Douglas, Jr, MD, Susan Spaniol, MN,

#### **St. Joseph Medical Center, Tacoma, WA**

G. Gilbert Johnston, MD, Pam Charboneau, RN

#### **Swedish Hospital Medical Center, Seattle, WA**

Don Miller, MD, Margaret Kimball, ART, Jann L. Smart

#### **Tacoma General Medical Center, Tacoma, WA**

Ronald Knight, MD, Carole Burton, BSN

#### **University of Washington Medical Center, Seattle, WA**

Bradley Hofer, MD, Vickie Fishfader

#### **Veteran's Affairs Medical Center, Seattle, WA**

Richard P. Cochran, MD, Julia Kieras, BSN

#### **Virginia Mason Medical Center, Seattle, WA**

Richard P. Anderson, MD, Sandra L. Tidwell, ARNP