
# MCSQI Annual Report | 2020

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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## Table of Contents

# Letter from the Chairman

Dear Colleagues,

**Thomas Matthew, MD**
**Director, Johns Hopkins Cardiothoracic Surgery at Suburban Hospital**

Now in our seventh year, the MCSQI continues to advance the quality of cardiac surgery in the state of Maryland despite the onset of COVID-19 in the winter of 2020 with its imposed limitations. Engagement among our members continued to improve through virtual collaboration and commitment to fulfill our mission *to continuously improve the clinical quality of cardiac surgery in the state of Maryland through data analysis, research, and education.* I want to personally thank those who have actively participated in our quality improvement initiatives, especially under the challenging times during the past year.

We welcomed a new hospital member in 2020, Luminis Health Anne Arundel Medical Center in Annapolis, Maryland, which is now the eleventh cardiac surgery program in the state. Anne Arundel Medical Center began doing cardiac surgery in December of 2020 under the leadership of Daniel Lee, MD.

A few highlights of 2020 that are further expanded upon in this report include:

- **A demonstration of the significant impact of COVID–19 on cardiac surgery volumes nationally and in the state of Maryland.** Cardiac surgery volumes in Maryland decreased by 16% in 2020 compared with 2019, primarily due to the impact of COVID-19. The most dramatic decrease in volumes occurred in the month of April (-60%).
- **A formal agreement was established between the Maryland Healthcare Commission, the Health Services Cost Review Commission (HSCRC), and the MCSQI to obtain an expanded HSCRC dataset to link financial administrative data with the Society of Thoracic Surgeons (STS) clinical outcomes data.** In this way we can continue to improve the cost-effective delivery of high-quality cardiac surgery care.
- **The MCSQI continued its commitment to the advancement of 2020 Key Quality Initiatives.**
    - Readmission Reduction
    - Understanding Postoperative Atrial Fibrillation Variability
    - Cost Analysis and Improving Value
    - Blood Management Improvement
    - Re-engagement and Focus on Perfusion services

This past year significant progress was made in the area of Blood Management under the leadership of Rawn Salenger, MD, past MCSQI Chairman of the Board. Critical communication and clinical elements were identified that can be adopted as best practice by a "heart team" to maximize blood conservation. This report highlights progress made with this initiative and others through collaboration among key stakeholders and commitment to our mission.

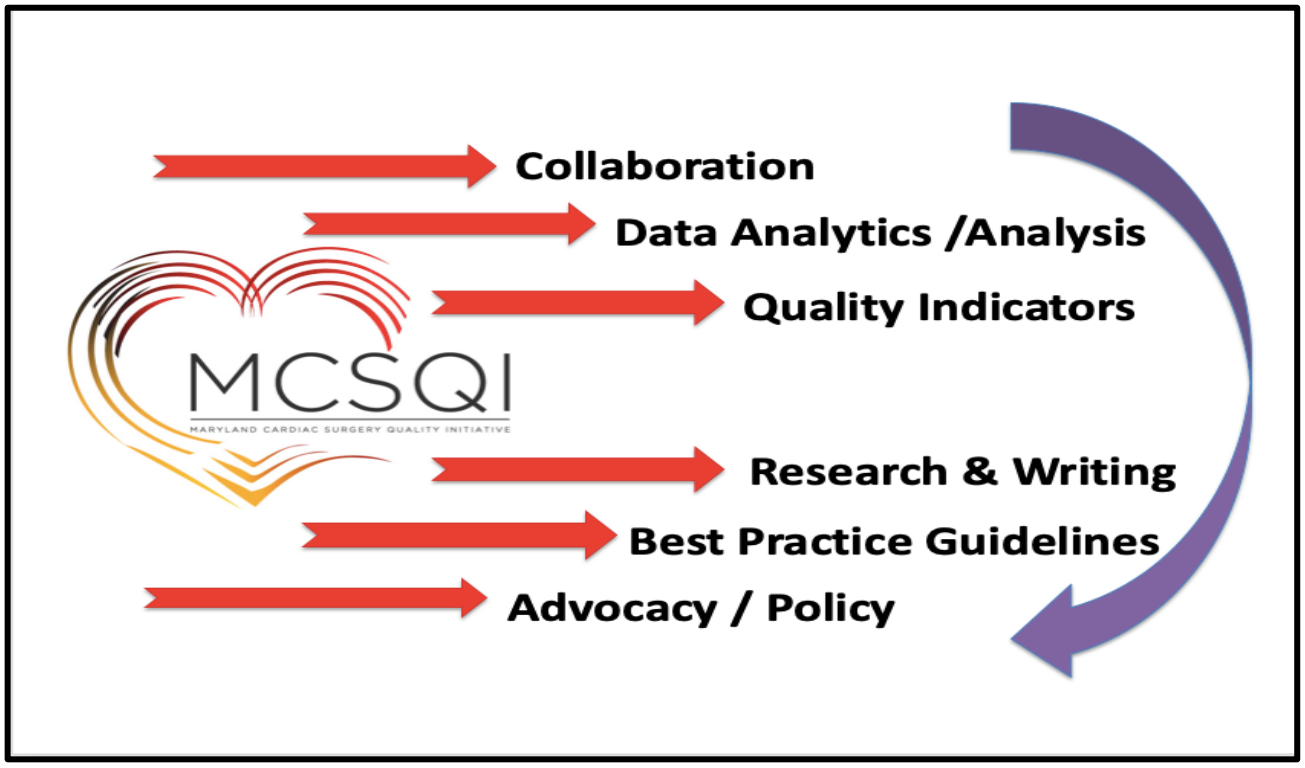
I encourage you to share this report with your team and hope you benefit from the information provided.

Sincerely,

Thomas Matthew, MD, MS, FACS, FACC
Chairman, MCSQI

# MCSQI Overview

***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, MCSQI 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 regional 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 improve oversight and 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, work to 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.

***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 Overview

## Organizational Focus

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*:** MCSQI focuses on selecting quality indicators, establishing baseline data, designing scorecards, addressing privacy and confidentiality, and using providers' commentary as context to better understand trends and variations. Data managers convene regularly to standardize coding practices, allowing for timely, sound, and accurate interpretations of cardiac surgery performance reports.

***Quality and Cost Improvements*:** Identification of statistically significant performance variations based on quarterly analysis of key clinical indicators have resulted in the development of MCSQI best practice guidelines. Involvement in the analysis process and implementation of practice guidelines has improved individual hospital outcomes. As a group, members analyze and compare performance data, share clinical protocols, develop recommended guidelines, and provide quality assessment tools.

***Communication and Education for Members*:** MCSQI's network of surgeons, data managers, clinical teams 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 consequently helps affect meaningful organizational change.

***Regulatory / MHCC Policy Engagement*:** Informative and timely updates to MCSQI members about proposed MHCC projects, regulatory changes and comment periods are provided. MCSQI works collaboratively with MHCC and submits consensus recommendation statements representing all 11 cardiac surgery programs to both MHCC and the Maryland Hospital Association.

***Expansion to Multi-disciplinary Collaboration*:** MCSQI has expanded participation to include 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. This approach also provides opportunities to collaborate with payers.

***Research and Writing Publications*:** Over 33 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 and the National Cardiac Surgery Quality IMPROVE Network that represents six regional collaboratives comprised of over 90 programs.

# Organizational Model


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.

## 2020 Organizational Highlights

**Daniel C. Lee, MD**
Chief, Cardiac Surgery
AAMC

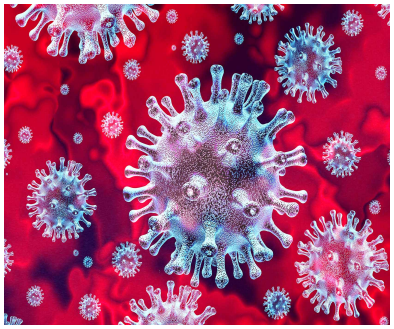
***Luminis Health Anne Arundel Medical Center (AAMC) became the 11th Cardiac Surgery Program in Maryland and joined MCSQI.*** Under the leadership of Daniel C. Lee, MD, AAMC began performing cardiac surgery in December of 2020.

***Niv Ad, MD was elected as MCSQI's Treasurer*** for a two-year term. He will become chairman of the board in 2022. Dr. Ad also serves as the Chair for MCSQI's Research and Writing Committee and has been a valuable contributor to MCSQI.

***Mike Fiocco, MD, became the Perfusion Committee Chair*** and engaged with perfusionists over the course of the year and conducted a survey regarding top concerns, goals, and key issues that MCSQI can address that will impact outcomes. A goal was established to encourage hospitals to integrate perfusion data with their EMR system and establish a meaningful quality outcomes dashboard.

**A Semi-Annual MCSQI Newsletter was Initiated to Enhance Communication.** MCSQI published its first newsletter in February of 2020 to improve communication and keep members informed.

# COVID-19 Impact



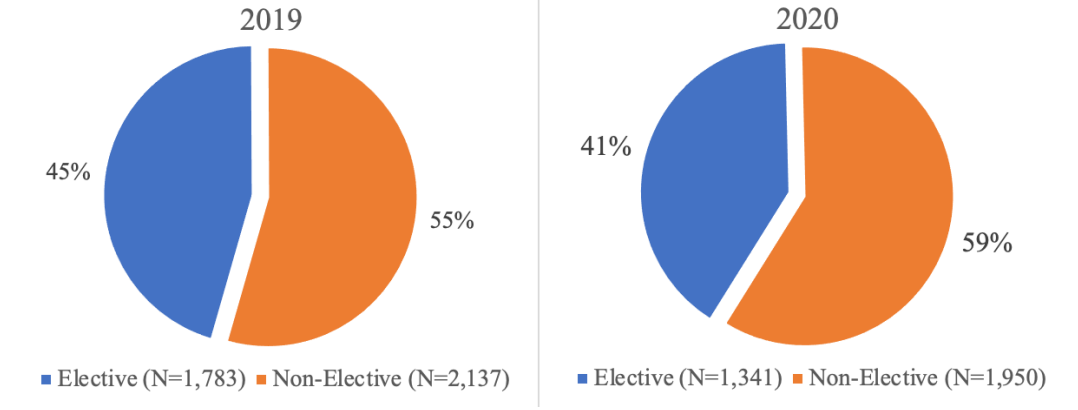
## COVID-19 Negatively Impacts Cardiac Surgery Volumes

The onset of COVID-19 in the winter of 2020 significantly impacted cardiac surgery volumes. Nationally, total cardiac surgery cases decreased 15% in 2020 compared to 2019, while volumes in Maryland decreased by 16%. The most dramatic decrease in volumes occurred in the month of April 2020 because of the abrupt cessation of elective surgeries. Maryland experienced a slightly larger decrease in volumes (-60%) compared to the national rate (-53%). Morbidity and mortality also increased.

***ADULT CARDIAC SURGERY CASES***

| | April 2020 Change Compared to 2018 - 2019 Monthly Mean | | 2019 to 2020 Change | |
|---|---|---|---|---|
| **Variable** | **National** | **MCSQI** | **National** | **MCSQI** |
| **Volume** | -53% | -60% | -15% | -16% |
| **Elective** | -65% | -71% | -19% | -24% |
| **Non-Elective** | -40% | -51% | -12% | -9% |
| **O/E Mortality (all major cases)** | 110% | 82% | 14% | 18% |
| **O/E Mortality (iCABG)** | 167% | 41% | 11% | 3% |
| **Readmission Rate** | N/A | -63% | -5% | -21% |

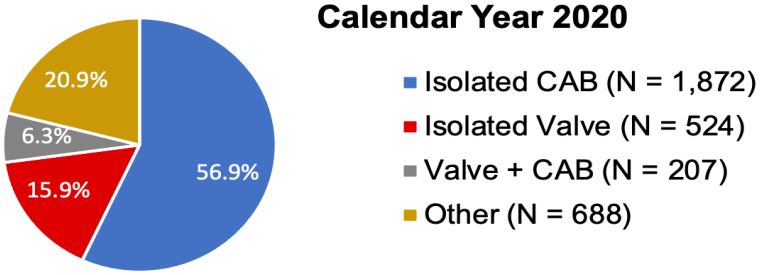
**Procedure Status by Year: All MCSQI Hospitals, STS Major Procedures, 2019 vs. 2020**




STS Comparison: 48% Elective Procedures in 2019; 46% Elective Procedures in 2020.

# Volume Trends

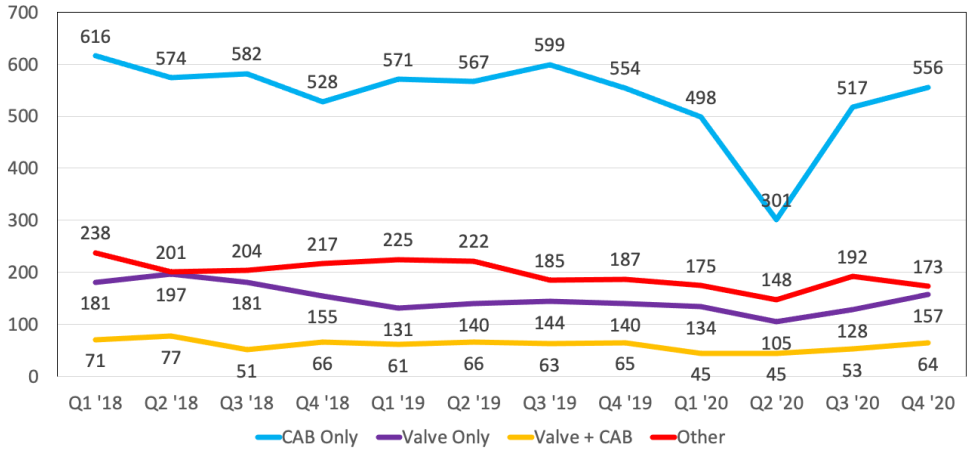
## Statewide Procedure Volume by STS Category: Calendar Year 2020




| MCSQI Procedure Volume | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|
| Isolated CABG | 2,324 (53.4%) | 2,460 (58.5%) | 2,300 (55.6%) | 2,291 (58.4%) | 1,872 (56.9%) |
| Isolated AVR (SAVR) | 411 | 276 | 333 | 235 | 177 |
| AV Replacement + CABG | 262 | 207 | 186 | 180 | 134 |
| Isolated MVR | 84 | 89 | 128 | 98 | 97 |
| MV Replacement + CABG | 22 | 29 | 29 | 29 | 29 |
| Isolated MV Repair | 165 | 221 | 253 | 222 | 250 |
| MV Repair + CABG | 49 | 53 | 50 | 46 | 44 |
| **Total: STS Major Procedures** | **3,317 (76.2%)** | **3,335 (79.4%)** | **3,279 (79.2%)** | **3,101 (79.1%)** | **2,603 (79.1%)** |
| Other Procedures* | 1,035 (23.8%) | 867 (20.6%) | 860 (20.8%) | 819 (20.9%) | 688 (20.9%) |
| **Total: All Procedures** | **4,352** | **4,202** | **4,139** | **3,920** | **3,291** |

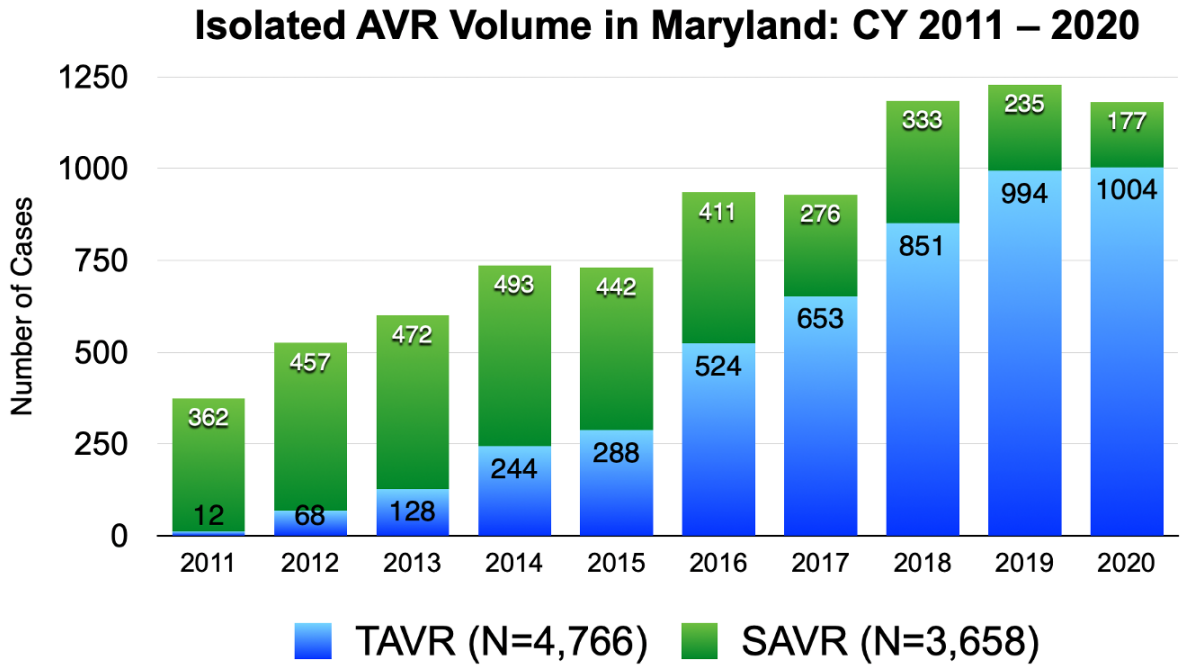
* Includes other cardiac surgery for ex: CABG or Valve + Other procedures, Transplants, VAD, Aortic Surgery. Excludes Transcatheter Procedures.

## Cardiac Surgery Volume by Quarter: All MCSQI Hospitals, 2018 – 2020

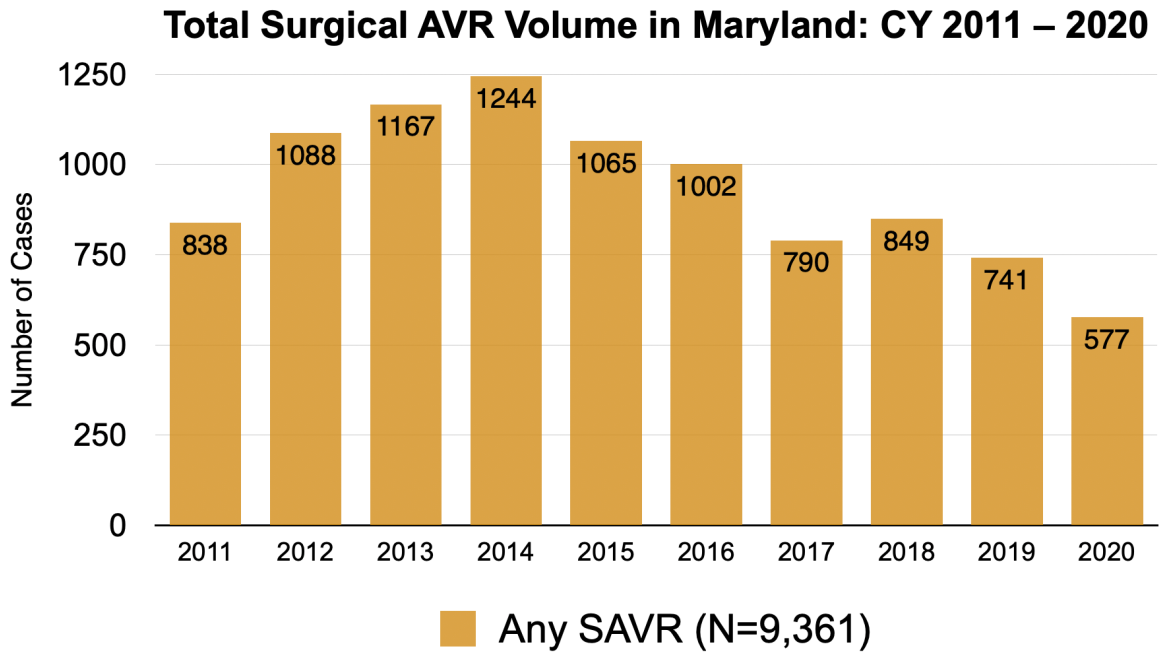



18% drop in total procedures for CY 2020 compared with 2018-2019 volume

# Volume Trends




Despite COVID-19, transcatheter aortic valve replacement (TAVR) volumes increased slightly by 1% in 2020 from 2019; however, total TAVR and SAVR volumes decreased by 9% while surgical aortic valve replacements decreased by approximately 25%.



# Quality Committee

The Quality Committee is tasked with managing MCSQI's quality improvement agenda. The Chair is Glenn Whitman, MD and Co-chair is Thomas Matthew, MD. Membership is comprised of surgeons, data managers, intensivists, advance 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.

## 2020 Highlights:

| | MCSQI Rates (Unadjusted) | 2013 CAB Only | 2020 CAB Only | Impact |
|---|---|---|---|---|
| **Early Extubation / Prolonged Ventilation** | Early Extubation | 40% | 74% | 83% Improvement |
| | Prolonged Ventilation | 9.5% | 5.4% | 43% Reduction |
| **Blood Utilization** | Intra-operative Blood Transfusion | 39% | 18% | 54% Reduction |
| | Post-operative Blood Transfusion | 34% | 25% | 26% Reduction |
| | Any Blood Transfusion | 55% | 33% | 40% Reduction |
| **MCSQI Blood Management** | • Tenets representing the most critical components were drafted under the leadership of Rawn Salenger, MD.<br>• Surgeons, perfusionists, anesthesiologists and advanced practice providers vetted and modified the recommended tenets.<br>• Communication and adoption of a blood conservation culture among the mutlidisciplinary cardiac surgery team was determined to be critical, in addition to key clinical elements. | | | |
| **Readmission Reduction Initiative** | • Readmission rates decreased 21%, potentially attributed to COVID-19 concerns among patients to return the hospital, access limitations, and limited bed availability, as well as virtual medical evaluation opportunities.<br>• Re-evaluation of the implementation of MCSQI's Readmission Reduction Tenets was delayed due to COVID-19.<br>• A Readmissions Performance Dashboard with 20 variables was developed. | | | |
| **Atrial Fibrillation Initiative** | • New Onset of A-Fib variability rates continue to be monitored. State rates decreased slightly to 25.6% in 2020 from 26.9% in 2019. However, significant variances among programs exist.<br>• Data managers were surveyed about their understanding of STS definitions for new onset A-Fib and documentation. It was determined that cardiac surgeons and advance practice providers need further education on the definitions and appropriate documentation. | | | |

# Quality Committee

## 2020 Highlights (continued)

| | |
|---|---|
| **Cost / Value Initiative** | • A Formal agreement between MCSQI, MHCC and HSCRC was drafted for MCSQI to obtain confidential data and an expanded financial/administrative data set.<br>• Maryland Department of Health Institutional Review Board approved MCSQI's Data Linking Project Proposal and granted an IRB exemption**.** |
| **Perfusion** | • A Perfusion work group was re-established under the leadership of Michael Fiocco, MD from Medstar Union Memorial Hospital.<br>• Protocols and concerns were shared and discussed among members.<br>• Goal established to have hospitals integrate perfusion data into the EMR and develop a Perfusion Performance Dashboard. |
| **Structural Heart** | • Fall Meeting Presentation: **Aortic Valve Disease 2020: Patient Centered Care And The Role of A Valve Center Of Excellence** by Douglas R. Johnston, MD, FACS, Cleveland Clinic<br>• **TVT Panel Discussion – TAVR vs SAVR,** case studies by cardiologists and cardiac surgeons |

# Quality Committee

Blood management and conservation continues to be a key strategic initiative for MCSQI. Transfusion rates continue to improve in the state with 40% reduction in 2020 compared to 2013 for any blood product used (33% vs. 55%). MCSQI Blood Management Tenets developed in 2020 represent a summary of the most critical elements to follow. The elements are based on a review of published literature, discussions regarding clinical protocols and practice patterns among cardiac surgeons, anesthesiologists, and perfusionists, and the analysis of transfusion data and protocols of top performers.

## BLOOD MANAGEMENT TENETS

***Goal: Create a multidisciplinary culture of blood conservation through research, education, collaboration and enhanced communication among cardiac surgeons, anesthesiologists perfusionists, Advance Practice Providers, cardiac nurses, and critical care providers.***

**Preoperative:**

- 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:**

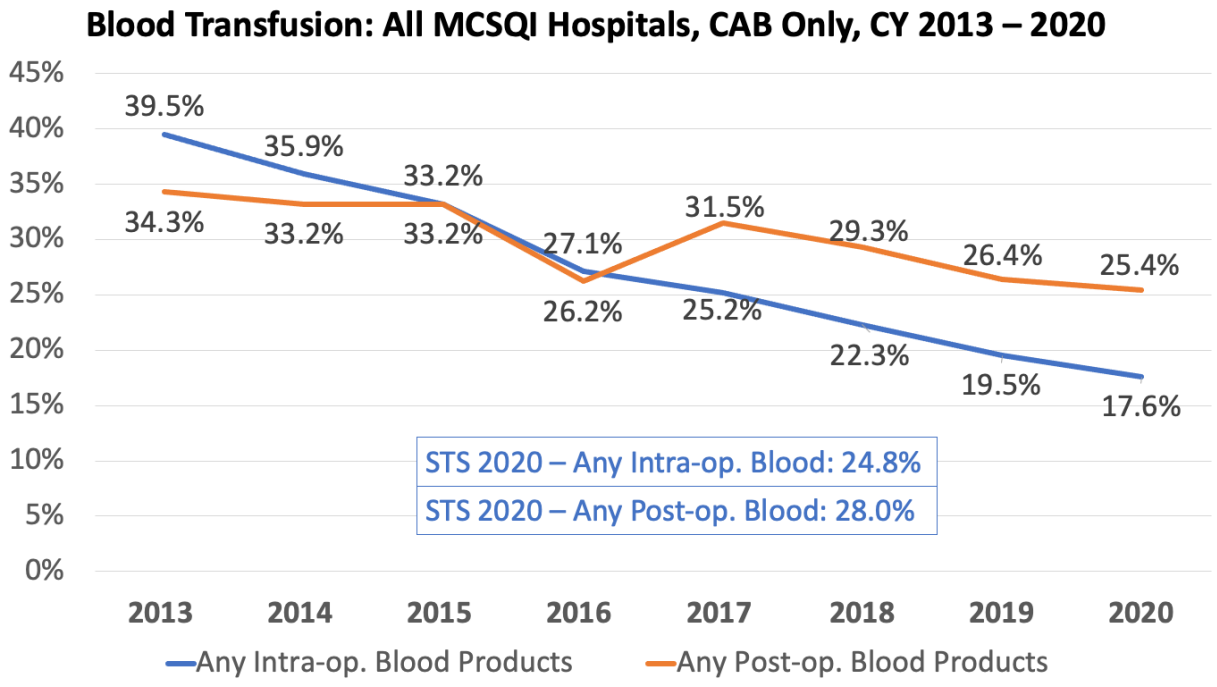
- The importance of meticulous hemostasis by the surgeon cannot be overstated. Employing a checklist to look for bleeding before closing the chest can help reduce blood loss.
    - Antifibrinolytic agent should be utilized unless contraindicated
    - Maximize RAP/VAP
    - Transfusion threshold = Hgb 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.

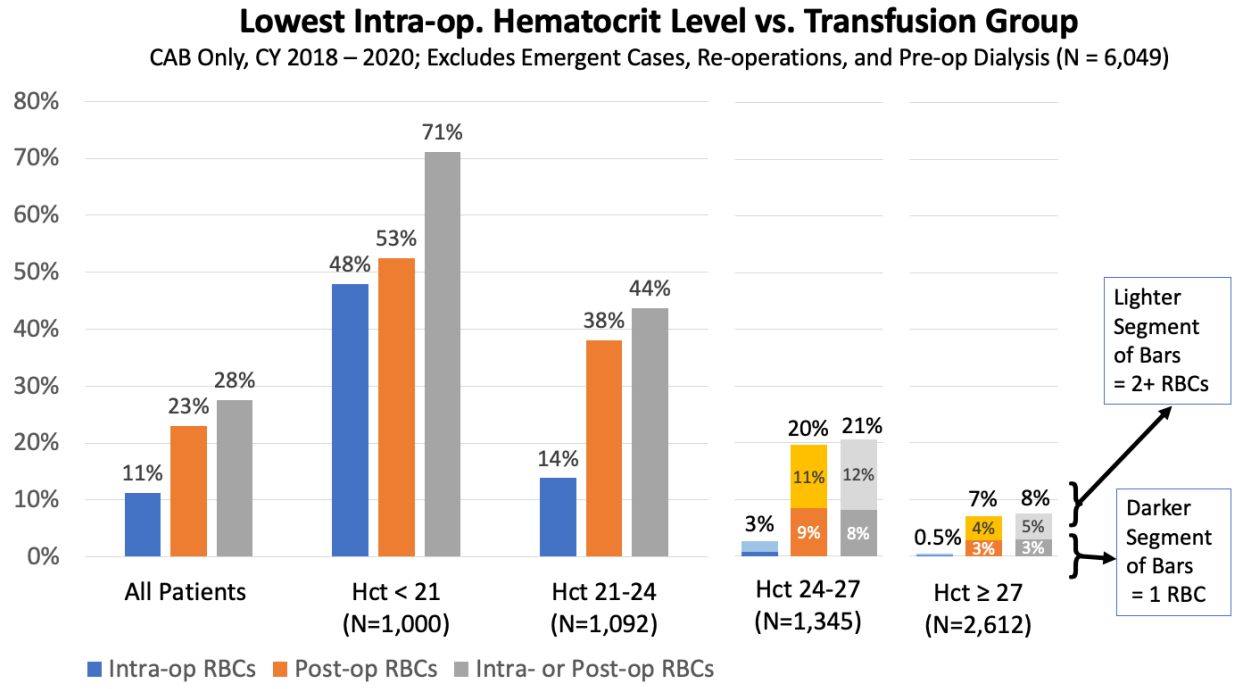
**Postoperative:**

- 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

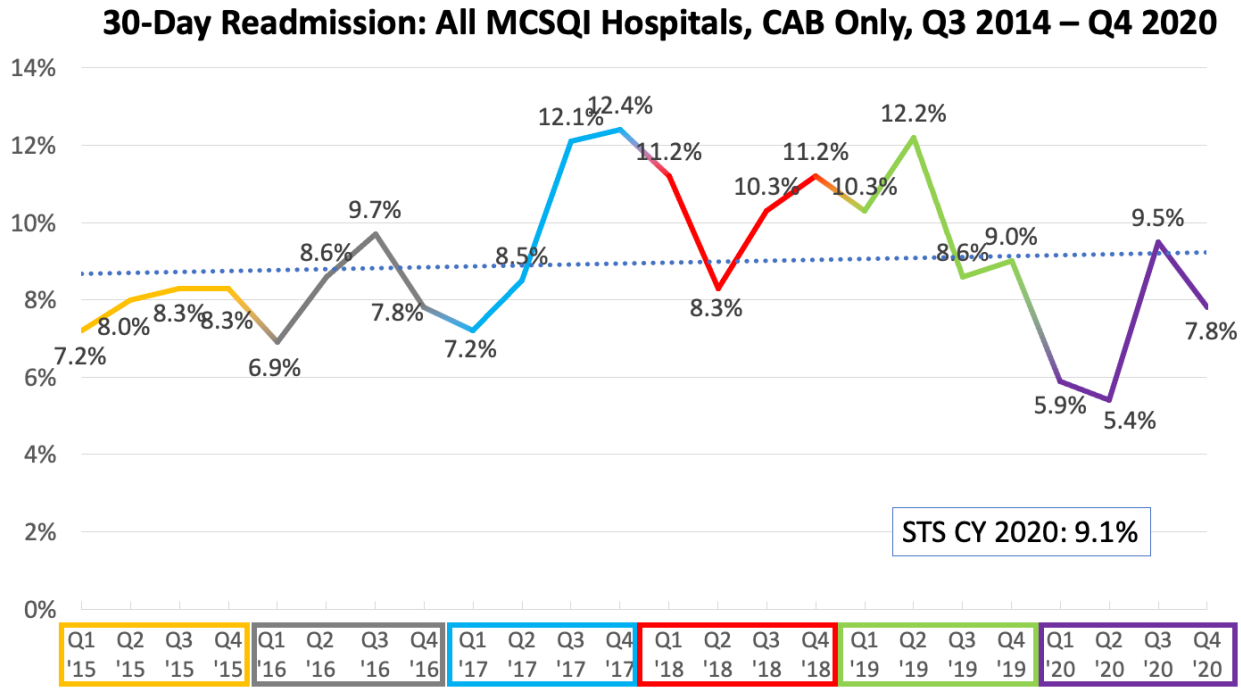
*Note: This document is meant to represent MCSQI's consensus opinion on the fundamentals of conservative blood management. There are also more comprehensive and stricter options that many are successfully employing, but this is meant to represent a good starting point for those interested in basic blood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

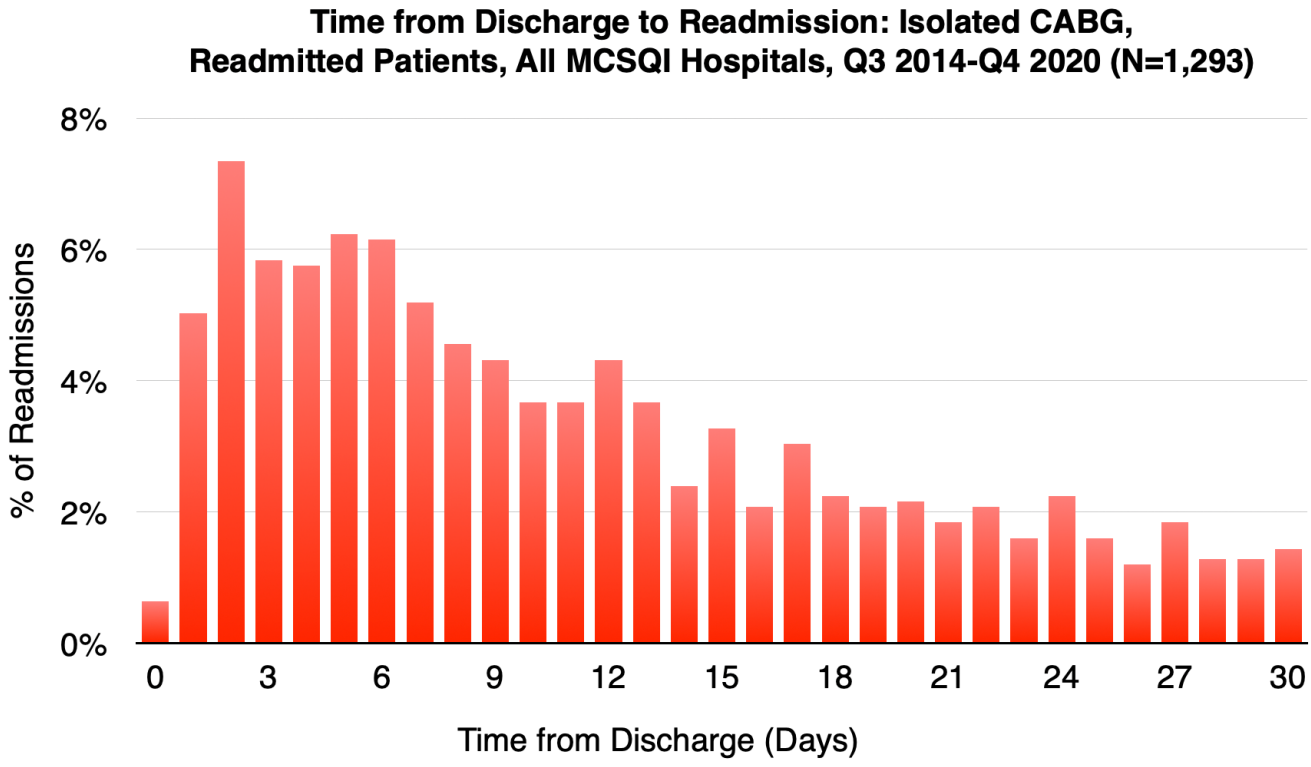
# Quality Committee



# Quality Committee




Most readmissions (55%) occur within the first ten days after discharge.

# Research and Writing Committee

The Research and Writing Committee, chaired by Niv Ad, MD of Adventist HealthCare White Oak Medical Center, and co-chair Diane Alejo of Johns Hopkins, 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.

## 2020 Highlights

In 2020 MCSQI published two manuscripts, one poster and three presentations at the national Society of Thoracic Surgeons meetings. The successful collaboration of MCSQI with the IMPROVE Network yielded a podium presentation: "*Evaluating the Role of Failure to Rescue after Cardiac Surgery – A National Experience."* Our colleagues presenting for the IMPROVE Network were awarded the Maxwell Chamberlain Paper Memorial Award.

### Poster & Presentation

**Society of Thoracic Surgeons Advances in Quality and Outcomes, 2020.**

- Multiple Arterial Grafts in Coronary Artery Bypass Surgery: Variation in Practice & Outcomes

### 3 Presentations

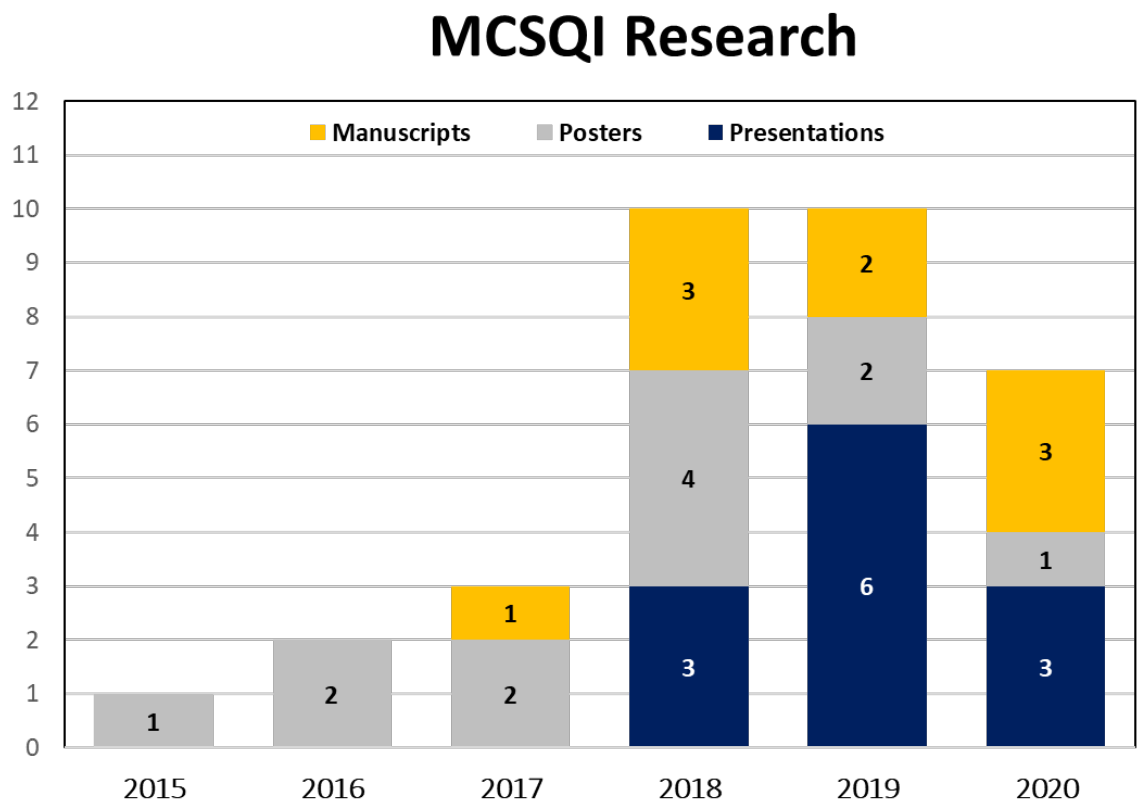
**Society of Thoracic Surgeons (STS) 56th Annual Meeting, 2020**.

- Evaluating the Role of Failure to Rescue on Mortality after Cardiac Surgery - A National Experience *(Maxwell Chamberlain Memorial Paper Award)*
- A Maryland Cardiac Surgery Statewide Analysis of the Impact of Extubation in the Operating Room Following Routine Cardiac Surgery
- Dual Antiplatelet Therapy at Discharge is Safe after Acute MyocardiaI Infarction Treated with Coronary Artery Bypass Grafting Yet Practice Variation Exists With-in a Statewide Quality Collaborative

### 3 Publications

- Clinical Practice Variation and Outcomes for Stanford Type A Aortic Dissection Repair Surgery in Maryland: Report from a Statewide Quality Initiative. *Aorta (Stamford)*
- Racial Disparity in Cardiac Surgery Risk and Outcome: Report from a Statewide Quality Initiative. *(Annals of Thoracic Surgery)*
- Mitigating the Risk: Transfusion or Reoperation for Bleeding After Cardiac Surgery. *(Annals of Thoracic Surgery)*

# Research and Writing Committee



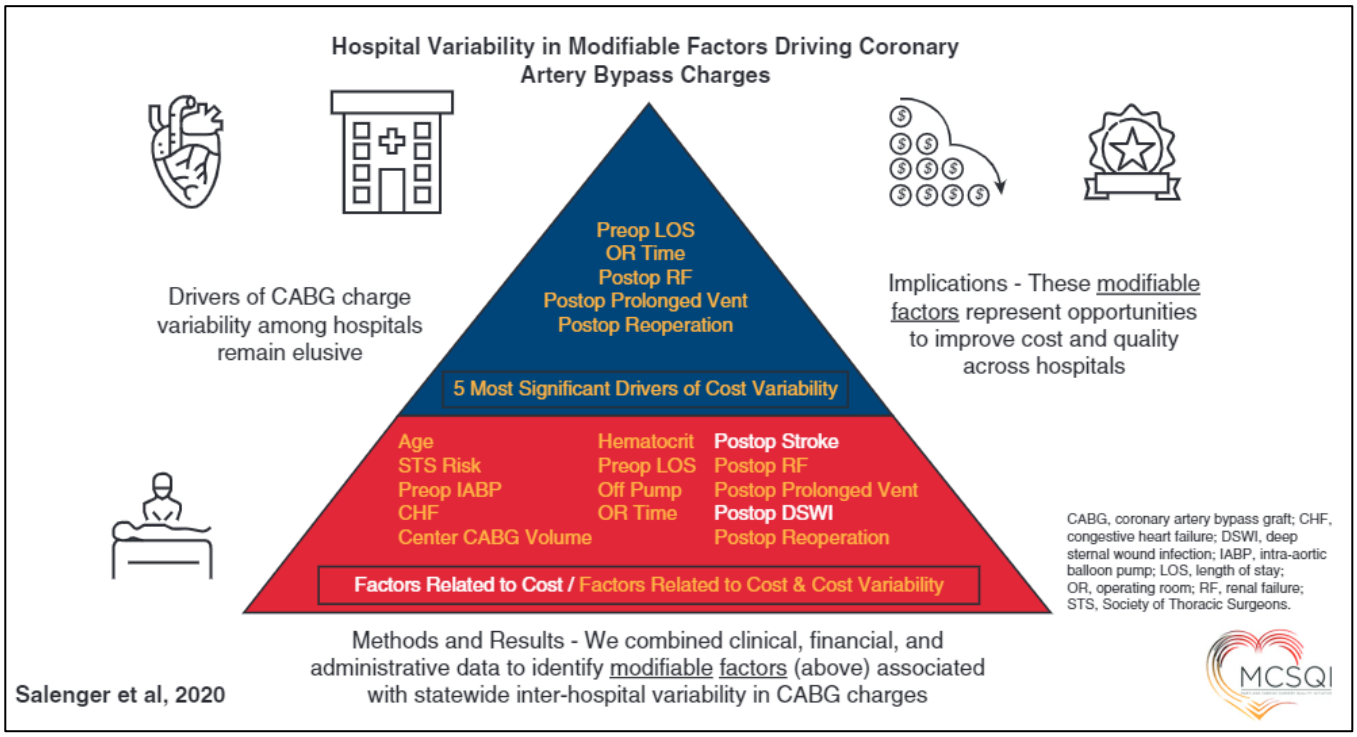

| TOTAL | |
|---|---|
| Presentations | 12 |
| Posters | 12 |
| Manuscripts | 9 |

**Projects:**

- **Analytical Innovation – Machine Learning and Artificial Intelligence**
  - MCSQI embarked on its first project using artificial intelligence and the MCSQI statewide dataset to develop a new prediction model of outcomes in cardiac surgery.
- **Four-State 90th Percentile Comparisons:** Virginia, Michigan, Washington, Maryland (66 Hospitals).
  - Utilizing a "high hurdle" 90th percentile benchmark, MCSQI hospitals continue to perform well compared to other regional consortia.
  - 80% of MCSQI programs had better outcomes than expected, compared to only 52% of the other collaboratives.

# Research and Writing Committee

- **Linking Administrative/Financial Data to STS Clinical Registry: – A Statewide Analysis of Hospital Variability in Modifiable Factors Driving Coronary Artery Bypass Charges**
  - Significant inter-hospital charge variability exists across our state, unrelated to patient risk profile



# Data Manager Committee

MCSQI's STS Data Manager Committee, co-chaired by Kimberly Behrens of Johns Hopkins Hospital 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 in Virginia, Michigan, and Texas. Data Managers serve alongside surgeons on various committees and task forces within MCSQI.

## 2020 Highlights

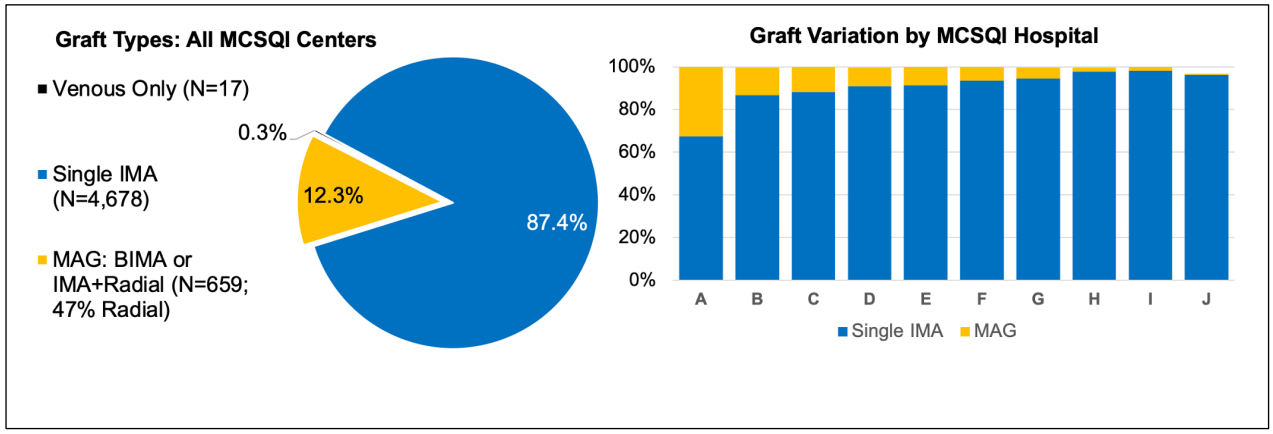
Data Managers convene at bi-annual workshops to review challenging cases and confirm all members are up to date with the latest STS definition clarifications. STS surgeons have also participated in these workshops.

### MCSQI Poster Presentation at STS AQO Conference

The data manager's poster was accepted by the STS AQO and the abstract ***Multiple Arterial Grafts in Coronary Artery Bypass Surgery: Variation in Practice and Outcomes*** was presented by Gail Hanna, RN, BSN at the national conference on October 2, 2020.

Gail Hanna, RN, BSN

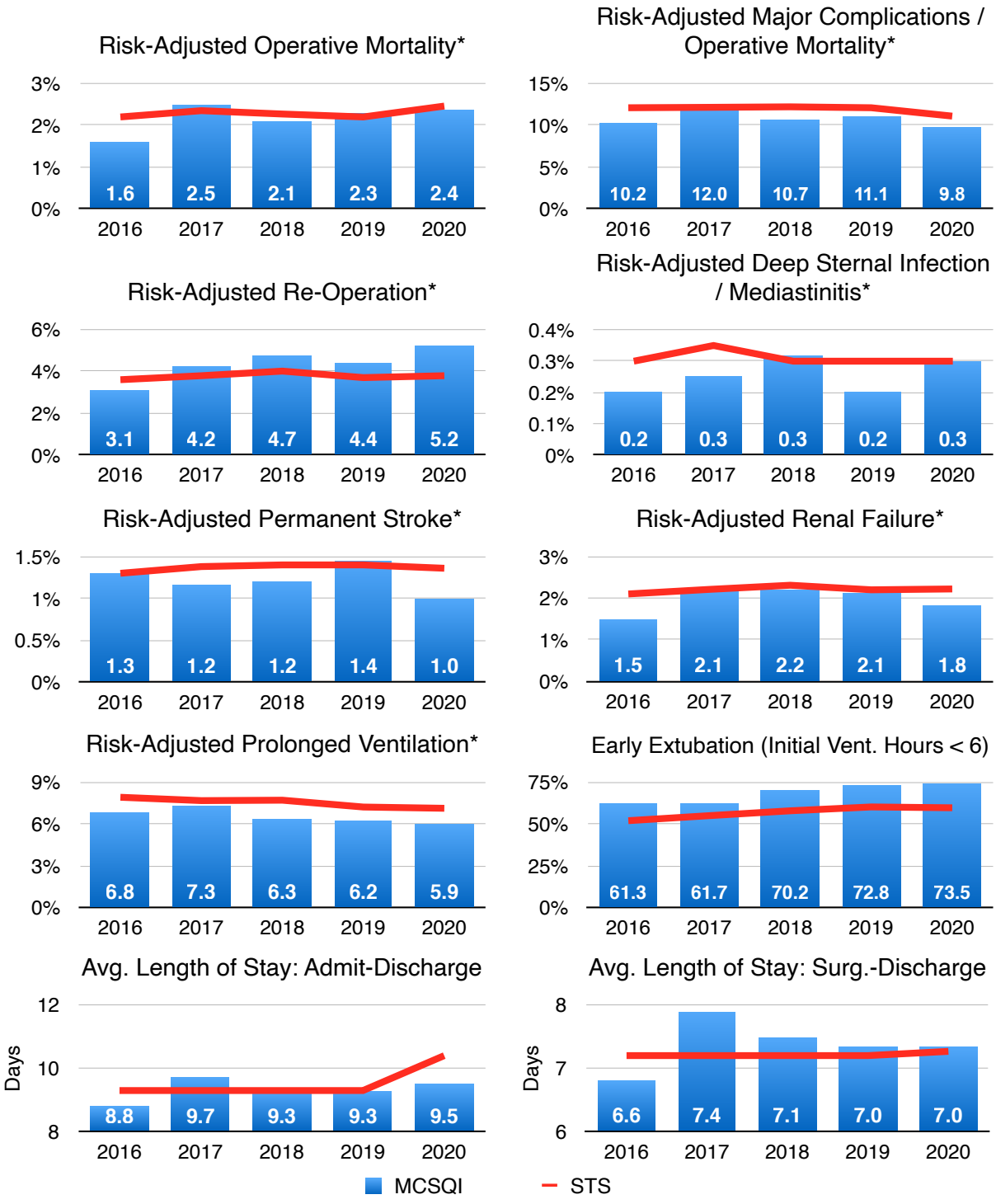
***5,354 patients MCSQI (July 2017 - December 2019) First-time isolated CABG with 2+ grafts***




### A Collaborative "Virtual" Data Manager Workshop Held

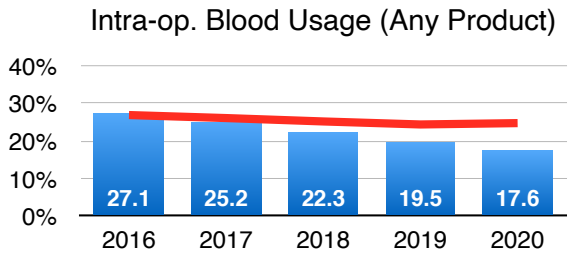
In collaboration with the Virginia Cardiac Services Quality Initiative, a data managers' educational workshop was held on November 5, 2020. Coding scenarios provided by the Michigan Society of Thoracic and Cardiovascular Surgeons (MSTCVS) were reviewed and discussed to enhance the data managers' knowledge base.

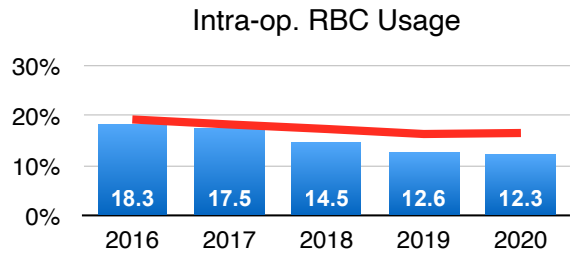
# Clinical Quality Indicators – Isolated CABG

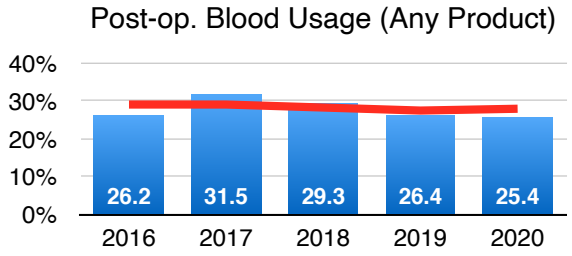


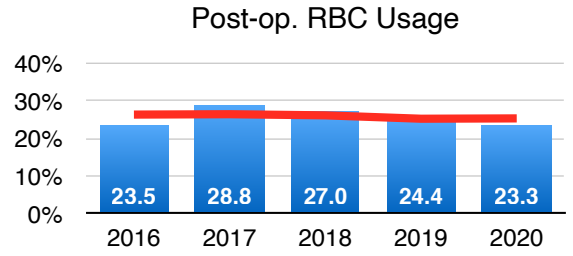

*__STS Risk-adjusted Rates__. These calculations involve two steps: 1) Calculation of the O/E ratio, which divides the percentage of an observed morbidity by the rate predicted by the STS risk calculator, and 2) Multiplication of the O/E ratio by the STS national rate of the observed morbidity. All O/E 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.

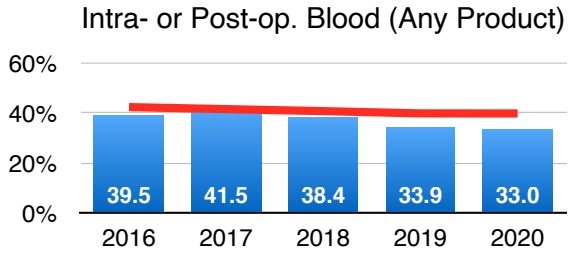
# Clinical Quality Indicators – Isolated CABG

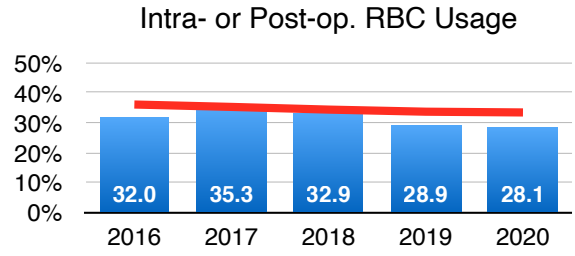


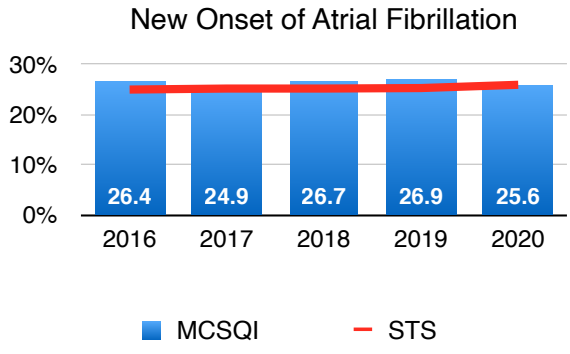



# National Quality Forum Measures

| Calendar Year 2020 Isolated CABG Procedures (unless otherwise indicated) | | MCSQI | STS |
|---|---|---|---|
| **Procedure Volume** | Isolated CABG | 1,872 (56.9%) | 132,385 (51.9%) |
| | Isolated Valve | 524 (15.9%) | 34,457 (13.5%) |
| | CABG + Valve | 207 (6.3%) | 16,994 (6.7%) |
| | Other | 688 (20.9%) | 71,163 (27.9%) |
| **Pre-Operative** | Timing of Antibiotic Administration | 99.7% | 98.0% |
| | Selection of Antibiotic Administration | 99.4% | 98.5% |
| | Duration of Prophylaxis | 99.4% | 98.9% |
| | Pre-operative Beta Blockers | 98.7% | 96.6% |
| **Operative** | Use of Internal Mammary Artery | 99.7% | 99.4% |
| **Complications**** | Risk-Adjusted Prolonged Ventilation | 4.3% | 7.1% |
| | Risk-Adjusted Deep Sternal Infection | 0.2% | 0.1% |
| | Risk-Adjusted Permanent Stroke | 0.8% | 1.4% |
| | Risk-Adjusted Renal Failure | 1.8% | 2.2% |
| | Risk-Adjusted Cardiac-Related Re-Operation | 3.4% | 2.5% |
| **Discharge** | Anti-Platelets | 99.4% | 98.2% |
| | Beta Blockers | 99.9% | 98.8% |
| | Anti-Lipids | 99.6% | 98.4% |
| **Mortality**** | Risk-Adjusted Inpatient Mortality: Isolated CABG | 1.6% | 1.8% |
| | Risk-Adjusted Operative Mortality: Isolated CABG | 2.3% | 2.5% |
| | Risk-Adjusted Operative Mortality: AV Replacement, 2020 | 2.3% | 2.2% |
| | Risk-Adjusted Operative Mortality: AV Replacement + CABG, 2020 | 7.6% | 3.9% |
| | Risk-Adjusted Operative Mortality: MV Replacement, 2020 | 10.9% | 5.6% |
| | Risk-Adjusted Operative Mortality: MV Replacement + CABG, 2020 | 14.9% | 10.6% |
| | Risk-Adjusted Operative Mortality: MV Repair, 2020 | 0.8% | 1.2% |
| | Risk-Adjusted Operative Mortality: MV Repair + CABG, 2020 | 3.3% | 6.5% |
| **Readmissions** | 30-Day Readmission Rate: Isolated CABG | 7.4% | 9.1% |

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

# STS 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

**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.*

## Manuscripts

**Hospital Variability in Modifiable Factors Driving Coronary Artery Bypass Charges.**
Salenger R, Etchill EW, Fonner CE, Alejo D, Matthew TL. Whitman GJR, Schena S, Gammie JS, Taylor B, Metkus TS, Holmes SD, Ad N, and the Maryland Cardiac Surgery Quality Initiative. *JTCVS 2021 Mar 9;S0022-5223(21)00420-7. doi: 10.1016/j.jtcvs.2021.02.094*

**Clinical Practice Variation and Outcomes for Stanford Type A Aortic Dissection Repair Surgery in Maryland: Report from a Statewide Quality Initiative.** Mazzeffi M, Ghoreishi M, Alejo D, Fonner CE, Tanaka K, Abernathy JH 3rd, Whitman G, Salenger R, Lawton J, Ad N, Brown J, Gammie J, Taylor B; Investigators for the Maryland Cardiac Surgery Quality Initiative. *Aorta (Stamford). 2020 Jun;8(3):66-73. doi: 10.1055/s-0040-1714121. Epub 2020 Nov 5. PMID: 33152787*

# Posters, Manuscripts and Presentations

**Racial Disparity in Cardiac Surgery Risk and Outcome: Report From a Statewide Quality Initiative.**
Mazzeffi M, Holmes SD, Alejo D, Fonner CE, Ghoreishi M, Pasrija C, Schena S, Metkus T, Salenger R, Whitman G, Ad N, Higgins RSD, Taylor B, MCSQI
*Annals of Thoracic Surgery 2020 Jan 18. DOI: 10.1016/j.athoracsur.2019.11.043 PMID: 31962111*

**Mitigating the Risk: Transfusion or Reoperation for Bleeding After Cardiac Surgery.**
Pasrija C, Ghoreishi M, Whitman G, Ad N, Alejo DE, Holmes SD, Schena S, Salenger R, Mazzeffi MA, Fonner CE, Taylor B; Investigators for the Maryland Cardiac Surgery Quality Initiative.
*Annals of Thoracic Surgery. 2019 Dec 19.*
doi: *10.1016/j.athoracsur.2019.10.076. [Epub ahead of print] PMID: 31866482*

**Predictors of Operative Mortality Among Cardiac Surgery Patients with Prolonged Ventilation.**
Suarez-Pierre A, Fraser CD, Zhou X, Crawford TC, Lui C, Metkus TS, Whitman GJ, Higgins RS, Lawton JS.
*Journal of Cardiac Surgery. 2019 Jul 3. doi: 10.1111/jocs.14118. [Epub ahead of print] PMID: 31269299*

**Variation in Platelet Transfusion Practices in Cardiac Surgery.**
Zhou X, Fraser CD 3rd, Suarez-Pierre A, Crawford TC, Alejo D, Conte JV Jr, Lawton JS, Fonner CE, Taylor BS, Whitman GJR, Salenger R.
*Innovations (Phila). 2019 Apr;14(2):134-143. doi: 10.1177/1556984519836839. Epub 2019 Mar 18.*

**Bilateral Internal Mammary Artery Use in Diabetic Patients: Friend or Foe?**
Crawford TC, Zhou X, Fraser III CD, Magruder JT, Suarez-Pierre A, Alejo D, Bobbitt J, Fonner CE, Wehberg K, Taylor B, Kwon C, Fiocco M, Conte JV, Salenger R, Whitman GJ; Investigators for the Maryland Cardiac Surgery Quality Initiative.
*Annals of Thoracic Surgery. 2018 Oct; 106(4):1088-1094. doi:10.1016/j.athoracsur.2018.04.030. Epub 2018 Jun 20.*

**Off-Pump Coronary Artery Bypass in Octogenarians: Results of a Statewide, Matched Comparison.**
Suarez-Pierre A, Crawford TC, Fraser III CD, Zhou X, Lui C, Taylor B, Wehberg K, Conte JV, Whitman GJ, Salenger R; MCSQI Collaborative.
*General Thoracic and Cardiovascular Surgery. 2018 Oct 19. doi:10.1007/s11748-018-1025-8.*

**Less is More: Results of a Statewide Analysis of the Impact of Blood Transfusion on CABG Outcomes.**
Crawford TC, Magruder JT, Fraser III CD, Suarez-Pierre A, Alejo D, Fonner CE, Canner J, Horvath K, Wehberg K, Taylor B, Kwon C, Whitman GJ, Conte JV, Salenger R. Investigators for the Maryland Cardiac Surgery Quality Initiative.
Ann Thorac Surg. 2018 Jan;105(1):129-136. doi: 10.1016/j.athoracsur.2017.06.062. Epub 2017 Nov 1. PMID: 29074154

**Variation in Red Blood Cell Transfusion Practices During Cardiac Surgery Among Centers in Maryland: Results from A State Quality Improvement Collaborative.**
Magruder JT, Blasco-Colmenares E, Crawford TC, Alejo D, Conte JV, Salenger R, Fonner CE, Kwon CC, Bobbitt J, Brown JM, Nelson MG, Horvath KA, Whitman GR.
*Annals of Thoracic Surgery. 2017 Jan; 103(1):152-160. Epub 2016 Aug 20.*

# Posters, Manuscripts and Presentations

## Podium Presentations:

**Dual Antiplatelet Therapy at Discharge is Safe after Acute MyocardiaI 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

## Hospitals

| |
|---|
| **Adventist HealthCare White Oak Medical Center** |
| **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** |

## Board Members

| | |
|---|---|
| Niv Ad, MD | Adventist HealthCare White Oak Medical Center |
| Stefano Schena, MD | Johns Hopkins Hospital |
| Daniel Lee, MD | Luminis Health Anne Arundel Medical Center |
| Michael Fiocco, MD | MedStar Union Memorial Hospital |
| Peter Cho, MD | Sinai Hospital |
| Thomas Matthew, MD, Chair | Suburban Hospital |
| James Todd, MD | TidalHealth Peninsula Regional |
| Jamie Brown, MD | University of Maryland Capital Region Health |
| Rawn Salenger, MD | University of Maryland St. Joseph Medical Center |
| Brad Taylor, MD | University of Maryland Medical Center |
| Mark Nelson, MD | UPMC Western Maryland |
| Terri Haber, MPH, Executive Director | MCSQI |
| Diane Alejo, BA | MCSQI |
| Clifford E. Fonner, BA | MCSQI |
| Eileen Fleck, MPP | Maryland Health Care Commission |

## Treasurer

| | |
|---|---|
| Niv Ad, MD | Adventist Healthcare White Oak Medical Center |

## Director of Analytics

| | |
|---|---|
| Clifford E. Fonner, BA | MCSQI |

## Biostatistician

| | |
|---|---|
| Sari D. Holmes, PhD | MCSQI |

# MCSQI Committee Leadership

## Co-founders:

| |
|---|
| Edwin Fonner Jr., DrPH |
| Clifford E. Fonner, BA |
| John V. Conte, MD |
| Diane Alejo, BA |

## Data Manager Committee

| | |
|---|---|
| Kimberly Behrens RN, BSN, Chair | Johns Hopkins Hospital |
| Dawn Roach, RN, Co-chair | UM St. Joseph Medical Center |
| Terri Haber, MPH | MCSQI |
| Diane Alejo, BA | MCSQI / Johns Hopkins Hospital |
| Clifford E. Fonner, BA | MCSQI |

## Planning Committee

| | |
|---|---|
| Thomas Matthew, MD, Chair | Suburban Hospital |
| Rawn Salenger, MD, Past Chair | UM St. Joseph Medical Center |
| Niv Ad, MD, Treasurer | Adventist White Oak Medical Center |
| Terri Haber, MPH, Executive Director | MCSQI |
| Clifford E. Fonner, BA, Director of Analytics | MCSQI |
| Diane Alejo, BA, Advisor / Co-Chair R&W | MCSQI / Johns Hopkins Hospital |
| Kimberly Behrens RN, BSN, Chair Data Mgr. | Johns Hopkins Hospital |
| Michael Fiocco, MD, Chair Perfusion | Medstar Union Memorial Hospital |
| Glenn Whitman, MD, Chair Quality | Johns Hopkins Hospital |

## Quality Committee

| | |
|---|---|
| Glenn Whitman, MD, Chair | Johns Hopkins Hospital |
| Thomas Matthew, MD, Co-Chair | Suburban Hospital |
| Terri Haber, MPH | MCSQI |
| Jennifer Cook, RN, BSN | Adventist HealthCare White Oak Medical Center |
| Diane Alejo, BA | MCSQI / Johns Hopkins Hospital |
| Clifford E. Fonner, BA | MCSQI |

## Regulatory Committee

| | |
|---|---|
| Paul Massimiano, MD | Adventist HealthCare White Oak Medical Center |
| Terri Haber, MPH | MCSQI |
| Eileen Fleck, MPP | Maryland Health Care Commission (MHCC) |
| Clifford E. Fonner, BA | MCSQI |
| Diane Alejo, BA | MCSQI / Johns Hopkins Hospital |

# MCSQI Committee Leadership

## Research & Writing Committee

| | |
|---|---|
| Niv Ad, MD, Chair | Adventist HealthCare White Oak Medical Center |
| Diane Alejo, BA, Co-Chair | MCSQI /Johns Hopkins Hospital |
| Rawn Salenger, MD | UM St. Joseph Medical Center |
| Sari Holmes, PhD | MCSQI |
| Terri Haber, MPH | MCSQI |

## Perfusion Task Force

| | |
|---|---|
| Michael Fiocco, MD, Chair | Medstar Union Memorial Hospital |
| Holly Tannehill, CCP | Adventist HealthCare White Oak Medical Center |
| Christa Kampert | UM St. Joseph Medical Center |
| Terri Haber, MPH | MCSQI |

# 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 Corporation | 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

UPMC WESTERN MARYLAND

TidalHealth

Luminis Health

MedStar Union Memorial Hospital

SUBURBAN HOSPITAL JOHNS HOPKINS MEDICINE

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*

# Testimonials

*"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*

*"In 2013 Maryland created a statewide cardiovascular quality initiative providing a platform for in depth review of the care our patients receive who undergo heart surgery. Success of a program is measured by its outcomes. The Society of Thoracic Surgery (STS) sets the 'National' benchmarks to measure this success. The data managers in MCSQI are committed to ensuring Maryland programs succeed in data integrity, as this is the core of meaningful data. Data Managers at all ten sites in Maryland work collaboratively, review patient scenarios/data definitions, etc. to ensure STS registry data is accurate, complete, reproducible, and reflect the quality of care for patients in Maryland. The data managers play a vital role in supporting the quality improvement goals of MCSQI at a regional level and align themselves with other regional STS collaboratives at a national level! This collaborative and supportive approach is the key to MCSQI's success in reporting surgical outcomes among all programs in our State."*

*~ Jennifer Cook, Adventist HealthCare White Oak Medical Center*