10 YEAR SUMMARY REPORT: 2013 - 2022

The Maryland Cardiac Surgery Quality Initiative's (MCSQI) Annual Report is a confidential report detailing the activities and achievements of MCSQI. It is intended for use by physicians, administrators, data managers and the cardiac surgery community for development and evaluation of quality improvement plans.

The source of statewide outcome metrics and calculations are from the MCSQI data warehouse. MCSQI member hospitals submit Society of Thoracic Surgeons (STS) Adult Cardiac Surgery data on a quarterly basis. STS exclusion criteria and Observed-to-Expected recalibration coefficients are applied.

All data in this report is protected from disclosure pursuant to the provisions of Maryland statutes as may be applicable.

Unauthorized disclosure or duplication is absolutely prohibited.

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Letter from the Chairman

Niv Ad, MD
Chairman, MCSQI

Dear Colleagues,

The Maryland Cardiac Surgery Quality Initiative is now in its tenth year and continues to advance the quality of cardiac surgery and reduce cost of care in the State of Maryland. Major accomplishments during this time include:

- **Clinical Performance Improvements** - As a state, key improvements between 2012 and 2022 include:
    - 85% Improvement in Early Extubation and 50% reduction in observed Prolonged Ventilation.
    - 53% Reduction in Intra-operative Blood Transfusion and 28% reduction in Post-operative Blood Transfusion.
- **Best Practice Guidelines** - Through data analysis, practice assessments, literature review, and focused discussions, MCSQI Tenets were developed for: Early Extubation, Wound Healing, Readmission Reduction, Blood Management, and STS Data Management.
- **Education and Communication** - Over thirty-five educational presentations, webinars, workshops, and individual hospital meetings have been conducted in the past ten years. Performance Dashboards and individual hospital letters comparing STS Performance on a semi-annual basis were created to assist programs in identifying opportunities for improvement.
- **Policy Recommendations** - Over the years we have made formal recommendations to the Maryland Healthcare Commission (MHCC) regarding COMAR 10.24.17, the Health Service Cost Review Commission (HSCRC), and the Maryland Hospital Association (MHA) that have contributed to ensuring appropriate regulations and financial reimbursement. For example, the consensus statement submitted to MHCC and MHA resulted in the exclusion of four Potentially Preventable Complications (PPC) for cardiac surgical APR-DRGs.
- **Collaboration** - Formal relationships have been established with MHCC and HSCRC to link administrative and clinical data. Currently, four specific projects focused on resource utilization, cost variability, and clinical outcomes are in development. MCSQI also partners with other cardiac surgery collaboratives from around the country. All collaborative efforts have the common goal of enhancing the quality and value of patient care.

- **Quality Research and Publications** - Results include over 40 MCSQI research posters, manuscripts, and presentations at national societal meetings such as the Society of Thoracic Surgery and the American Association of Thoracic Surgery. Manuscripts have been published in the Annals of Thoracic of Thoracic Surgery, Journal of Thoracic and Cardiovascular Surgery, Journal of Hospital Administration, Journal of Cardiothoracic and Vascular Anesthesia, and others.

The organization remains steadfast to fulfill our mission to *continuously improve the clinical quality of cardiac surgery in the state of Maryland through data analysis, research, and education.* In 2022 MCSQI continued commitment to the advancement of Strategic Quality Initiatives:

- Readmission Reduction
- Understanding Postoperative Atrial Fibrillation Variability
- Cost Analysis and Improving Value
- Blood Management Improvement
- Perfusion Variables and Reporting
- Deep Sternal Wound Healing

This report highlights progress made over the past ten years with these initiatives and others through collaboration among key stakeholders and a firm commitment to our mission.

Please share this report with your team and I hope you benefit from the information provided.

Sincerely,

Niv Ad

Niv Ad, MD
Chairman, MCSQI

MCSQI's MISSION is to continuously improve the clinical quality of cardiac surgery provided in the state of Maryland through data analysis, research, and education.

Since 2013, the Maryland Cardiac Surgery Quality Initiative has brought surgeons, data managers and hospital administrators together to compare data, share best practices, perform outcome analyses, and implement process improvements. MCSQI has become a trusted, credible leader promoting a culture of continuous quality improvement in the cardiac surgery community. Benefits include reduced costs, enhanced clinical effectiveness, increased accountability, fewer state variations, and stronger alliances between heart team members.

Our group endorses the spirit and intent of the Maryland Health Care Commission's (MHCC) legislative charge to maintain high performance standards in Maryland hospitals' cardiac programs.

MCSQI's Key Strategic Goals

***Improve Quality and Control Costs*:** MCSQI members collaborate to analyze hospital processes and provider practices, identify opportunities for improvement, and help implement relevant best practice protocols.

***Enhance Communications and Education*:** MCSQI serves as the interface to communicate process of care information between member sites, eliminating decision making in silos and connecting clinical teams. MCSQI's network of providers, data managers, and administrators fosters statewide collaboration through in-person meetings, conference calls and site visits. Through dynamic communication MCSQI informs, motivates, builds trust, and increases transparency, which helps affect meaningful organizational change.

***Inform MHCC Policy*:** MCSQI helps establish a voice within the state's healthcare legislation by providing MHCC committees and staff with ways to define and assess cardiac surgery performance. MCSQI works collaboratively with MHCC and submits consensus recommendation statements representing all 11 cardiac surgery programs to both MHCC and the Maryland Hospital Association. Informative and timely updates to MCSQI members about proposed MHCC projects, regulatory changes and comment periods are provided.

Organizational Focus

MCSQI is a non-profit consortium supported by all the hospitals that perform cardiac surgery in the state of Maryland. The organization is governed by cardiac surgeons and cardiovascular administrators from each of the member hospitals. The organization provides value to its stakeholders by improving the quality of care through data analysis and implementing best practice protocols led by the Board of Directors, Quality Committee and Research and Writing Committee.

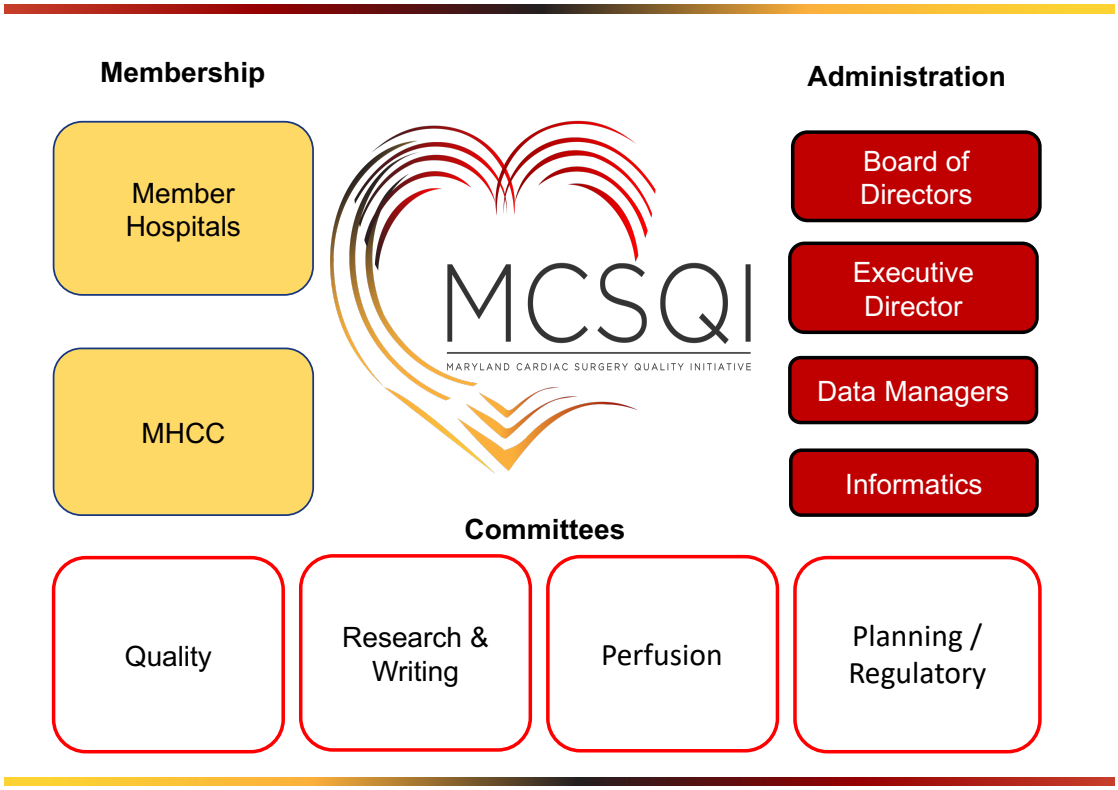
Benchmarking and Reporting: Benchmarking and reporting on key quality indicators are used in a confidential manner to assess trends and to stimulate conversation among providers about variations. Identification of statistically significant performance variations based on quarterly analysis of key clinical indicators have resulted in the development of MCSQI best practice guidelines.

***Multi-disciplinary Collaboration*:** MCSQI participants include cardiac surgeons, advance practice providers, data managers, hospital administrators, intensivists, cardiac anesthesiologists, perfusionists, cardiac rehabilitation specialists, and interventional cardiologists. A multi-disciplinary approach expands opportunity for quality improvement through enhanced coordination and delivery of value-based care.

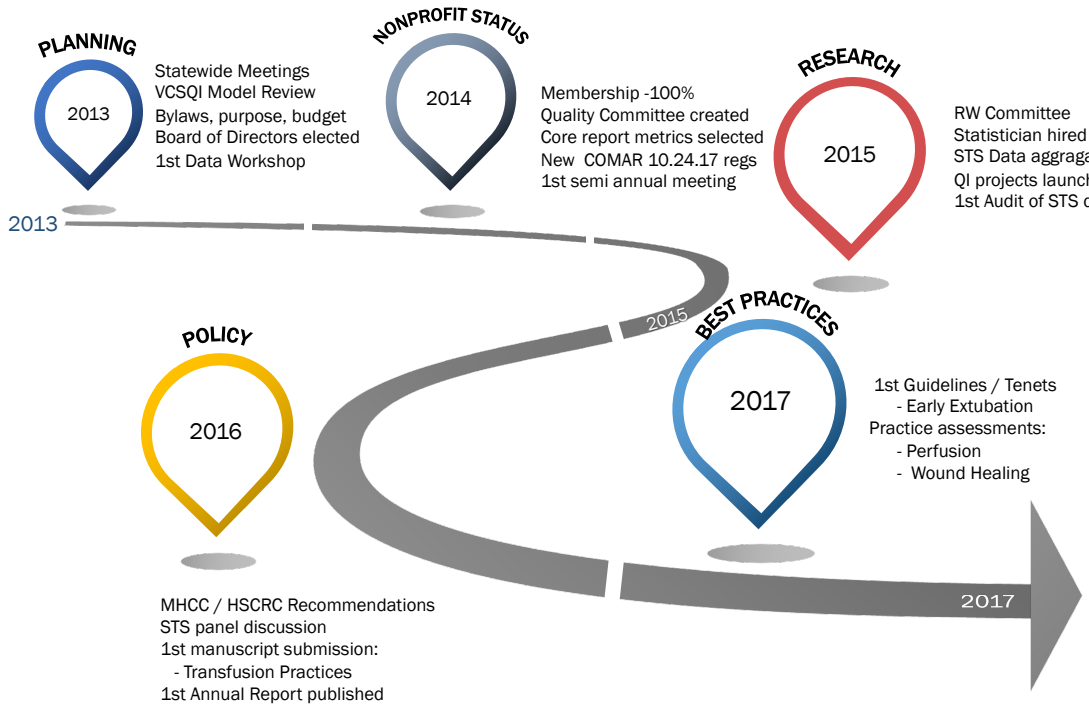
***Research and Writing Publications*:** Over 40 research posters, manuscripts, and presentations have been presented at national surgical society meetings. In addition to MCSQI's Director of Analytics, a biostatistician is contracted to assist MCSQI with committee-approved quality research projects and publications.

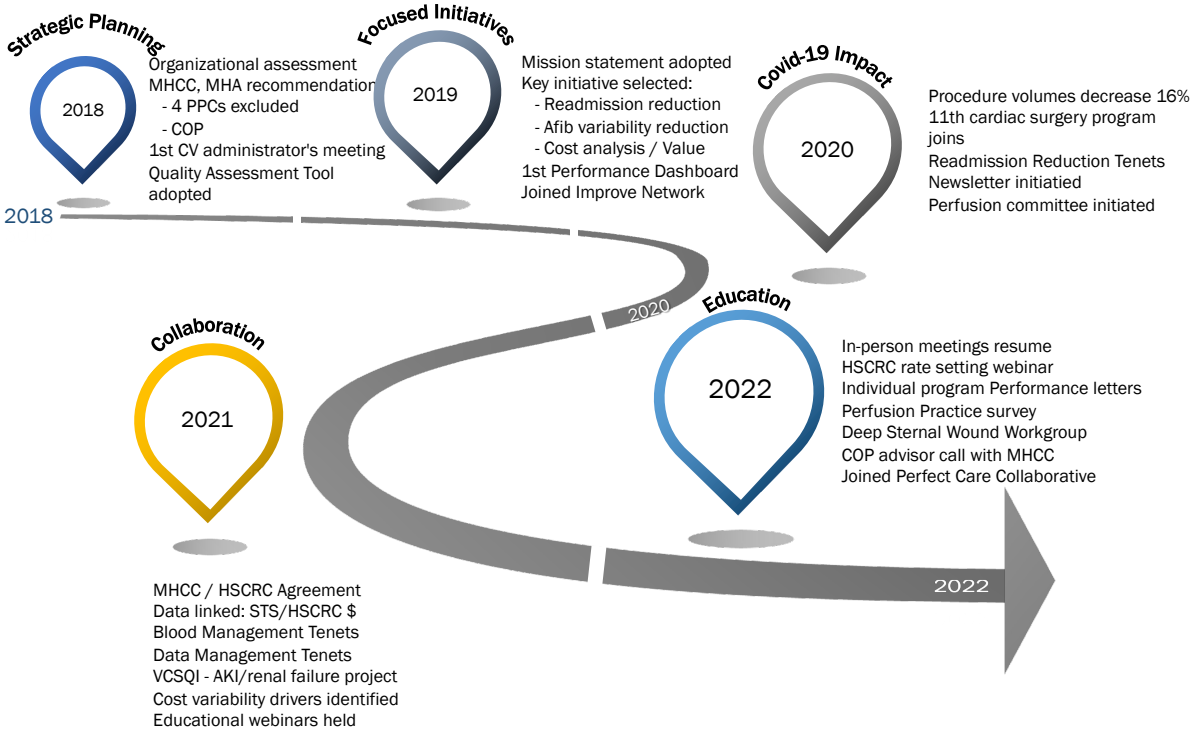
***Regional and National Collaboration*:** MCSQI has entered into formal agreements and projects with other cardiac quality consortiums such as the Virginia Cardiac Services Quality Initiative, the National Cardiac Surgery Quality IMPROVE Network that represents six regional collaboratives comprised of over 90 programs, and the Perfect Care Collaborative that includes programs from North Carolina and Virginia.

Organizational Structure



Key Milestones





Organizational Leadership

John Conte, MD
Chair, Board
2014-2015

Jamie Brown, MD
Chair, Board
2016

Kurt Wehberg, MD
Chair, Board
2017

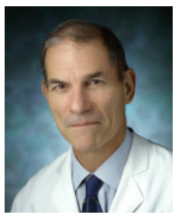
Paul Massimiano, MD
Chair, Board
2018

Rawn Salenger, MD
Chair, Board
2019-2020

Thomas Matthew, MD
Chair, Board
2020-2021

Niv Ad, MD
Chair, Board
2022-2023
Chair, Research/Writing

Brad Taylor, MD, MPH
Treasurer



Glenn Whitman, MD
Chair, Quality

Ricardo Quarrie, MD
Co-Chair, Quality

Charlie Evans, MD
Chair, Perfusion

Elizabeth
Passano, MS
Chair, Data
Managers

Dawn
Roach, RN
Co-Chair,
Data
Managers

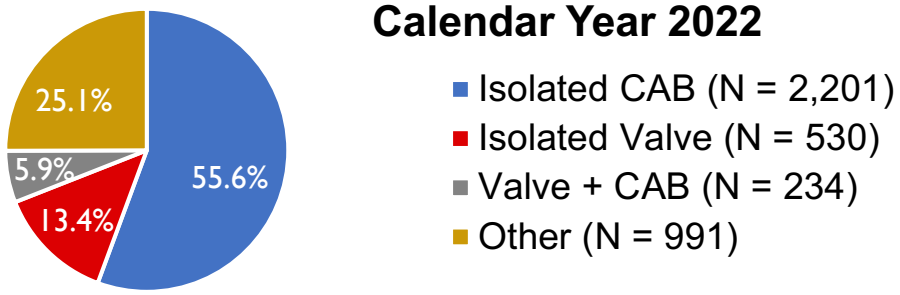
Diane Alejo
Co-Founder
Co-Chair,
Research/
Writing

Eddie
Fonner
Co-Founder
Director,
Analytics

Terri Haber,
MPH
Executive
Director

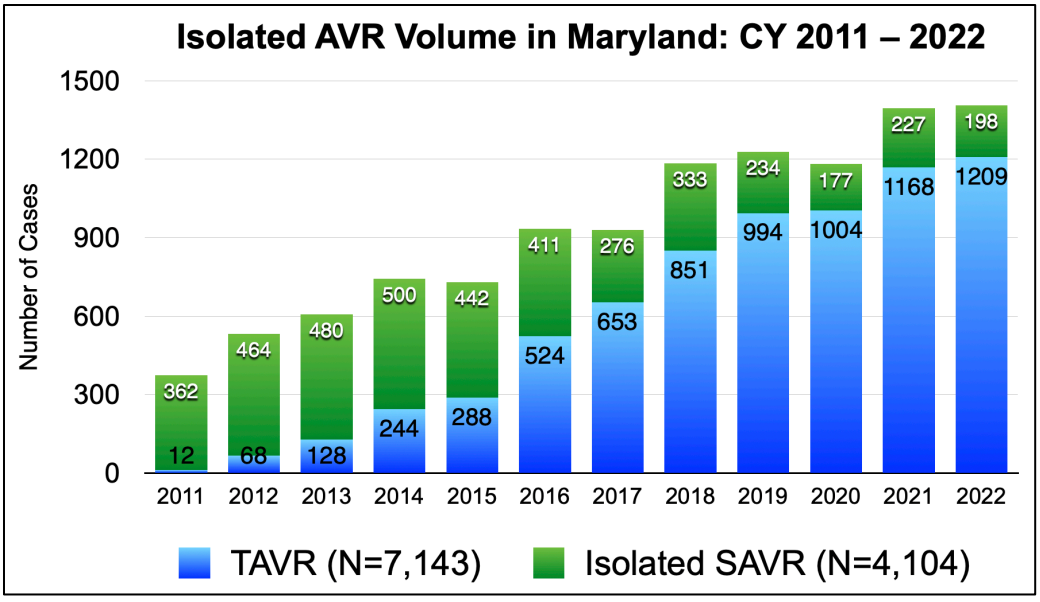
Volume Trends

Statewide Procedure Volume by STS Category: Calendar Year 2022



MCSQI Procedure Volume	2018	2019	2020	2021	2022
Isolated CABG	2,300 (55.6%)	2,291 (58.4%)	1,872 (56.9%)	2,222 (58.9%)	2,201 (55.6%)
Isolated AVR (SAVR)	333	235	177	227	198
AV Replacement + CABG	186	180	134	161	157
Isolated MVR	128	98	97	111	128
MV Replacement + CABG	29	29	29	27	35
Isolated MV Repair	253	222	250	206	204
MV Repair + CABG	50	46	44	56	42
Total: STS Major Procedures	**3,279 (79.2%)**	**3,101 (79.1%)**	**2,603 (79.1%)**	**3,010 (79.8%)**	**2,965 (75.9%)**
Other Procedures*	860 (20.8%)	819 (20.9%)	688 (20.9%)	762 (20.2%)	991 (25.1%)
Total: All Procedures	**4,139**	**3,920**	**3,291**	**3,772**	**3,956**

* Includes other cardiac surgery for ex: CABG or Valve + Other procedures, Transplants, VAD, Aortic Surgery. Excludes Transcatheter Procedures.



STS Major Procedure Volumes and Outcomes: MCSQI vs. STS Total

	2012 to 2022 (10-Year Change)		2021 to 2022 (1-Year Change)	
Variable	**National**	**MCSQI**	**National**	**MCSQI**
Total Volume	+6%	–1%	+1%	–2%
Elective	+18%	–20%	+5%	+1%
Non-Elective	–5%	+21%	–3%	–4%
O/E Mortality	0%	–30%	0%	–11%
CAB Only Readmission Rate	+4%	+15%	0%	–5%

MCSQI Patient Demographics: Isolated CABG Procedures

	2012	2022	% Change
Average Age	65.0	66.1	+2%
Male Gender	71.9%	74.5%	+4%
Female Gender	28.1%	25.5%	–9%
White Race	74.6%	70.6%	–5%
Black Race	15.3%	18.7%	+22%
Asian Race	4.1%	5.5%	+34%
Payor: Medicare	50.5%	54.3%	+8%
Payor: Commercial	64.3%	60.3%	–6%
Average BMI	31.3	29.9	–4%

Quality Committee

The Quality Committee is tasked with managing MCSQI's quality improvement agenda. The Chair is Glenn Whitman, MD and a new Co-chair is Ricardo Quarrie, MD was elected in 2022. Membership is comprised of surgeons, data managers, intensivists, advanced practice providers, and administrators from the eleven MCSQI hospitals.

The Quality Committee examines hospitals' data from the statewide STS registry on a quarterly basis and correlates results with practice variation on key clinical indicators. Identification of statistically significant performance variances have resulted in the development of MCSQI best practice guidelines. Individual hospital outcomes have improved because of provider involvement in the analysis process and implementation of practice guidelines.

During the past 10 years MCSQI Tenets were developed for: Wound Healing, Blood Management, Early Extubation, Readmission Reduction, and STS Data Management are shown below.

2012 - 2022 Comparisons:

	MCSQI Rates (Unadjusted)	2012 CAB Only	2022 CAB Only	Impact
Early Extubation / Prolonged Ventilation • **Tenets Adopted 2015**	Early Extubation	38.5%	71.0%	**85% Improvement**
	Prolonged Ventilation	12.3%	6.1%	**50% Reduction**
Sternal Wound Infection • **Guidelines 2017**	Deep Sternal Infection	0.31%	0.36%	**16% Increase**
Blood Utilization • **Tenets Adopted 2021**	Intra-operative Blood Transfusion	39.7%	18.6%	**53% Reduction**
	Post-operative Blood Transfusion	37.2%	26.8%	**28% Reduction**
	Any Blood Transfusion	55.7%	34.1%	**39% Reduction**
Readmissions • **Tenets Adopted 2019**	30-day Readmission	7.4%	9.7%	**31% Increase**
Atrial Fibrillation	New Onset A-Fib	23.6%	27.0%	**14% Increase**

Sternal Wound Healing Best Practice Guidelines

A. Preoperative Wound Healing Initiatives

1. Mupuricin in nares in all patients, if possible
2. Bathe with Hibiclens night before and morning of surgery, if possible
3. Hair clipped morning of surgery, if possible
4. We recommend shaving facial hair prior to surgery
5. Pre-op antibiotic given within 60 minutes of incision
6. Smoking Cessation, at least 2 weeks prior to surgery, if possible

B. Intraoperative Wound Healing Initiatives

1. Absolute & Strict Sterile Technique & Environment, Systematic Control
2. Facility Maintenance & Management of sterility
3. Clip hair in OR only if absolutely necessary (e.g., salvage or emergency cases)
4. Incision area scrubbed x 2 with Hibiclens scrub
5. Prepped chin to ankles with Duraprep
6. Ioban placed on chest over incision area after completion of procedure
7. Pre-op antibiotic given included in the 'time out'
8. Tight intraoperative glucose control (glucose levels 100-140 mg/dL)
9. Repeat intravenous antibiotic dose four hours after incision
10. Vancomycin Paste (6 grams Vanco/6cc normal saline), applied to sternal table at the time of closure

C. Post-operative Wound Healing Initiatives

1. Careful hand-washing (soap & water) before & after every patient's dressing change
2. Use of gloves during any wound care management
3. Do not remove Op-site / Dressing for at least 7 days unless excessive bleeding
4. Tight glucose management (100-140 mg/dL)
5. Nutritional Supplementation & Management
6. Smoking Cessation education prior to discharge

Blood Conservation Tenets

Goal: Create a multidisciplinary culture of blood conservation through research, education, collaboration.

Pre-op:

- Check quantitative platelet aggregation study for patients on preop DAPT to guide operative timing
- Evolving evidence suggests that preoperative intravenous Fe and erythropoietin may mitigate the need for PRBC transfusions in patients with preoperative anemia.

Intraoperative:

- The importance of meticulous hemostasis by the surgeon cannot be overstated. Employing a checklist to look for bleeding before closing the chest can help reduce blood loss.
- Antifibrinolytic agent should be utilized unless contraindicated
- Maximize RAP/VAP
- Transfusion threshold = Hgb 7 g/dl
- If Hgb is 7 g/dl, transfusion may not be necessary. The following indicators of adequate oxygen delivery may aid decision-making:
    - Lactate
    - HCO3
    - Base Deficit
- Acute Normovolemic Hemodilution (ANH) is a reasonable consideration to help avoid allogenic blood transfusion in select patients. There is evidence suggesting that the efficacy of ANH may be proportional to the volume of blood removed.

Postoperative:

- A threshold Hgb 7.5 g/dl is recommended before considering transfusion and has been shown to be safe in the literature (TRICS Trial, 2018)
- Each decision to transfuse should be discussed with cardiac surgery team leaders

Note: This document is meant to represent MCSQI's consensus opinion on the fundamentals of conservative blood management. There are also more comprehensive and stricter options that many are successfully employing, but this is meant to represent a good starting point for those interested in basic blood conservation.

Extubation Best Practices

1. Document the targeted extubation time of 5 hours on a whiteboard at the patient's bedside upon admission to ICU
2. Start the extubation process at 35° C
3. Indications for spontaneous breathing trial:
   - Resolution of ongoing acidosis
   - Chest tube drainage of <200 mL/hour for 2 hours (<150 mL/hour may be too stringent)
4. Extubation process initiated/ overseen by RT/RN, not MD/Provider, as the latter group not at patient bedside

Readmission Reduction Initiative: Recommended Tenets

1. See patient in clinic within 10 days post-discharge.
2. For patients being discharged to rehab: APP/MD calls provider at receiving facility to debrief about patient, establish rapport, and give provider the cardiac surgery team's 24/7 phone number.
3. Cardiac surgery team notified by ER before readmitting or placing a cardiac surgery patient in Observation.

The above recommendations are in addition to other important and more common practices to minimize readmissions e.g. cardiac surgery nurses/APP provide patient education and participate in discharge planning, provision of comprehensive written discharge instructions, etc.

Data Management Tenets

Goal: Create best practice guidelines to improve the quality and efficiency of STS data documentation, abstraction, and reporting processes for Maryland Cardiac Surgery Programs.

STS Surgeon Champion

- Identify a Surgeon Champion who is either the MCSQI surgeon board member or a delegated surgeon from each cardiac surgery program.
- Support the STS data manager and the STS data collection and reporting process.
    - Review STS Outcome Metrics –National, Regional & Local Benchmarking
    - Meet with data managers at least monthly and serve as an educational resource for abstraction and clarification
    - Support the development of enhanced data collection tools
    - Act as a liaison to surgeons, clinical providers, informatics team, and leadership
    - Support professional development for data managers, including their attendance at STS AQO annual meetings, MCSQI data manager meetings and educational workshops.
- Endorse and communicate the MCSQI value to hospital administration and surgical colleagues. Disseminate MCSQI Annual Reports, quality improvement and research initiatives, publications, and practice protocols through the quality leadership chain.
- Be a change agent by reviewing and sharing data across multi-disciplinary teams (Perfusion, OR, Anesthesia, APP, CVSICU and CV Nursing teams, etc.) to identify opportunities for quality and process improvements.

Informatics Support: EMR Documentation & Data Extracts

- Incorporate STS fields in EMR documentation (Cardiac Surgery H&P, Brief OpNote, Operative Note, Anesthesia and Perfusion documentation, CVICU Intensivist Admission Note, Discharge Summary) to support STS data abstraction and STS audits performed by the STS and the Maryland Healthcare Commission.
- Periodically review and update Cardiac Surgery Documentation: H&P, OpNote, and Discharge Summary templates and Surgeon worksheets to ensure STS data elements are included and current with corresponding STS versions.
- Effectively use available technology and reporting tools to abstract, track, share, and audit STS data.

Data Management Quality Practices and Goals

- Develop an educational slide deck or reference guide of key STS data and definitions to share with the Cardiac Surgery Team.
- Create and maintain a Source of Truth document to identify primary and secondary sources for data abstraction, per hospital.
- Review monthly STS ACS FAQ updates with Surgeons and Clinicians to discuss changes and improve documentation to reflect these updates.

Data Management Tenets (Continued)

- Attend and participate in quarterly meetings with key stakeholders (Surgeons, Residents, APPs, Data Managers, Anesthesia, Perfusion, CV OR & ICU Teams, etc.) to review data metrics, documentation issues, and quality improvement initiatives.

- Develop Standard Operating Procedures and Optimization Strategies for STS data abstraction, cleaning, data management and reporting.
    - Develop Data Management, Quality / Harvest Checklist for STS data utilizing:
        - IQVIA Quality Reports
        - IQVIA Operational Reports
        - IQVIA Library – Other Resources Sections
        - STS Vendor Reporting Tools
        - CRISP (HIE) Access
        - Michigan Data Checker
        - EMR Reports
    - Validate IQVIA Report Metrics with vendor reporting tools when possible.
    - Validate STS Public Reporting.
    - Review materials to maintain STS content education.
        - STS IQVIA updates
        - STS Training Manual
        - STS FAQ Summary Document
        - STS Registry Website: Additional Resources
    - Develop collaborative relationship with Care Team impacting STS data collection to provide education of STS definitions, documentation compliance and establish a “go to clinical colleague” when questions arise.
    - Develop collaborative relationship with peer Data Managers within your program, within MCSQI and Data Managers within the STS community.
    - Perform Data Manager internal audits for inter-rater reliability assessment when applicable.

- Explore STS Data Manager educational opportunities and training.
    - STS Monthly Educational Webinars
    - STS Data Manager Mentorship Program
    - STS AQO National Meetings
    - STS Data Manager Task Forces
    - MCSQI Data Manager Meetings and Workshops
    - MCSQI Bi-annual Meetings, QI, and R&W Committee Meetings
    - MCSQI Quality and Research Projects

- Meet annually with program leadership to evaluate Data Manager workload and review data management responsibilities to ensure adequate FTE resources are available for data abstraction, entry, cleaning, and reporting requests.

2022 Quality Committee Highlights

Cost / Value Initiative	• A formal agreement between MCSQI, MHCC and HSCRC was finalized in 2021 for MCSQI to obtain an expanded financial/administrative data set. The HSCRC inpatient and outpatient data set was successfully linked to MCSQI's STS data in 2022 and four research projects were initiated on: Observation and Readmissions, Comparison of APR-DRG and STS Risk Adjustments, Cost of Cardiac Surgery Under GBR, and New On-set AFib after Cardiac Surgery and Long-term Costs.
Perfusion	• The committee continued efforts to establish a Perfusion Performance Dashboard. • The 11 MCSQI programs were surveyed regarding perfusion practices to help determine variables to collect and track. The survey showed significant variability. • Collaborated with VCSQI to assess Acute Kidney Injury and Renal Failure performance and best practices.
Deep Sternal Wound	• Due to increasing DSWI rates for the state, a workgroup was established to develop recommendations for improvement. A survey was developed and distributed to all programs. Results and recommendations are pending.
Data Management	• Data Managers and CV service line administrators participated in an advisor call with MHCC regarding the Certificate of On-going Performance process. In addition, two educational data management workshops were held and national collaboration continued.

Research and Writing Committee

The Research and Writing Committee, chaired by Niv Ad, MD and co-chair Diane Alejo, continues to have excellent engagement and collaboration from MCSQI membership. The committee reviews and approves proposals for research and oversees the research process. Statistical analysis is performed by MCSQI's Biostatistician, Sari Holmes, PhD, an expert in analyzing STS data and conducting cardiovascular research. Eddie Fonner, MCSQI's Director of Analytics, manages the MCSQI data warehouse and provides analytics to support the work of the Research and Writing Committee's efforts to impact quality improvement and research at state, regional and national levels.

2022 Highlights

In 2022, MCSQI published two manuscripts and presented a poster at the national level.

Manuscripts

Center Variation in Use of Preoperative Dual Antiplatelet Therapy and Platelet Function Testing at the Time of Coronary Artery Bypass Grafting in Maryland.
Anesthesia Analgesia, 2022.

Number and Type of Blood Products are Negatively Associated with Outcomes Following Cardiac Surgery.
Annals of Thoracic Surgery, 2022.

Poster:

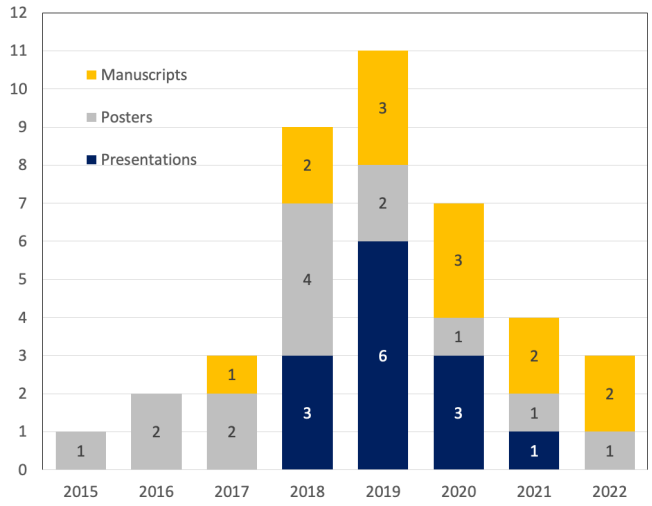
Comparison of Surgeon Survey Responses with Actual Multiple Arterial Graft Use in Patients Undergoing Coronary Artery Bypass Grafting in a Statewide Quality Database Collaborative.
Society of Thoracic Surgeons Annual Meeting, 2022.

IMPROVE Network

In 2017, MCSQI joined the IMPROVE Network, a consortium of six regional collaboratives whose mission is to improve the value of cardiovascular surgical care by developing, sharing best practice knowledge, coordinating, undertaking, evaluating, and disseminating quality improvement projects across our member organizations. At the STS 56th Annual Meeting, "Evaluating the Role of Failure to Rescue on Mortality after Cardiac Surgery - A National Experience" won the Maxwell Chamberlain Memorial Paper Award.

MCSQI has collaborated with IMPROVE on five research projects to date. Over 80,000 patients are included in the study populations, displaying the statistical power of the group's projects. This provides an opportunity for MCSQI to benchmark outcomes among other hospitals participating in quality improvement networks.

Published Manuscripts, Posters and Presentations



TOTAL	
Manuscripts	13
Posters	14
Presentations	13

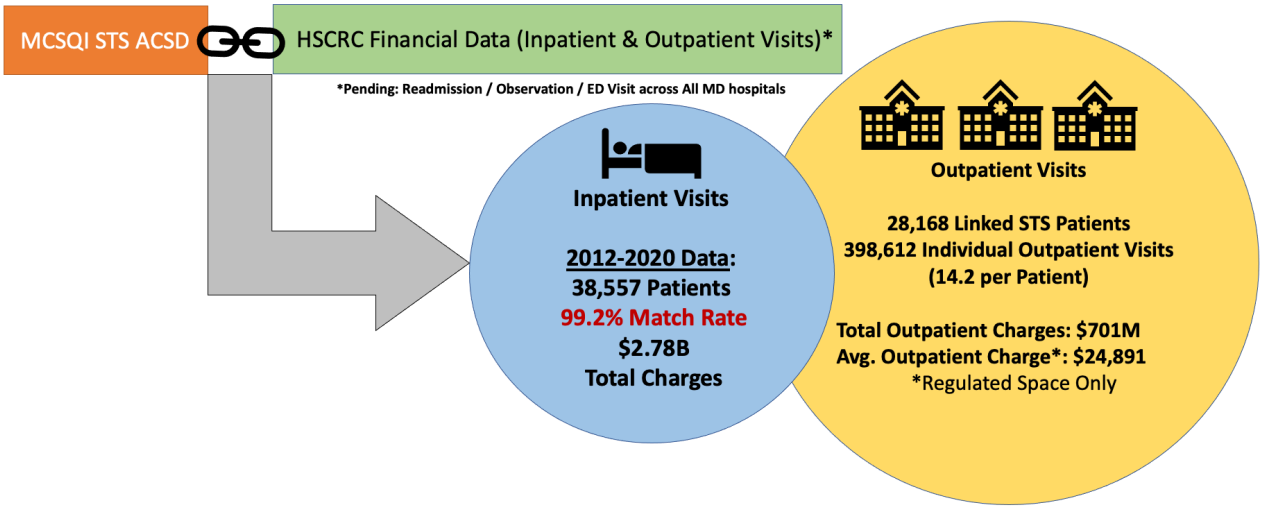
National Meetings

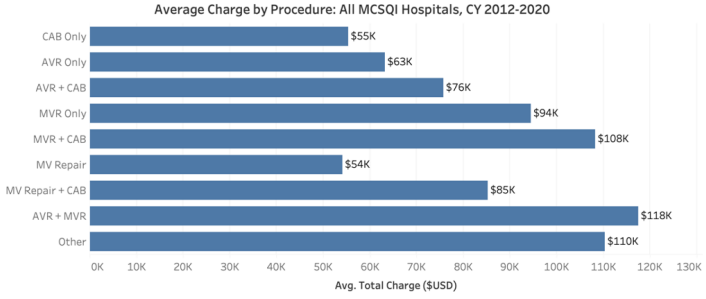
- American College of Surgeons Clinical Congress
- American Heart Association Quality of Care & Clinical Outcomes Scientific Sessions
- American Association of Thoracic Surgery (AATS)
- American Society of Anesthesiologists
- Eastern Cardiothoracic Surgeons Society
- Heart Valve Society Scientific Meeting
- Society of Thoracic Surgeons (STS)
- STS Advances in Quality & Outcomes (STS AQO)
- Southern Thoracic Society Association (STSA)

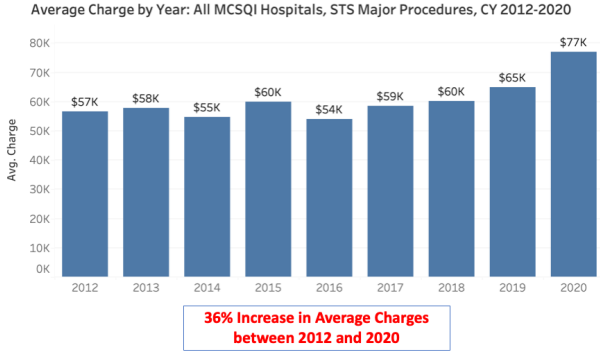
Journals

- Aorta
- Anesthesia & Analgesia
- Annals of Thoracic Surgery
- General Thoracic and Cardiovascular Surgery
- Innovations
- Journal of Cardiac Surgery
- Journal of Cardiothoracic and Vascular Anesthesia
- Journal of Hospital Administration
- The Journal of Thoracic and Cardiovascular Surgery

MCSQI Data Warehouse: STS and HSCRC Linkage







Source: HSCRC-STS Linked Data Set provided by MHCC and Advanta Government Services

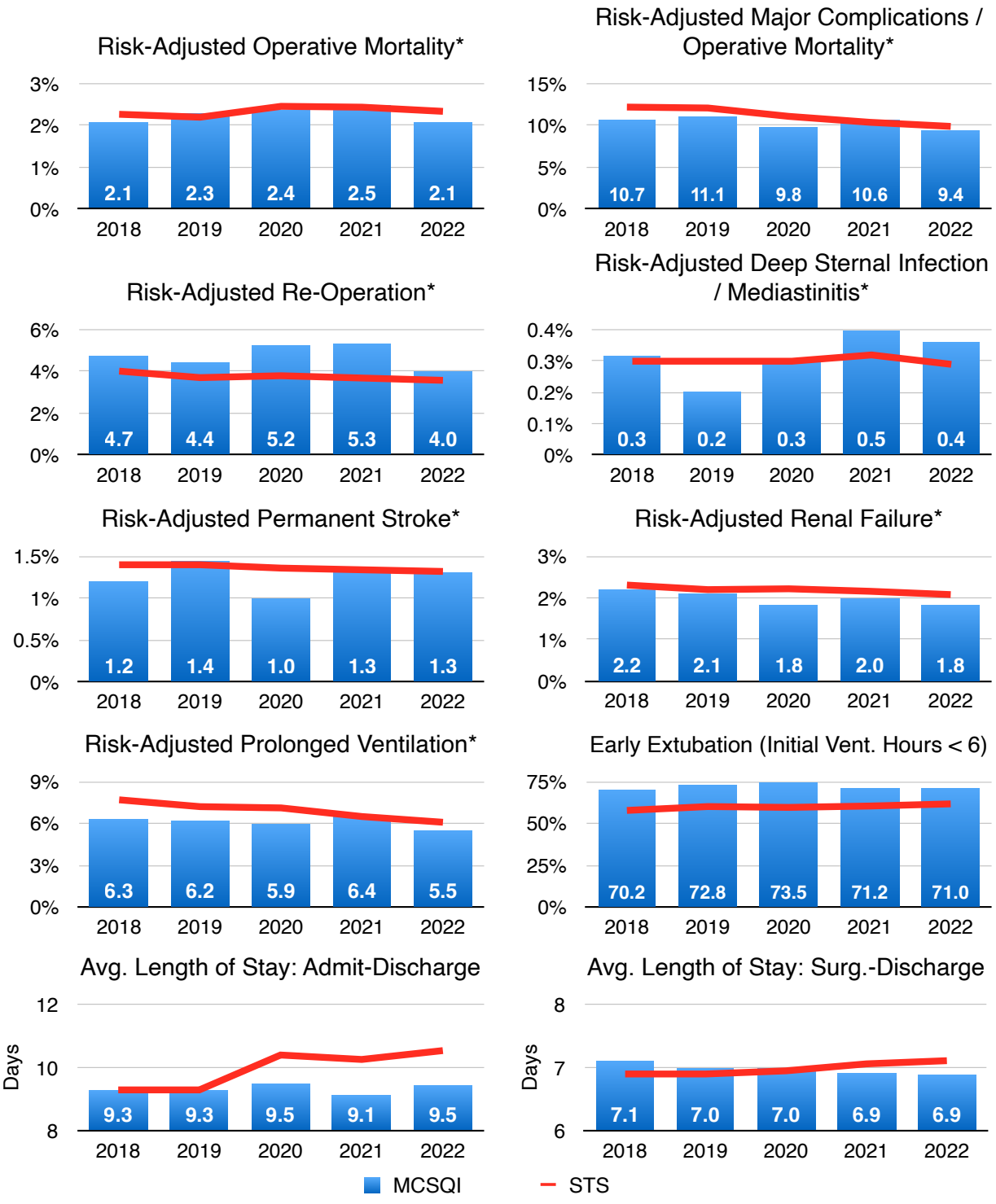
Data Manager Committee

MCSQI's STS Data Manager Committee, co-chaired by Elizabeth Passano, MS of Luminis Health Anne Arundel Medical Center, and Dawn Roach of University of Maryland St. Joseph Medical Center, serves as the backbone of the organization. The data managers share vital details related to data abstraction with their internal teams, which allows for more accurate and consistent data collection. Collaboration amongst the group is instrumental in ensuring that data is collected with the same understanding of STS definitions. MCSQI Data Managers also interface with counterparts nationally and serve alongside surgeons on various committees within the organization. MCSQI Data Managers presented eight posters at the STS Advances in Quality and Outcomes (AQO) Conference from 2015 to 2022 with a 100% abstract acceptance rate!

2022 Highlights

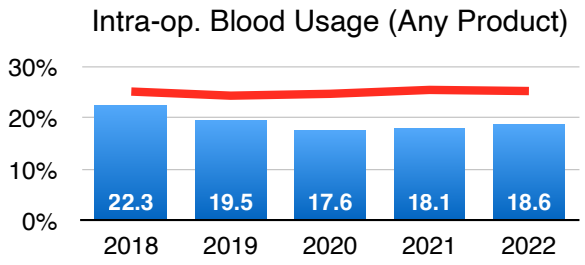
- Advisor call with MHCC regarding Certificate of On-going Performance data and information requests.
- Two hybrid Data Manager Workshops
- Quarterly STS Regional Call participation
- AQO Project Planning Session

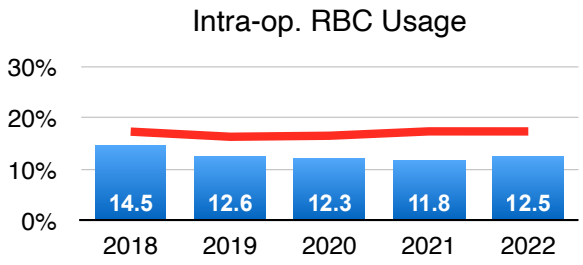
Clinical Quality Indicators – Isolated CABG

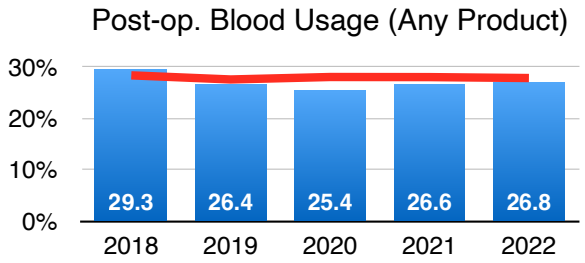


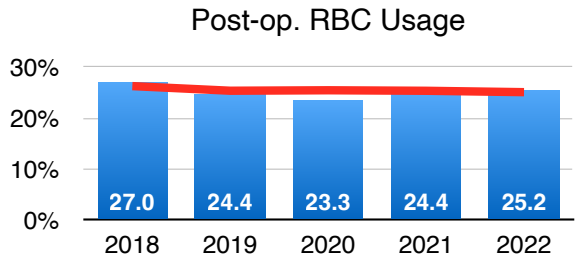
*__STS Risk-adjusted Rates__. These calculations involve two steps: 1) Calculation of the O/E ratio, which divides the percentage of an observed morbidity by the rate predicted by the STS risk calculator, and 2) Multiplication of the O/E ratio by the STS national rate of the observed morbidity. All O/E ratios apply STS Recalibration coefficients, which normalize the national benchmark value to exactly 1.0. All Risk-adjusted Rates apply Recalibration coefficients from the CY 2018 STS report.

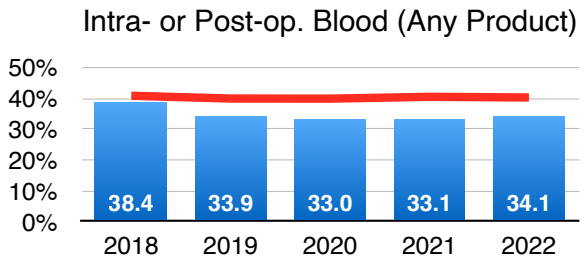
Clinical Quality Indicators – Isolated CABG

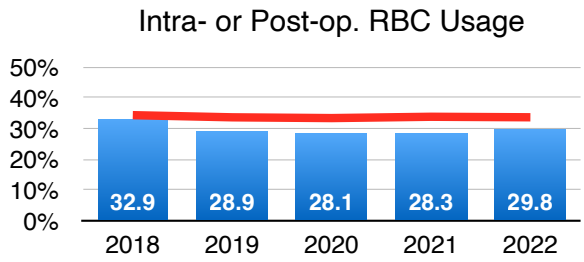


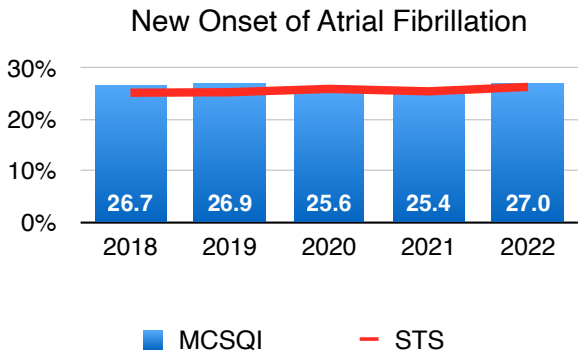












National Quality Forum Measures

Calendar Year 2022 Isolated CABG Procedures (unless otherwise indicated)		MCSQI	STS
Procedure Volume	Isolated CABG	2,201 (55.6%)	155,923 (54.8%)
	Isolated Valve	530 (13.4%)	40,384 (14.2%)
	CABG + Valve	234 (5.9%)	19,378 (6.8%)
	Other	991 (25.1%)	68,827 (24.2%)
Pre-Operative	Timing of Antibiotic Administration	99.4%	97.4%
	Selection of Antibiotic Administration	100.0%	98.1%
	Antibiotics Discontinued	99.4%	97.3%
	Pre-operative Beta Blockers	98.9%	96.6%
Operative	Use of Internal Mammary Artery	99.9%	99.6%
Complications**	Risk-Adjusted Prolonged Ventilation	5.5%	6.1%
	Risk-Adjusted Deep Sternal Infection	0.4%	0.3%
	Risk-Adjusted Permanent Stroke	1.3%	1.3%
	Risk-Adjusted Renal Failure	1.8%	2.1%
	Risk-Adjusted Cardiac-Related Re-Operation	2.8%	2.5%
Discharge	Anti-Platelets	99.7%	97.8%
	Beta Blockers	99.6%	99.2%
	Anti-Lipids	99.4%	99.2%
Mortality**	Risk-Adjusted Inpatient Mortality: Isolated CABG	1.7%	1.8%
	Risk-Adjusted Operative Mortality: Isolated CABG	2.1%	2.3%
	Risk-Adjusted Operative Mortality: AV Replacement, 2022	1.0%	2.2%
	Risk-Adjusted Operative Mortality: AV Replacement + CABG, 2022	5.0%	4.2%
	Risk-Adjusted Operative Mortality: MV Replacement, 2022	3.9%	5.3%
	Risk-Adjusted Operative Mortality: MV Replacement + CABG, 2022	4.7%	11.3%
	Risk-Adjusted Operative Mortality: MV Repair, 2022	1.3%	1.1%
	Risk-Adjusted Operative Mortality: MV Repair + CABG, 2022	2.7%	6.5%
Readmissions	30-Day Readmission Rate: Isolated CABG	9.7%	9.1%

** MCSQI Risk-Adjusted Rates are not statistically significantly different from STS National Rates.

STS Metric Specifications

Operative Mortality O/E*: Any death during patient hospitalization or within 30 days of surgery	**Inpatient Mortality O/E***: Any death during patient hospitalization
Prolonged Ventilation O/E*: Post-operative pulmonary ventilation greater than 24 hours	**Permanent Stroke O/E***: Post-operative stroke that did not resolve within 24 hours
Renal Failure O/E*: Increase in post-operative serum creatinine greater than 3 times baseline, serum creatinine greater or equal to 4 mg/dL, or new requirement for dialysis post-operatively	**Mediastinitis O/E***: Any post-operative deep sternal wound infection or mediastinitis during patient hospitalization or within 30 days of surgery
Re-Operation O/E*: Return to the operating room for bleeding, valve dysfunction, graft occlusion, aortic intervention, or other cardiac reasons (the NQF definition does not include 'other non-cardiac reasons')	**Morbidity/Mortality O/E***: Any patient incurring operative mortality or any of the five major STS morbidities
Readmissions within 30 Days: Any patient who was readmitted for inpatient stay at an acute care facility within 30 days of discharge	**Re-Operation for Bleeding**: Re-exploration for mediastinal bleeding either in the ICU or return to operating room
Length of Stay (LOS) Admit-Discharge: Total number of days from patient admission to discharge	**Length of Stay (LOS) Surgery-Discharge**: Total number of days from surgery to discharge
Post-Operative Ventilation Time: Total amount of time from operating room exit to initial extubation, plus any additional time spent on pulmonary ventilation	**Early Extubation**: Initial Ventilation Hours less than 6, including patients who were extubated in the operating room
Intra-Operative Blood Products: Any patient who was transfused any time intra-operatively during the initial surgery.	**Post-Operative Blood Products**: Any patient who was transfused any time post-operatively
New Onset of Atrial Fibrillation: Any patient with post-operative Atrial Fibrillation; excludes patients with pre-operative history of atrial fibrillation or arrhythmia.	***The Observed-to-Expected Ratio (O/E)**: These calculations divide the percentage of an observed morbidity by the rate predicted by the STS risk calculator. All O/E ratios apply STS Recalibration coefficients, which normalize the national benchmark value to exactly 1.0.

Posters, Manuscripts and Presentations

Posters

Comparison of Surgeon Survey Responses with Actual Multiple Arterial Graft Use in Patients Undergoing Coronary Artery Bypass Grafting in a Statewide Quality Database Collaborative. *Society of Thoracic Surgeons Annual Meeting, 2022*

Strategies for optimizing STS Data Quality and Efficiency – A Statewide Assessment. *Society of Thoracic Surgeons Advances in Quality and Outcomes, 2021.*

Multiple Arterial Grafts in Coronary Artery Bypass Surgery: Variation in Practice & Outcomes. *Society of Thoracic Surgeons Advances in Quality and Outcomes, 2020.*

The Value and Impact of A Statewide Quality Collaborative.
Society of Thoracic Surgeons Advances in Quality and Outcomes, 2019.

Complementing Society of Thoracic Surgeons (STS) Adult Registry Data with Financial Data – A First Pass.
Society of Thoracic Surgeons Advances in Quality and Outcomes, 2019.

Predictors of Operative Mortality in Cardiac Surgery Patients with Prolonged Ventilation. *American College of Surgeons Clinical Congress, 2018.*

Government Based Insurance is Associated with Fewer Arterial Conduits in CABG.
American College of Surgeons Clinical Congress, 2018.

Contemporary Outcomes Comparing Mitral Valve Repair and Replacement in the Elderly in a Statewide Registry. *Heart Valve Society Scientific Meeting, 2018.*

Off-pump Coronary Artery Bypass in Octogenarians: Results of a Statewide, Matched Comparison. *Society of Thoracic Surgeons Annual Meeting, 2018.*

Variations in Perfusion Practice during Adult Cardiac Surgery: A Statewide Survey.
Eastern Cardiothoracic Surgical Society (ECTSS) Annual Meeting, 2017.

Sternal Wound Care Practices in Maryland Cardiac Surgery Programs.
Society of Thoracic Surgeons Advances in Quality and Outcomes Meeting, 2017.

STS Data Managers & Surgeons Enhancing Quality Measurement – Statewide Review of Reasons for Prolonged Ventilation.
Society of Thoracic Surgeons Advances in Quality and Outcomes Meeting, 2016.

Are Surgeons Discussing STS Predicted Risk Scores? A Look across Maryland Hospitals.
Society of Thoracic Surgeons Advances in Quality and Outcomes Meeting, 2016.

The Maryland Cardiac Surgery Quality Initiative: Collaborating to Improve Outcomes Statewide.
Society of Thoracic Surgeons Advances in Quality and Outcomes Meeting, 2015.

Posters, Manuscripts and Presentations

Manuscripts

Center Variation in Use of Preoperative Dual Antiplatelet Therapy and Platelet Function Testing at the Time of Coronary Artery Bypass Grafting in Maryland. *Anesthesia Analgesia, 2022.*

Number and Type of Blood Products are Negatively Associated with Outcomes Following Cardiac Surgery. *Annals of Thoracic Surgery, 2022.*

A Comparison of Statistical Methods for Hospital Performance Assessment. *Journal of Hospital Administration, 2021.*

Interhospital Failure to Rescue after Coronary Artery Bypass Grafting *Journal of Thoracic and Cardiovascular Surgery, 2021.*

Clinical Practice Variation and Outcomes for Stanford Type A Aortic Dissection Repair Surgery in Maryland: Report from a Statewide Quality Initiative. *Aorta (Stamford), 2020.*

Racial Disparity in Cardiac Surgery Risk and Outcome: Report From a Statewide Quality Initiative. *Annals of Thoracic Surgery, 2020.*

Mitigating the Risk: Transfusion or Reoperation for Bleeding After Cardiac Surgery. *Annals of Thoracic Surgery, 2020.*

Predictors of Operative Mortality Among Cardiac Surgery Patients with Prolonged Ventilation. *Journal of Cardiac Surgery, 2019.*

Variation in Platelet Transfusion Practices in Cardiac Surgery. *Innovations, 2019.*

Off-Pump Coronary Artery Bypass in Octogenarians: Results of a Statewide, Matched Comparison. *General Thoracic and Cardiovascular Surgery, 2019.*

Bilateral Internal Mammary Artery Use in Diabetic Patients: Friend or Foe? *Annals of Thoracic Surgery, 2018*

Less is More: Results of a Statewide Analysis of the Impact of Blood Transfusion on CABG Outcomes. *Annals of Thoracic Surgery, 2018.*

Variation in Red Blood Cell Transfusion Practices During Cardiac Surgery Among Centers in Maryland: Results from A State Quality Improvement Collaborative. *Annals of Thoracic Surgery, 2017.*

Posters, Manuscripts and Presentations

Podium Presentations:

Association between Cerebral Oximetry Use and Perioperative Stroke in Patients Having Cardiac Surgery with CPB.
American Society of Anesthesiologists Annual Meeting, 2021.

Dual Antiplatelet Therapy at Discharge is Safe after Acute Myocardial Infarction Treated with Coronary Artery Bypass Grafting yet Practice Variation Exists Within a Statewide Quality Collaborative.
Society of Thoracic Surgeons (STS) 55th Annual Meeting, 2020.

Evaluating the Role of Failure to Rescue on Mortality after Cardiac Surgery - A National Experience (Maxwell Chamberlain Memorial Paper Award: IMPROVE Network). *Society of Thoracic Surgeons (STS) 55th Annual Meeting, 2020.*

A Maryland Cardiac Surgery Statewide Analysis of the Impact of Extubation in the Operating Room Following Routine Cardiac Surgery.
Society of Thoracic Surgeons (STS) 55th Annual Meeting, 2020.

Modifiable Inter-Hospital Cost Variability in Coronary Artery Bypass Surgery.
Eastern Cardiothoracic Surgical Society (ECTSS) 57th Annual Meeting. 2019.

Does the Number and Type of Blood Products Transfused Negatively Impact Patient Outcomes Following Open Heart Surgery?
American Association of Thoracic Surgery (AATS) Annual Meeting, 2019.

Racial Disparity in Cardiac Surgery Risk and Outcome: Report From a Statewide Quality Initiative.
American Association of Thoracic Surgery (AATS) Annual Meeting, 2019.

Center-specific Variation in Use of Dual Antiplatelet Therapy Prior to Coronary Surgery: An Outcome Analysis from the Maryland Cardiac Surgery Quality Initiative. *American Heart Association (AHA) Quality of Care and Outcomes Research Scientific Sessions, 2019.*

Mitigating the Risk: Transfusion or Reoperation for Bleeding After Cardiac Surgery.
Society of Thoracic Surgeons (STS) 55th Annual Meeting, 2019.

Blood Utilization: Tale of Two Metrics – Improvement and Variability.
Society of Thoracic Surgeons (STS) 55th Annual Meeting, 2019.

Recent Antiplatelet Therapy Does Not Affect Short Term Outcomes Following Non-CABG Cardiac Surgery.
Southern Thoracic Surgical Association (STSA) 65th Annual Meeting, 2018.

Bilateral Internal Mammary Artery Utilization in Diabetics: Friend or Foe?
Society of Thoracic Surgeon (STS) 54th Annual Meeting, 2018.

Variation in Platelet Transfusion Practices During Cardiac Operations Among Centers in Maryland: Results from a State Quality-Improvement Collaborative.
Society of Thoracic Surgeon (STS) 54th Annual Meeting, 2018.

MCSQI Committee Leadership

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Johns Hopkins Hospital
Luminis Health Anne Arundel Medical Center
MedStar Union Memorial Hospital
Sinai Hospital
Suburban Hospital
TidalHealth Peninsula Regional
University of Maryland Capital Region Health
University of Maryland St. Joseph Medical Center
University of Maryland Medical Center
University of Pittsburgh Medical Center Western Maryland

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Clifford E. Fonner, BA
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From left to right: Drs. Rawn Salenger, Niv Ad, Thomas Matthew, James Gammie, Ricardo Quarrie, and Charlie Evans at the Spring 2022 Bi-Annual Meeting.

Dr. Sean Beinart of Luminis Health Anne Arundel Medical Center presents at the MCSQI Fall 2022 Bi-Annual Meeting

Resources and Affiliates

RESOURCES:	
MCSQI Website	https://mcsqi.org
Maryland Health Care Commission (MHCC)	https://mhcc.maryland.gov
MHCC Quality Reports	https://healthcarequality.mhcc.maryland.gov
Maryland Health Services Cost Review Commission (HSCRC)	http://www.hscrc.state.md.us
Society of Thoracic Surgeons (STS)	https://www.sts.org
STS Public Reporting	https://publicreporting.sts.org/acsd
National Quality Forum (NQF)	http://www.qualityforum.org

AFFILIATES:	
ARMUS LLC by Health Catalyst	https://www.armus.com
IMPROVE Network	http://www.improvenetwork.org
VCSQI Virginal Cardiac Services Quality Initiative	http://vcsqi.org

MCSQI Member Hospitals

Adventist HealthCare White Oak Medical Center

SINAI HOSPITAL A LifeBridge Health Center

JOHNS HOPKINS MEDICINE THE JOHNS HOPKINS HOSPITAL

Luminis Health

MedStar Union Memorial Hospital

SUBURBAN HOSPITAL JOHNS HOPKINS MEDICINE

TidalHealth Peninsula Regional

UPMC | WESTERN MARYLAND

UNIVERSITY of MARYLAND MEDICAL CENTER

UNIVERSITY of MARYLAND CAPITAL REGION HEALTH

UNIVERSITY of MARYLAND ST. JOSEPH MEDICAL CENTER

Testimonials

"The MCSQI has demonstrated that by working together on important clinical questions we can improve important quality metrics in the care of Maryland Cardiac Surgery patients and by rotating the leadership positions we can make sure that all of our state cardiac surgery programs are well represented and empowered to participate."

~ John V. Conte, MD, Co-founder MCSQI

"The MCSQI state collaborative has been a successful collaboration of all the cardiac surgery centers in Maryland and is taking quality of care for cardiac surgery patients to an even higher level. The multidisciplinary interaction provides resources, networking, and sharing of best practices and ideas that has already demonstrated positive outcomes and has set the basis for future quality initiatives in cardiac surgery."

~ Chrissy Ruhl, UPMC Western Maryland

"It is gratifying to see Maryland's cardiac surgery programs working together to improve services for cardiac surgery patients. MCSQI's collaborative efforts bode well for future patients."

~ Eileen Fleck, Maryland Health Care Commission

"In this day and age with so much confrontation and dissension, it is comforting to note that the Maryland Cardiac Surgery Quality Initiative stands for just the opposite. Through the sharing of experience and data, collegiality and cooperation, MCSQI has a vision to improve the care that this state gives its cardiac patients. There are not many collaboratives throughout the country like this, and Maryland can count itself among those few that recognize the importance of this kind of united effort, where the only thing that matters is one common goal, better treatment for our patients."

~ Dr. Glenn Whitman, Johns Hopkins Hospital

"Following the pioneering efforts of Dr. Alfred Blalock at Johns Hopkins Hospital in the 1940's and Dr. Joseph McLaughlin at University of Maryland in the 1970's, the development of the Maryland Cardiac Surgery Quality Initiative (MCSQI) is probably the single most important advancement in the history of organization of cardiovascular medicine in the state of Maryland. The future of cardiac surgery in Maryland is dependent on statewide hospital and physician collaboration and sharing of "best practices."

~ Dr. Kurt Wehberg, Peninsula Medical Regional Center

"MCSQI provides the framework for an ongoing unprecedented level of collaboration between cardiac surgery programs in Maryland. By learning from experiences at other high-quality programs, UM Saint Joseph Medical Center has been able to augment our own quality initiatives, and ultimately improve care for our patients."

~ Dr. Rawn Salenger, University of Maryland St. Joseph Medical Center

"The MCSQI state collaborative has been a great source of clinical collaboration for our newly launched Cardiac Surgery Program at Luminis Health, helping ensure the absolute highest quality of cardiac care to our community! The sharing of best practices, innovative ideas and networking is so supportive and so beneficial to the future of the quality of cardiac surgery care in Maryland, we are grateful to be a part of this amazing group!"

~ Wendy Penny MBA, BSN, RN, NE-BC, Associate Chief Nursing Officer, Luminis Health Anne Arundel Medical Center