

Cardiac Surgeons and the Quality Movement: the Michigan Experience

Richard L. Prager, MD,* Frederick R. Armenti, MD,[†] Joseph S. Bassett, MD,[‡] Gail F. Bell, MSN,[§] Daniel Drake, MD,[¶] Eric C. Hanson, MD,^{||} John C. Heiser, MD,[#] Scott H. Johnson, MD,^{**} F. B. Plasman,[§] Francis L. Shannon, MD,^{††} David Share, MD,^{‡‡} Patty Theurer, BSN,[§] and Jaelene Williams, MS,[§] for the Membership of the Michigan Society of Thoracic and Cardiovascular Surgeons

The Michigan Society of Thoracic and Cardiovascular Surgeons created a voluntary quality collaborative with all the cardiac surgeons in the state and all hospitals doing adult cardiac surgery. Utilizing this collaborative over the last 3 years and creating a unique relationship with a payor, an approach to processes and outcomes has produced improvements in the quality of care for cardiac patients in the state of Michigan.

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Historical Introduction

The Michigan Society of Thoracic and Cardiovascular Surgeons (MSTCVS) was founded in 1965 during an era when many national, regional, and state speciality societies were beginning. The first meeting of what was initially called the Michigan Society of Thoracic Surgeons was held on September 21, 1965 in Detroit in conjunction with the Michigan State Medical Society (personal communication, Allen Silbergleit, MD, PhD, Historian, Michigan Society of Thoracic and Cardiovascular Surgeons, August 2008). The initial meeting was attended by 17 of the 60 board certified thoracic surgeons in Michigan. Dr Cameron Haight, Head of the Section of Thoracic Surgery at the University of Michigan in Ann Arbor, was the President of the society.

As one of the first state thoracic organizations, plans were implemented for an annual meeting, which in the initial years often occurred in conjunction with the American College of Surgeons Michigan Chapter meeting. In the mid-1980s the Michigan Society of Thoracic Surgeons created its own meeting time and moved the annual meeting to resort areas in northern Michigan in late summer. Recognizing the evolution of the speciality of Thoracic Surgery, in 1988 the name of the organization was changed from the Michigan Society of Thoracic Surgeons to the Michigan Society of Thoracic and Cardiovascular Surgeons. Today, the Society has over 100 board-certified thoracic surgeon members, as well as associate members, including data managers, physician assistants, and perfusionists.

Since its inception in 1965 the society has had yearly meetings with the initial focus of these meetings on case presentations, as well as providing an opportunity for house officers from Michigan programs in general surgery, and the two thoracic surgical residency programs to present scientific papers. Presentations from invited cardiac and thoracic surgeon guests with expertise in various areas have become a part of the meeting programs in recent years.

Starting in the late 1990s, discussions at the summer meetings focused on creating a statewide clinical database and using the forum of the meetings to discuss outcomes. Partially stimulated by ongoing discussions in southeast Michigan by purchasers and payers about access to cardiac surgical outcomes data, as well as consideration by the Greater Detroit Area Health Council to create a cardiac surgical outcomes data-

*Section of Cardiac Surgery, Department of Surgery, University of Michigan, Ann Arbor, Michigan.

[†]McLaren Regional Medical Center, Flint, Michigan.

[‡]Beaumont Hospital Royal Oak, Royal Oak, Michigan.

[§]MSTCVS Quality Collaborative, Ann Arbor, Michigan.

[¶]Munson Medical Center, Traverse City, Michigan.

^{||}Beaumont Hospital Troy, Troy, Michigan.

[#]Spectrum Health, Grand Rapids, Michigan.

^{**}Sparrow Hospital, Lansing, Michigan.

^{††}Southeastern Michigan Cardiovascular Surgeons, Troy, Michigan.

^{‡‡}Department of Family Medicine, University of Michigan Health System, Ann Arbor, Michigan.

Address reprint requests to Richard L. Prager, MD, 5144 Cardiovascular Center, 1500 E. Medical Center, Drive, Ann Arbor, MI 48109-5864.
E-mail: rprager@umich.edu

base of its own, the MSTCVS members recognized an opportunity to create a regional data system and step into the world of structure, process, and outcomes in cardiac surgery.

Prompted by these discussions, as well as the early publications of the Northern New England Consortium,¹ and recognizing an opportunity, the MSTCVS created a regional report with the Society of Thoracic Surgeons (STS) and the Duke Clinical Research Institute (DCRI) with data from approximately half of the 30 programs in Michigan. This embryonic collaborative approach allowed the surgeons a forum to review their data collectively once a year at the summer meeting and discuss site outcomes and approaches. These data were unblinded at the meeting and prompted active discussions of techniques, patient selection, and care approaches. Over the ensuing early years, more programs were encouraged to participate voluntarily in the STS database and gradually other sites began sharing their data with the state in a regional report as well. An atmosphere of self-improvement was fostered among the surgeons, and as surgeon relationships grew, even in competitive environments, discussions became more specific, more “granular,” and allowed program insights into structures and processes that were successful at other, often competitor, institutions. With time, a major portion of the yearly summer meeting focused on data, data manager education, and outcomes and process discussion.

Simultaneously, led by a core group of experienced STS data managers in the state of Michigan, separate meetings were created throughout the state to enhance the understanding of STS definitions, the coding of cases, and the mechanisms to do all of this efficiently. A parallel organization was created of “Michigan STS Data Managers” who participated both in our state quality meeting as well as by using a portion of the state meeting for their own educational activities. A robust quality initiative was created with nearly all the adult cardiac programs in the state on a voluntary basis under the umbrella of the MSTCVS.

Partnering with a Payer

In 1996, the Blue Cross/Blue Shield of Michigan Centers of Excellence Project asked Michigan hospitals involved with interventional cardiologic approaches to coronary artery disease to consider participating in a voluntary registry. Nine hospitals agreed and a data registry of interventional procedures and outcomes was initiated in December 1997 known as the Blue Cross/Blue Shield of Michigan Cardiovascular Consortium (BMC2).¹ This voluntary consortium involved physicians, administrators, and personnel from 9 hospitals in Michigan participating in a registry for percutaneous coronary interventions, which was funded by a payer, Blue Cross/Blue Shield of Michigan. This model was designed to provide validated information and outcomes for quality improvement initiatives for interventional approaches to coronary disease. This early collaborative created a partnership between a payer, physicians, and institutions and set the stage for the reality of an economic recognition of quality. As more institutions joined BMC2,¹ publications ensued which de-

scribed outcomes, process approaches, and economic benefits of the quality collaborative approach.²

With this template, Blue Cross/Blue Shield of Michigan entered discussions with the MSTCVS knowing the considerable involvement of the MSTCVS in a voluntary quality collaborative and understanding some of the expenses of this type of initiative from Blue Cross/Blue Shield of Michigan's experience with BMC2.¹ These robust discussions focused on the MSTCVS's vision that these data were the State Society's data and the Society believed the quality initiative was the responsibility of the cardiac and thoracic surgeons in the state of Michigan. While creating a funding arrangement with a payer-facilitated advancement of a quality approach with interventional cardiologists throughout the state, this was not an automatic template to be used for the cardiac surgeons in this state, and the MSTCVS's discussions with Blue Cross/Blue Shield of Michigan brought clarity to the state surgeons' goals, including the following:

1. Maintaining a quality collaborative data system throughout the state for cardiac operations and maintaining the voluntary participation of all cardiac surgical programs
2. Creating mechanisms for review of appropriate data
3. Creating rapid cycle feedback for programs in the state using the data
4. Funding full-time personnel to create an audit system as well as an active communication system with all programs in the state from a central resource center
5. Funding for expenses at the institutions for data management
6. Funding for quarterly reports and meetings

These discussions ensued for 2 years and in 2005 a document was signed by both Blue Cross/Blue Shield of Michigan and the MSTCVS creating a relationship to partially fund the extant cardiac surgeon-led quality collaborative, a very unique arrangement. It is noteworthy that Blue Cross/Blue Shield of Michigan is the dominate payer in the state of Michigan.

Quality Collaborative

Prior to creation of the cooperative agreement with Blue Cross/Blue Shield of Michigan, all adult cardiac surgical sites in Michigan began participating in the MSTCVS quality collaborative. With the agreement, funding was provided to each site for a portion of the data manager's salary and the STS data submission fee and the STS-DCRI quarterly Michigan data reports. With additional budgetary monies, two experienced nurses were hired full time, one as the MSTCVS quality initiative specialist and the second as the data management specialist. An office was established to create a central site for the collaborative. Initial efforts were focused on communication with all sites and e-mail systems setup with all data managers as well as the cardiac surgeons. This facilitated communication and arrangement of auditing visits and the initiation of the new model of quarterly meetings. With the funding facilitating the data accrual, the state of Michigan created quarterly reports from the STS and DCRI to be used at the quality meetings held every 3 months at different hospi-

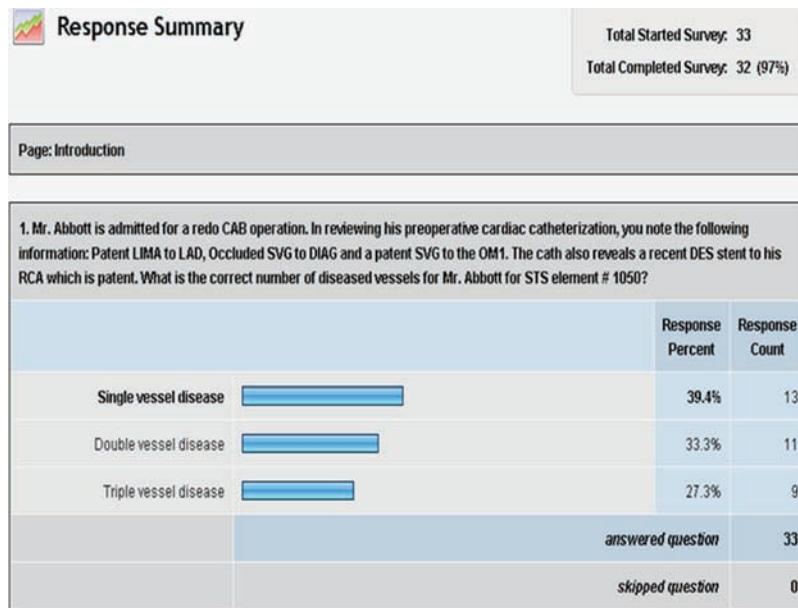


Figure 1 Example of a “Survey Monkey” case presented to data managers from all 33 sites.

tals in the state. These were attended by data managers and cardiac surgeons from all sites. The meetings focused on data review on a statewide level, as well as the individual site level, and the data were unblinded for the discussion. Confidentiality agreements were signed at each meeting with the understanding that none of these data could be used for individual or institutional purposes and were the property of the MSTCVS collaborative, as well as the STS.

Clearly a part of the foundation of this collaborative were the Michigan STS data managers who organized their own meetings often the day preceding the quarterly statewide meeting to go over definitions, approaches to problematic data areas, such as establishing a methodology for 30-day mortality follow-up, and education of the data manager group as a whole often focusing on the least experienced data managers. Utilizing Survey Monkey, an Internet-based survey tool, imaginary case scenarios were created and then coded by the data managers before their meetings. Responses were collated and presented at the meeting where discussion

of the case and data definitions resulted in improved understanding and statewide coding consistency.

This approach created a forum for discussion of data definitions and appropriate coding for both simple and complex clinical presentations. Figure 1 is an example of a Survey Monkey question created and reviewed at a data managers meeting (Fig. 1).

Statewide hospital audits were initiated in 2006 at all sites. The audits were conducted by the MSTCVS’s Data Management lead and the Quality Initiative lead. Figure 2 shows the audit scores statewide over the last 2 years. The audit is a review of the accuracy of data abstraction for 72 variables in the database, including all morbidity and mortality risk model variables, select cardiac surgery process measures, and postoperative surgical outcomes. The audits include coronary revascularization as well as valve cases. The 2-day audit is used as an audit-educational experience involving the review of 15-20 charts. These visits are considered an opportunity for educational interaction among peers and have pro-

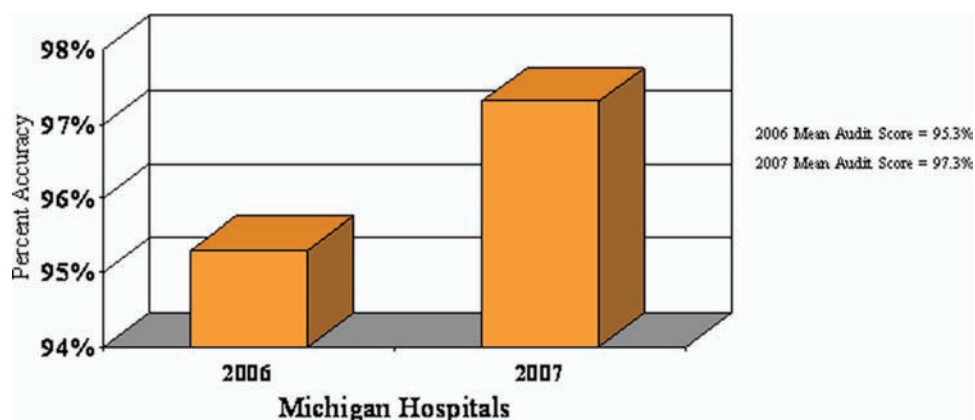



Figure 2 MSTCVS data audit scores for 33 sites 2006 and 2007.

vided significant benefits to the participating sites, as well as to the coordinating center.

Future MSTCVS data audits will provide a 1 to 5 star rating system for audit accuracy scoring purposes and involve weighting of the audit variables themselves (Fig. 2).

The coordinating center facilitates the quarterly quality meetings and has a large role in the summer meeting, of which one day is devoted to the quality collaborative project. To facilitate all this, a Web site for the State Society, <http://www.mstcv.org>, has been created which provides the meet-



MSTCVS IMA EXCLUSION CRITERIA
ISOLATED CAB

Hospital: _____ **Surgeon:** _____
Procedure Date: ___ / ___ / 20___ **Pt. initials or ID #:** _____

Procedure: CAB w/ greater svg → _____, _____, _____, _____, _____
radial → _____, _____, _____ **lesser saphenous vein** → _____, _____
gastroepiploic → _____, _____ **cephalic vein** → _____, _____
inferiorepigastric → _____, _____ **other conduits:** _____ → _____

Please document primary reason for IMA exclusion:

- **The LAD is not suitable for LIMA grafting: (target vessel too small)**
- **IMA used for prior CAB operation**
- **Calcified or diffuse coronary disease in the LAD**
- **Subclavian stenosis**
- **Previous thoracic surgery**
- **Previous mediastinal radiation**
- **Current use of immunosuppressive agents (eg, Prednisone, Imuran, or other)**
- **Coagulation disorder**
- **Chronic renal insufficiency**
- **Emergent procedure**
- **Require concomitant surgery (eg. Aneurysm resection, valve replacement)**
- **Morbid obesity**
- **Other:** _____

Please return to MSTCVS Coordinating Center
Fax# 734-998-6422

Adapted from The Leapfrog Group (Expert Panel-Endorsed Process Measures)
www.leapfroggroup.org

For Peer Review by the MSTCVS Quality Initiative Committee

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Figure 3 IMA Exclusion criteria form.

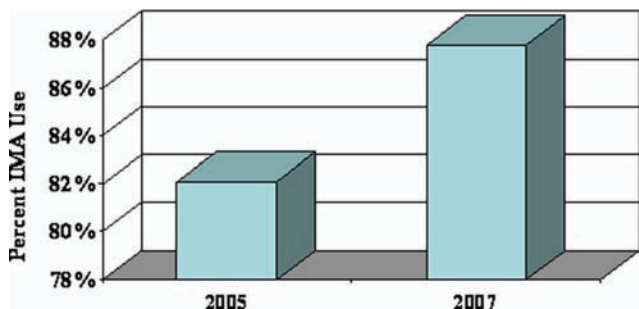


Figure 4 Michigan isolated CAB: Increase in IMA use at 7 target sites.

ing agendas, a portion of the quality initiative presentations, and the suggested care protocols that are endorsed by the collaborative.

Over the last 12 months, the State Society has created an associate member category, including all our State Society data managers, as well as interested perfusionists, nurse practitioners, and physician assistants working in the arena of cardiac surgery at our 33 participating hospitals. Recognizing the importance of perfusion technology, the Quality Collaborative is supporting the creation of a State of Michigan perfusion database. Perfusionists use our quarterly meetings to meet as well and are leading the efforts in a statewide approach to blood conservation.

Improvement Initiatives

The initial phases of our State Society’s quality initiative, even before partial payer funding, targeted process and outcome variables for focused review. These included the following:

1. Internal mammary artery (IMA) usage
2. Preoperative intra aorta balloon pump usage
3. Prolonged ventilation
4. Postoperative atrial fibrillation
5. Coronary artery bypass crude and risk adjusted mortality

Other areas reviewed included postoperative renal failure and postoperative cerebral vascular accident. As the collaborative became a more unified group and surgeons developed a “comfort zone” to discuss specific institutional results in an open forum, these 5 areas became a focus. These selected processes and outcomes variables were consistent with vari-

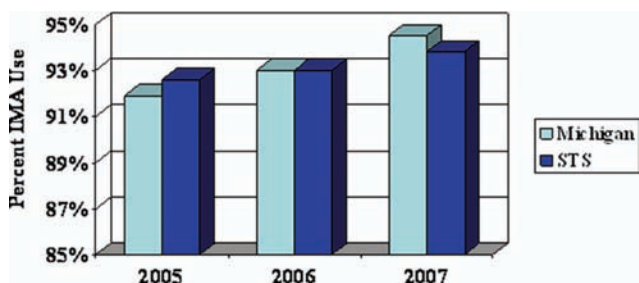


Figure 5 Michigan and STS isolated CAB: Internal mammary artery use (IMA).

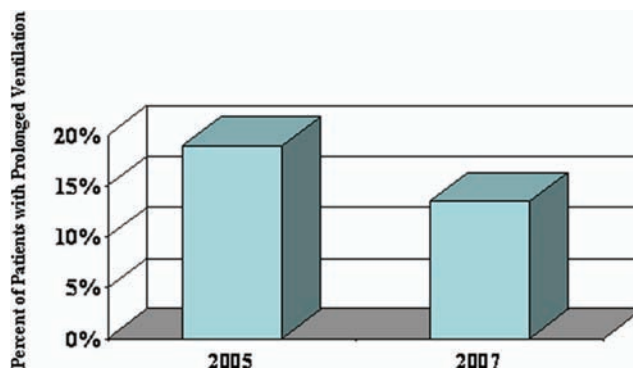


Figure 6 Michigan isolated CAB: Decrease in prolonged ventilation rates at 7 target sites.

ables used by the national quality forum as well as the STS for composite metrics.

In the quarterly meetings, site-specific data were reviewed. Sites that were outside the STS and Michigan average were identified. Approaches used at sites with consistently “better” outcomes were described and protocols and philosophies were shared. IMA use varied statewide with use percentages for isolated coronary artery bypass in the 60%-70% to the high 90% range. Noting this, the MSTCVS instituted a form to be filled out each time an internal mammary artery was not used on a primary coronary artery bypass procedure. These were filled out by the surgeons and faxed to the coordinating site for a review, tabulation and presentation the following quarter. Figure 3 is an example of the IMA Exclusion Criteria form.

IMA use was targeted noting Michigan’s overall use of the internal mammary artery at 81% from 2000 to 2002 for the state. With the program as outlined, the 7 outlier sites for mammary artery use have increased their use from an overall of 82% in 2005 to 88% in 2007 (Fig. 4), resulting in an increase of Michigan’s overall use on the statewide level to 94%, which is now above the STS average (Fig. 5).

Prolonged ventilation was a second example of an area of collaborative intervention. Again, sites were identified specifically. Seven of the 33 had significantly higher prolonged ventilation rates. Presentations and discussions occurred at the quarterly meeting and protocols were shared for facilitating timely extubation.

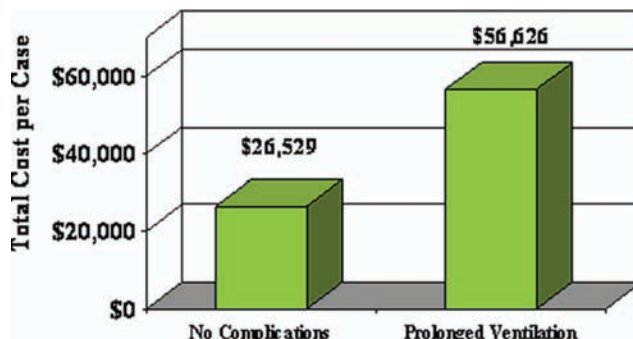


Figure 7 Michigan isolated CAB: Average total cost per case.

Patient Identifier: _____ Surgeon _____ DOS ____/____/____ DOD ____/____/____ Transfer: Yes No If yes: Hospital _____

Procedures (1) _____ (2) _____ (3) _____ (4) _____ STS Risk: _____ Euro Score: _____

CASE SUMMARY: include PHASE OF CARE MORTALITY ANALYSIS COMMENTS and CAUSE OF DEATH:

PHASE OF CARE MORTALITY ANALYSIS: Please select one PHASE (Pre-op, Intra-op, etc) and circle one subcategory (Judgment or Patient Preparation, etc)

<p>Pre-Operative Phase</p> <p>Cardiac risk factor profile e.g. CHF Cardiogenic shock Myocardial viability</p> <p>Non-cardiac risk factor profile: ≥ 2 major risk factors e.g. Renal failure on dialysis COPD Cerebrovascular Disease Peripheral Vascular Disease</p> <p>Judgment Timing of surgery Risk > benefit</p> <p>Patient preparation Medical status optimized</p> <p>Patient evaluation Functional class Risk identification e.g. cancer</p> <p>Other: _____</p>	<p>Intra-Operative Phase</p> <p>Anesthesia Technical (lines, TEE, ET) Pharmacologic management Recognition/treatment of issues</p> <p>Surgeon Judgment Technical Myocardial protection</p> <p>Cardiopulmonary By-Pass Parameters (hct, MAP, mVO₂) Fluid management</p> <p>Catastrophic event (specify): _____</p> <p>Other: _____</p>	<p>Post-Op ICU Phase</p> <p>Hemodynamic management Inotrope titration Adequate O₂ delivery</p> <p>Respiratory care ICU care (Keystone criteria) HOB elevated 30 degrees DVT prophylaxis Sepsis prevention/treatment Nutritional support Glycemic control PUJ Prophylaxis</p> <p>Surveillance/recognition/Rx of Decompensation</p> <p>Catastrophic event (specify): _____</p> <p>Other: _____</p>	<p>Post-Op Floor Phase</p> <p>Pharmacologic management Coumadin Other</p> <p>Surveillance/recognition/Rx of decompensation</p> <p>Sepsis prevention/treatment</p> <p>Catastrophic event (specify): _____</p> <p>Other: _____</p>	<p>Discharge Phase</p> <p>Appropriate disposition: e.g. Nursing home/ECF vs. home</p> <p>Pharmacologic details</p> <p>Adequate instruction and support network e.g. Visiting Nurse</p> <p>Catastrophic event (specify): _____</p> <p>Other: _____</p>
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<p>As identified in the Phase of Care above, was this pre-terminal "Seminal event" Avoidable? Yes No If Yes: How: _____</p> <p>Relative Strength this seminal event triggered fatal Outcome: Certain Most Likely Uncertain</p>	<p>Was Surgical Death Avoidable Yes No How: _____</p>
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Figure 8 Phase of care mortality analysis (POCMA) form.³

In 2005, the rates for prolonged ventilation ranged from 13.7% to 36%. In 2007, following intervention, the range dropped to 11.2%-15.2% with the overall prolonged ventilation rate dropping from 19% to 13.8% ($P = 0.0004$), as seen in Fig. 6.

Based on a cost analysis from selected adult cardiac surgery programs in Michigan, it is estimated that there is a US\$30,000 savings when ventilation is not prolonged, as shown in Fig. 7.

The MSTCVS has reviewed data from programs with risk-adjusted mortality in 2 of 3 consecutive 6-month periods that

is higher than the Michigan average and the STS average. These programs are selected for a formal site visit. The site visit team consists of the Quality Initiative and Quality Data Management leads, as well as two surgeons from a noncompetitive geographic area in the state. The visit consists of a facility tour and a meeting with key clinical and administrative personnel and concludes with review of the cardiac surgery mortality cases. A review letter is returned to the site with an analysis of the findings and a discussion of opportunities for improvement. The programs then continue to be monitored as part of the larger group review.



Figure 9 Outcomes profiling and public reporting panel discussants; R.L. Prager, MD, F. Edwards, MD, J. Santa, MD, D. Shahian, MD.

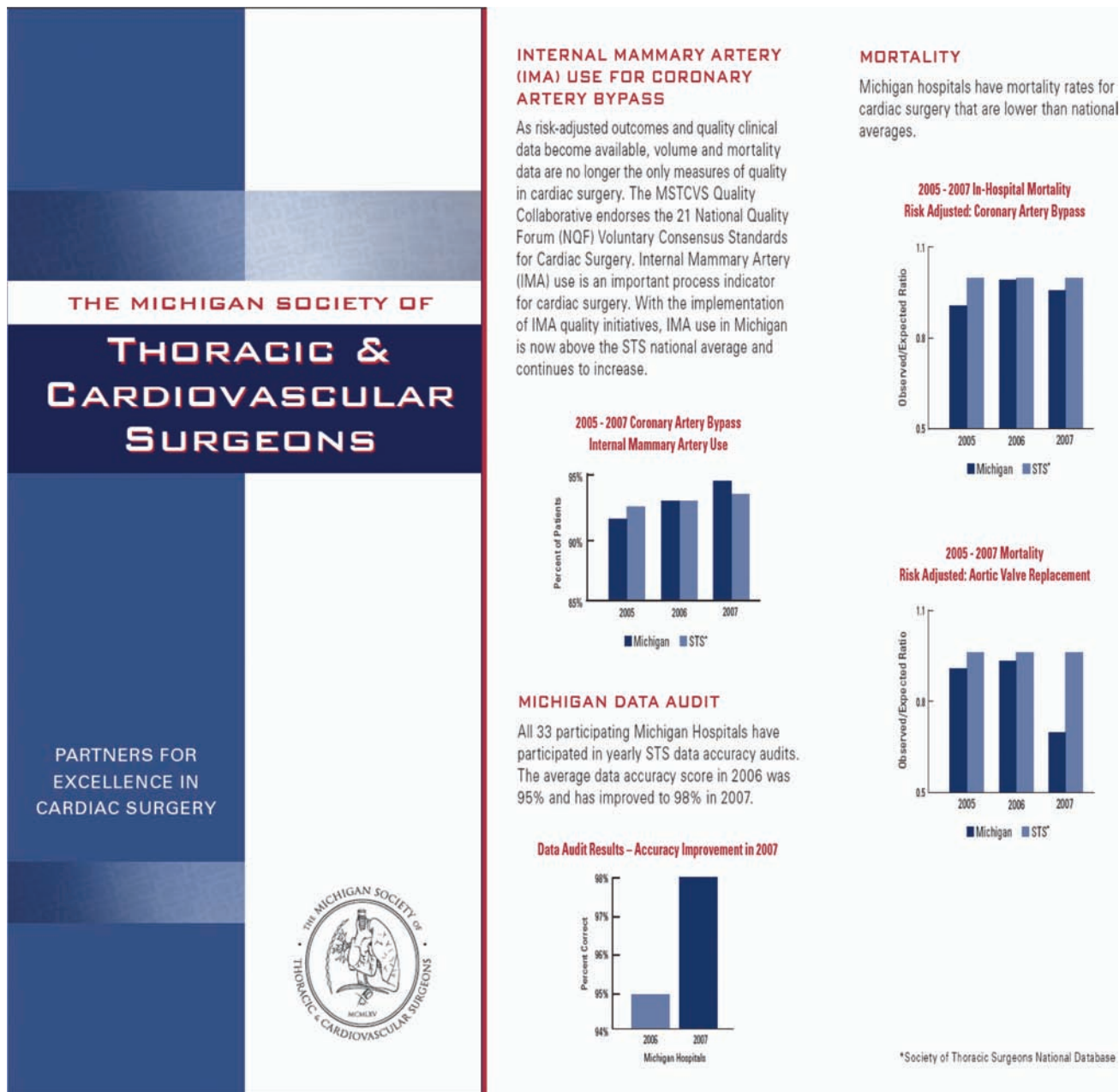


Figure 10 MSTCVS Quality Collaborative brochure.

A global view of statewide mortality has been undertaken for Michigan cardiac surgical mortalities in 2006 and 2007. This review uses a “phase of care mortality analysis” as a method to attempt to identify the phase of the patient’s care, including the disease presentation, when a decision or an event precipitated the patient’s death. By selecting one phase of care, the initial review of mortalities from 2006 and 2007 revealed that in 35% of the deaths, the preoperative timeframe was identified as having a direct relationship to the mortality. Further analysis of these data and delineation of approaches to decision-making and processes of care for cardiac surgery is ongoing. Figure 8 is an example of the Phase of Care Mortality Analysis form.³

Stimulated by publication of outcomes in cardiac surgery in other states, the MSTCVS hosted a panel on outcomes profiling and public reporting at the August 2008 summer meeting. The panel members included John Santa, MD, the newly appointed Director of Consumer Reports Health Ratings Center, Fred Edwards, MD, the Chair of the STS Database, and David Shahian, MD, the Director of Research at the Center for Quality and Safety at the Massachusetts General Hospital Institute for Health Policy (Fig. 9). Coincident with this initiative and recognizing an MSTCVS responsibility, the Society has taken a “gentle” step into result reporting with a Society-sponsored brochure containing overall state data distributed throughout Michigan in the fall of 2008, as shown in Fig. 10.

With the unity created by the MSTCVS because of the formation of this quality initiative, the role of our State Society has continued to evolve. We have created a Society liaison role and our representative now travels to all 33 hospitals to educate and inform administrative leadership at the institutions about their role in the quality collaborative and to review aspects of their program's results related to quality improvements. The results of our quality collaborative have been presented to the Michigan Hospital Association, the state's Certificate of Need (CON) committee, as well as our state's senators and representatives in Washington, DC. Leadership of our State Society has visited Capitol Hill in Washington, DC to present our collaborative and the role of the state cardiac surgeons. Our visibility is creating opportunities for cardiac surgical leadership to participate in state health policy discussions and approaches.

The MSTCVS is confident that clinical improvements cannot only be sustained but enhanced and surgeon cooperation and engagement continued at a very active level. Our State Society is comfortable with this role and responsibility and believes that in our current health care environment, state cardiac surgical leadership must take this opportunity to lead the quality movement. It is clear over the last 3 years we have created a very important and unique relationship with Blue Cross/Blue Shield of Michigan that facilitates an active and aggressive quality collaborative.^{4,5}

Early financial analysis from 7 of the adult cardiac surgical programs in Michigan demonstrate the financial savings potential when outcomes are improved and complications are avoided. A more sophisticated in-depth review is currently being undertaken with Blue Cross/Blue Shield of Michigan (personal communication, J. Birkmeyer, November 2008). While there is a sense that the quality collaborative model may fund itself,⁶ it is clearly one example of an innovative approach to the quality movement. This model has been successful for our Society and has improved processes and outcomes and created benefits for our patients as well as the payer.

Appendix

Michigan Society of Thoracic and Cardiovascular Surgeons Quality Collaborative Participants: Jeffrey Altshuler, MD, Julie Anderson, PA-C, Dimitrios Apostolou, MD, Agustin Arbulu, MD, Eduardo Arciniegas, MD, Frederick Armenti, MD, Ingida Asfaw, MD, Frank Baciewicz, MD, Kourosh Baghelai, MD, Jeralyn Baker, CCP, Douglas Baldwin, MD, Robert Bartlett, MD, Joseph Bassett, MD, Sanjay Batra, MD, Paul Betley, CCP, Margaret Bishop, RN, Theodore Boeve, MD, Steven Bolling, MD, Edward Bove, MD, Robert Brewer, MD, Michael Brown, PA-C, James Caralis, DO, Gary Chmielewski, MD, Alonso Collar, MD, Reza Dabir, MD, G. Michael Deeb, MD, James Delavan, MD, Alphonse Delucia, MD, Steven Demos, MD, Vernon Dencklau, DO, Daniel Drake, MD, Andrew Duda, MD, Anthony Fabaz, DO, Franco Fazzalari, MD, Carl-

ton Fischer, MD, Karsten Fliegner, MD, Otto Gago, MD, Harold Gallick, MD, Thomas Gazdecki, DO, Amy Geltz, RN, Christopher Genco, MD, Gary Goodman, MD, William Gordon, MD, David Grix, CCP, Jonathan Haft, MD, Michael Halpin, MD, Eric Hanson, MD, Steven Harrington, MD, Robert Harrison, MD, John Heiser, MD, James Herlocher, MD, John Hilu, MD, Eric Hoenicke, MD, Jonathan Hoffberger, DO, Anthony Holden, MD, Robert Holmes, MD, Robert Hooker, MD, Kevin Jager, PA-C, Scott H. Johnson, MD, Robert Jones, MD, Ali Kafi, MD, Richard Kanten, CCP, M. Michael Khaghany, MD, Marvin Kirsh, MD, Bobby Kong, MD, Mohan Kulkarni, MD, Dorothy Latham, RN, Michael Lee, MD, C. Douglas Lees, MD, Carmen Leone, CCP, Randall Lester, Chris Liakonis, DO, Paul Loh, PA-C, Donna Long, RN, Mahender Macha, MD, George Mack, DO, Shahrokh Mansoori, MD, Mark Marbey, MD, Curtis Marder, MD, Luigi Maresca, MD, David Martin, MD, James Martin, MD, Alfredo Martinez, LPN, Valerie Michalski, CCP, Cecilia Miller, CCP, Kristijan Minanov, MD, Moufid Mitri, MD, Edward Murphy, MD, Kristina Nitzsche, PA-C, Todd Nord, CCP, Suzanne O'Brien, RN, Charles O'Brien, MD, Richard Ohye, MD, Mark Orringer, MD, Robert Owens, CCP, Francis Pagani, MD, Ryan Pagnanelli, CCP, Michael Palluzzi, RN, Gaetano Paone, MD, Michael Parish, MD, Maria Parsons, PA-C, Lawrence Patzelt, MD, Theron Paugh, CCP, Allan Pickens, MD, Robert Porter, MD, Richard L. Prager, MD, Andrew Pruitt, MD, Richard Rasmussen, MD, Phillip Robinson, MD, James Rogers, MD, Louis Rondini, DO, Gary Roth, DO, Marc Sakwa, MD, John Sealey, DO, Timothy Sell, MD, Francis Shannon, MD, Allen Silbergleit, MD, Marc Silver, MD, Norman Silverman, MD, Vincent Simonetti, MD, Manak Sood, MD, Larry Stephenson, MD, Mack Stirling, MD, Rodman Taber, MD, Joseph Talbert, MD, J.D. Talbott, DO, Nicholas Tepe, MD, Shawn Tittle, MD, Luis Tomatis, MD, Barb Tranberg, RN, Kathy Tuinhoff, PA-C, Brad Vazales, MD, Henry Walters, MD, Bruce Washington, MD, Robert Welsh, MD, Michael Welsh, PA-C, Charles Willekes, MD, Robert Wilson, MD, Daniel Zwada, CCP.

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