Virginia Cardiac Services Quality Initiative

Spring 2023 Quarterly Meeting

Transforming Cardiovascular Care to Improve Patient Experience and Value

Tonight's Agenda

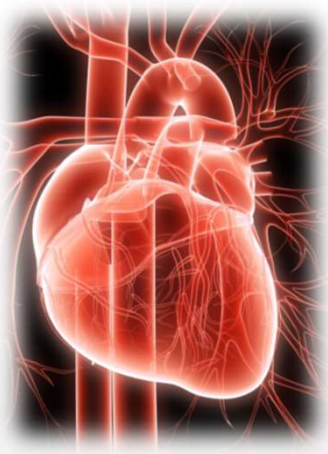
5:45 – 5:55 p.m.	Welcome and Updates from the Board *Mohammed Quader, MD, Virginia Commonwealth University* *VCSQI Chairman of the Board of Directors*
5:55 – 6:25 p.m.	How I Use VCSQI Data to Drive Quality Improvement *Robert Lancey, MD, MBA* *Sentara Rockingham Memorial Hospital*
6:25 – 6:45 p.m.	ELSO Center of Excellence Award Associated with Improved Failure to Rescue after Cardiac Arrest *Ray Strobel, MD, MSc, University of Virginia*
6:45 – 7:15 p.m.	Aortic Alerts: Transfer Practices for Emergency Patients *Kenan Yount, MD, MBA* *Assistant Professor of Surgery, University of Virginia*
7:15 – 7:30 p.m.	Q&A and Group Discussion

VCSQI

Welcome and Highlights from the Board

Mohammed Quader, MD
Virginia Commonwealth University
VCSQI Chairman

VCSQI Strategic Plan



Mission

Transform Cardiovascular Care to Improve Patient Experience and Value

Vision

Optimize Heart Care Outcomes Through National Collaboration, Innovation and Research

Core Values

- **V** alue-Based Best Practices
- **C** ollabration & Transparency
- **S** tewardship of Healthcare & Costs
- **Q** uality and Patient Centered
- **I** nnovation; Data and Analytic-Driven

Welcome to New Cardiology Members

- Augusta Health
- Bon Secours Memorial Regional
- Bon Secours Southside
- Bon Secours St. Francis

Congratulations to Eileen and Chris!

Eileen Dohmann, MBA, BSN, RN, NEA-BC
Mary Washington Hospital

Chris Sytsma, RN, MSN
Winchester Medical Center

VCSQI

Using VCSQI Data to Drive Quality Improvement

Robert Lancey, MD, MBA
Sentara Rockingham Memorial Hospital

ELSO Center of Excellence Recognition Associated with Improved Failure to Rescue after Cardiac Arrest

Raymond J Strobel, MD, MSc; Dustin Money, RRT-ACCS; Andrew M. Young, MD;; Alex Wisniewski, MD; Anthony Norman, MD; Raza Ahmad MD; Emily Kaplan, BA; Mark Joseph, MD; Mohammed Quader, MD; Michael Mazzeffi, MD; Leora T. Yarboro, MD; Nicholas R. Teman, MD, Investigators for the Virginia Cardiac Services Quality Initiative

VCSQI

UVA Health

@R_Strobes

Disclosure Statement

- I have nothing to disclose

Funding Statement

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Cardiac Arrest is most lethal complication after cardiac surgery

Published in final edited form as:
Ann Thorac Surg. 2014 August ; 98(2): 534–540. doi:10.1016/j.athoracsur.2014.03.030.

Hospital Variation in Mortality From Cardiac Arrest After Cardiac Surgery: An Opportunity for Improvement?

Damien J. LaPar, MD, MS, Ravi K. Ghanta, MD, John A. Kern, MD, Ivan K. Crosby, MD, Jeffrey B. Rich, MD, Alan M. Speir, MD, Irving L. Kron, MD, Gorav Ailawadi, MD, and Investigators for the Virginia Cardiac Surgery Quality Initiative

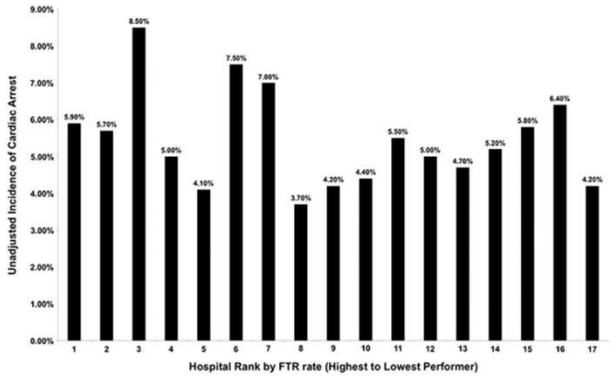


Fig 1.
Distribution of unadjusted postoperative cardiac arrest rates across Virginia Cardiac Surgery Quality Initiative hospitals ranked by failure-to-rescue (FTR) rate after cardiac arrest.

- Failure to rescue after cardiac arrest ranges from 50% to as high as 83%
- Characterized by abrupt onset and 100% mortality rate without immediate, system-level intervention
- Highly dependent on center-level characteristics

Extracorporeal Life Support Organization (ELSO)
Center of Excellence Recognition (CoE)

Patient and family

Environment

Systems

Workforce

Process Optimization

Quality

Knowledge Management

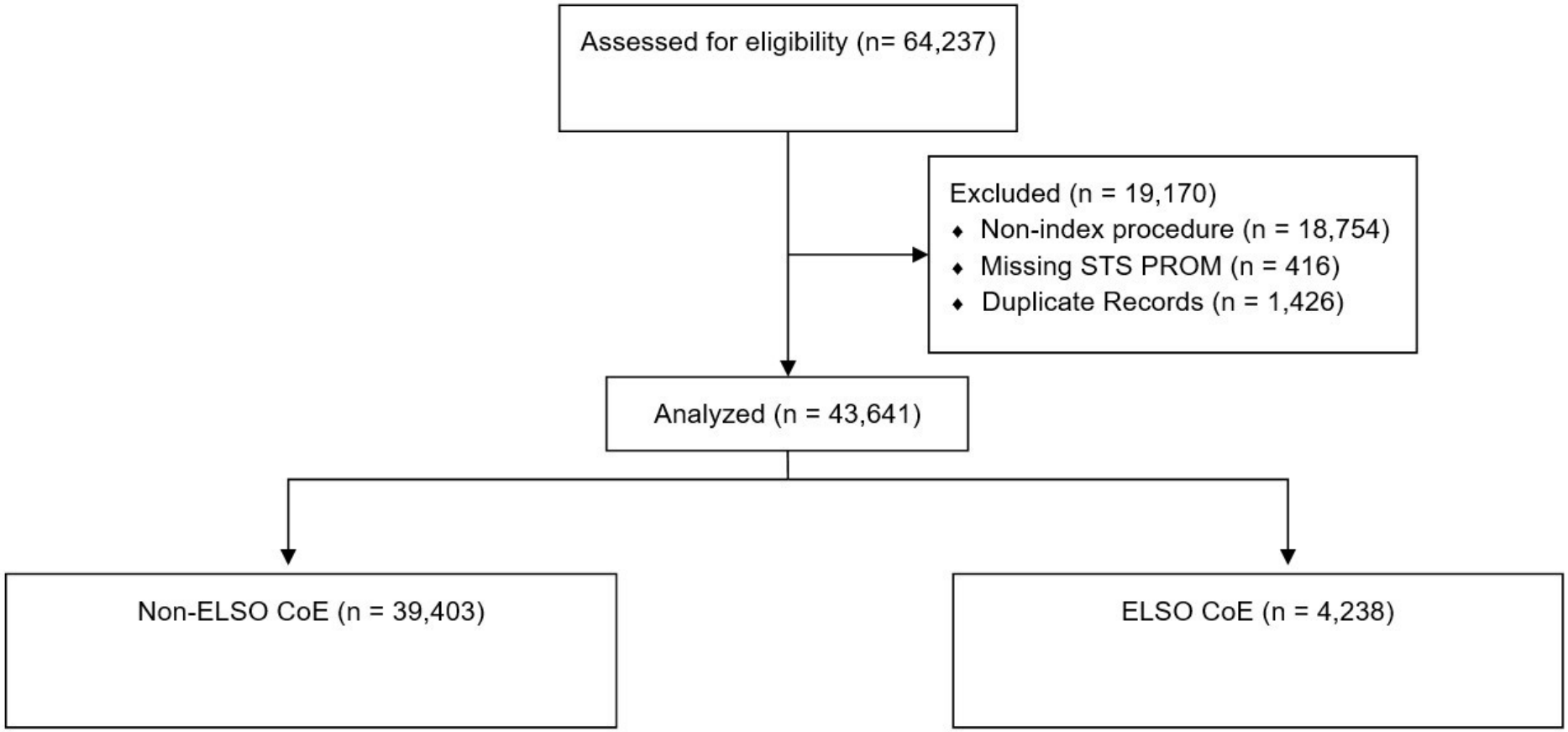
Study Hypothesis

Patients undergoing cardiac surgery at ELSO CoE centers would have significantly improved FTR after cardiac arrest, relative to patients undergoing surgery at non-ELSO CoE centers

Study Methods

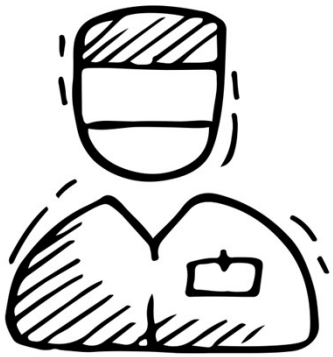
- **Cohort: Patients undergoing STS index operation in the Virginia Cardiac Services Quality Initiative (VCSQI) from 2011-2021**
- **Exposure Variable: ELSO CoE**
  - **Publicly available data (Recognition status, date of recognition)**
- **Outcomes: Failure to rescue after cardiac arrest**
  - **Other outcomes: operative mortality, STS-defined FTR, postoperative complications**
- **Analysis: Hierarchical, multivariable logistic regression**

CONSORT


Assessed for eligibility (n= 64,237)
Excluded (n = 19,170)
Non-index procedure (n = 18,754)
Missing STS PROM (n = 416)
Duplicate Records (n = 1,426)
Analyzed (n = 43,641)
Non-ELSO CoE (n = 39,403)
ELSO CoE (n = 4,238)

ELSO CoE Recognition

3 centers recognized as ELSO CoE (9.71% of all patients)

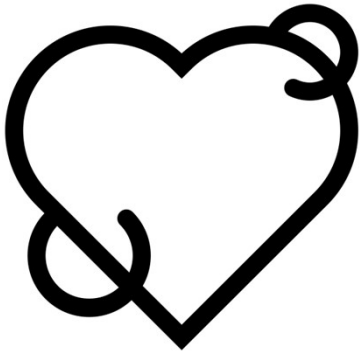


ELSO CoE centers were high volume (503 annual index cases vs. 226, p < 0.001)

Patient Characteristics associated with ELSO CoE

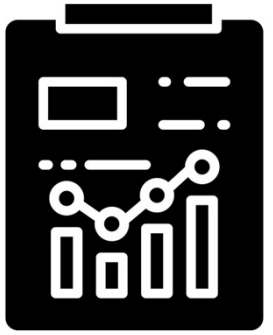
Patients at ELSO CoE, relative to those at non-ELSO CoE:

More valve and reoperative surgery



$p < 0.001$

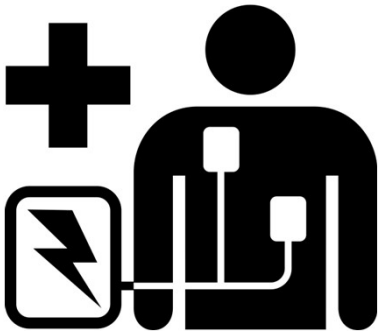
Increasing STS Predicted Risk of Mortality



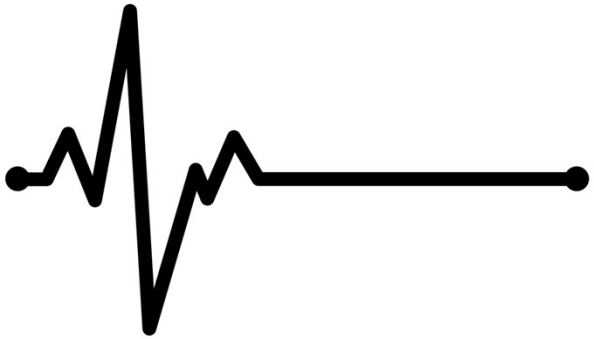
$p < 0.001$

Cardiac Arrest

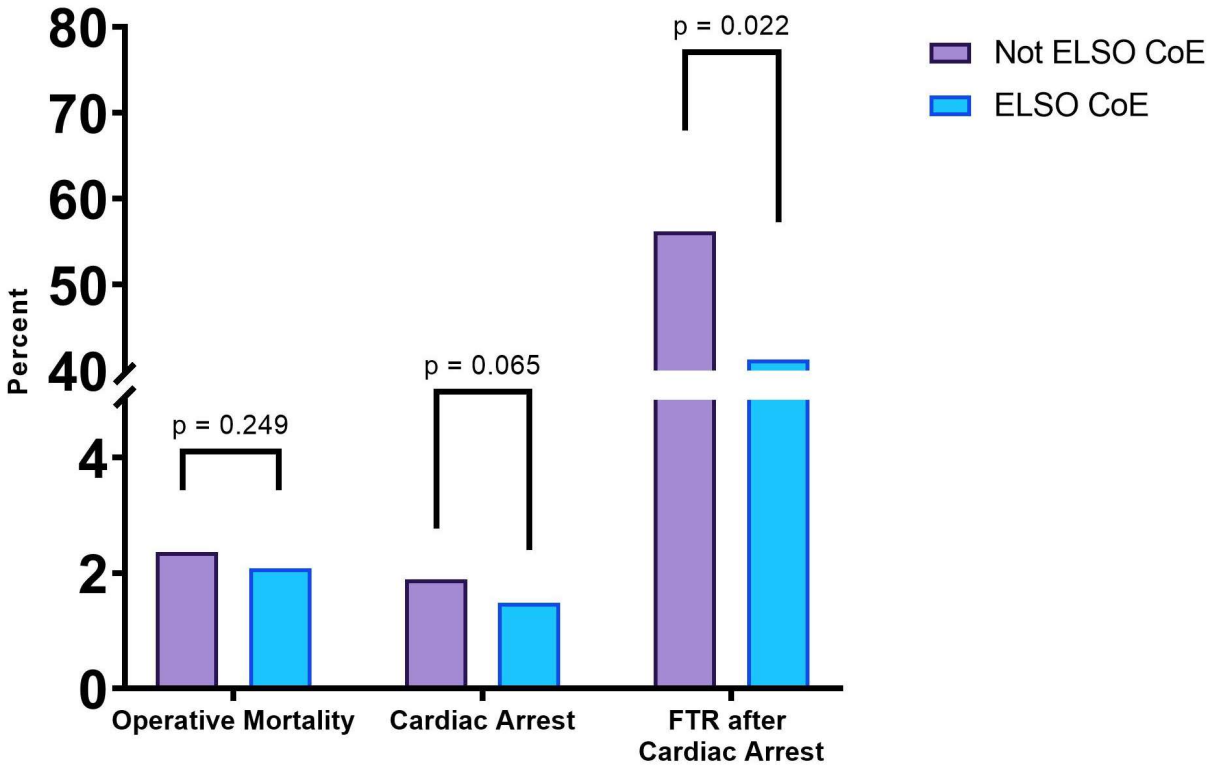
1.8% (N = 807) of patients experienced post-operative cardiac arrest



55% (N = 444) of these ultimately experienced FTR after cardiac arrest



Rate of Mortality, Cardiac Arrest and, and Failure to Rescue After Cardiac Arrest, by ELSO CoE Status

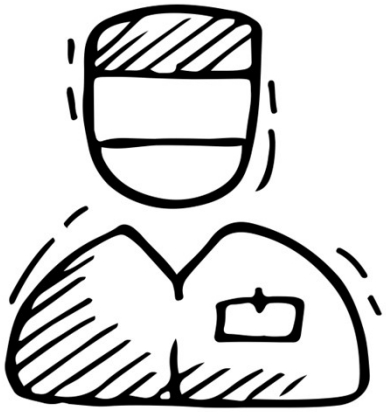


Patient Characteristics associated with improved FTR after Cardiac Arrest

More often cared for at ELSO CoE

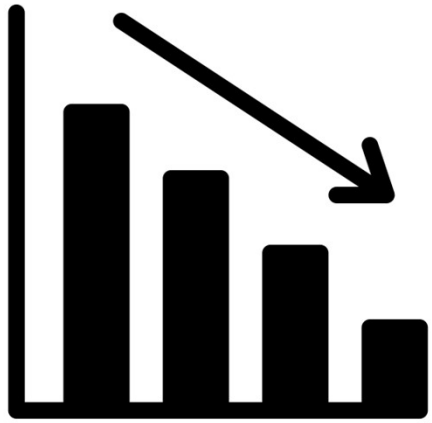
p = 0.02

Higher Volume Centers



p = 0.005

Lower STS PROM

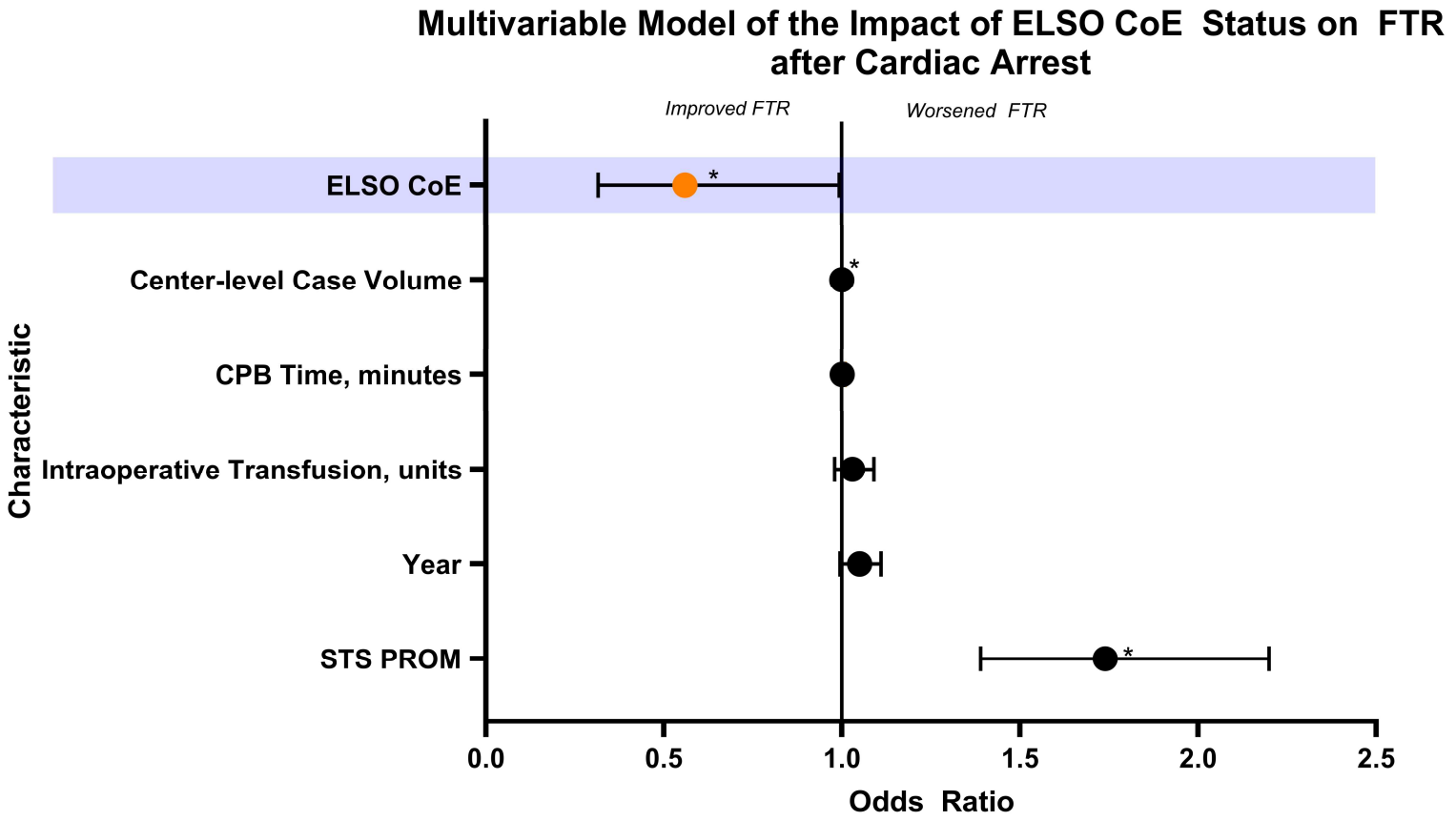


p < 0.001

Multivariable Model of Odds of FTR after Cardiac Arrest

Characteristic	OR (CIs)	p-value
ELSO CoE	0.56 (0.316 – 0.993)	0.047

- Adjusted for STS PROM, center-level case volume, year, CPB time, intra-operative transfusion requirements
- Center included as random intercept to account for center-level clustering

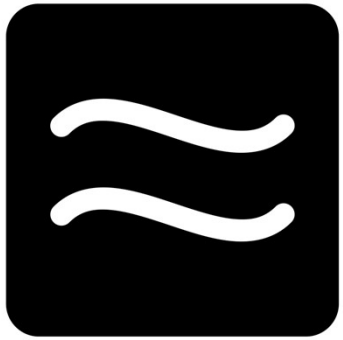

Multivariable Model of the Impact of ELSO CoE Status on FTR after Cardiac Arrest
Improved FTR
Worsened FTR
ELSO CoE
Center-level Case Volume
CPB Time, minutes
Intraoperative Transfusion, units
Year
STS PROM
Characteristic
0.0
0.5
1.0
1.5
2.0
2.5
Odds Ratio

Use of ECMO after Cardiac Arrest by ELSO CoE

ECMO more often used at ELSO CoE

25.4% vs. 11.3%, p = 0.001

Similar FTR after cardiac arrest among ECMO patients, regardless of ELSO CoE

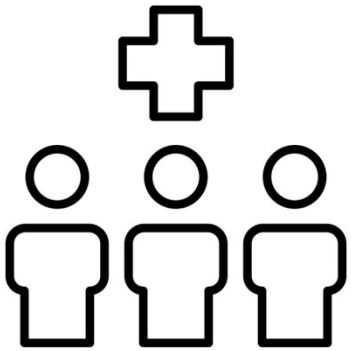


81.2% vs. 72.6%, p = 0.552

Limitations

- Unmeasured confounding
- External validity outside of VCSQI
- More granular center-specific characteristics unavailable (i.e., nurse-to-patient ratio, composition and structure of ICU staffing, etc.)

Conclusions



- **Significant, positive association between ELSO CoE and improved failure to rescue after cardiac arrest rate**

- **Suggests:**
  - **Importance of comprehensive quality programs in improving peri-operative outcomes**
  - **Patients at elevated risk of post-operative cardiac arrest may benefit from care at an ELSO CoE**

Thank You

ELSO Center of Excellence Recognition Associated with Improved Failure to Rescue after Cardiac Arrest

- Retrospective cohort study of 43,641 adult patients undergoing STS index procedures in a regional collaborative (Virginia Cardiac Services Quality Initiative) from 2011-2021.

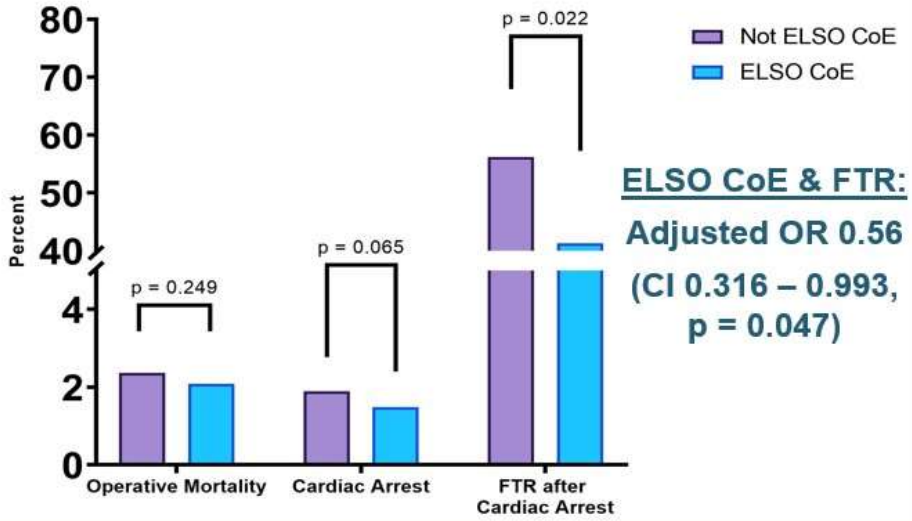
ELSO Center of Excellence Recognition (ELSO CoE)

ELSO CoE	Non-ELSO CoE
n = 4,238	n = 39,403
(9.71%)	(90.3%)

ELSO CoE Outcomes:

- **Similar rate of cardiac arrest (1.49% vs. 1.89%, p = 0.065)**
- **Improved FTR after cardiac arrest (41.3% vs. 56.2%, p -0.022)**

ELSO CoE Status was independently associated with improved FTR after Cardiac Arrest



ELSO CoE & FTR:

Adjusted OR 0.56

(CI 0.316 – 0.993, p = 0.047)

- ELSO CoE Status associated with improved risk-adjusted odds of FTR after Cardiac Arrest
- Suggests patients at elevated risk of cardiac arrest may benefit from care at ELSO CoE

FTR: Failure to Rescue; ELSO: Extracorporeal Life Support Organization; CoE: Center of Excellence Recognition.

Strobel, et al, 2023
@R_Strobes #VisualAbstract

Aortic Alerts: Transfer Practices for Emergency Patients

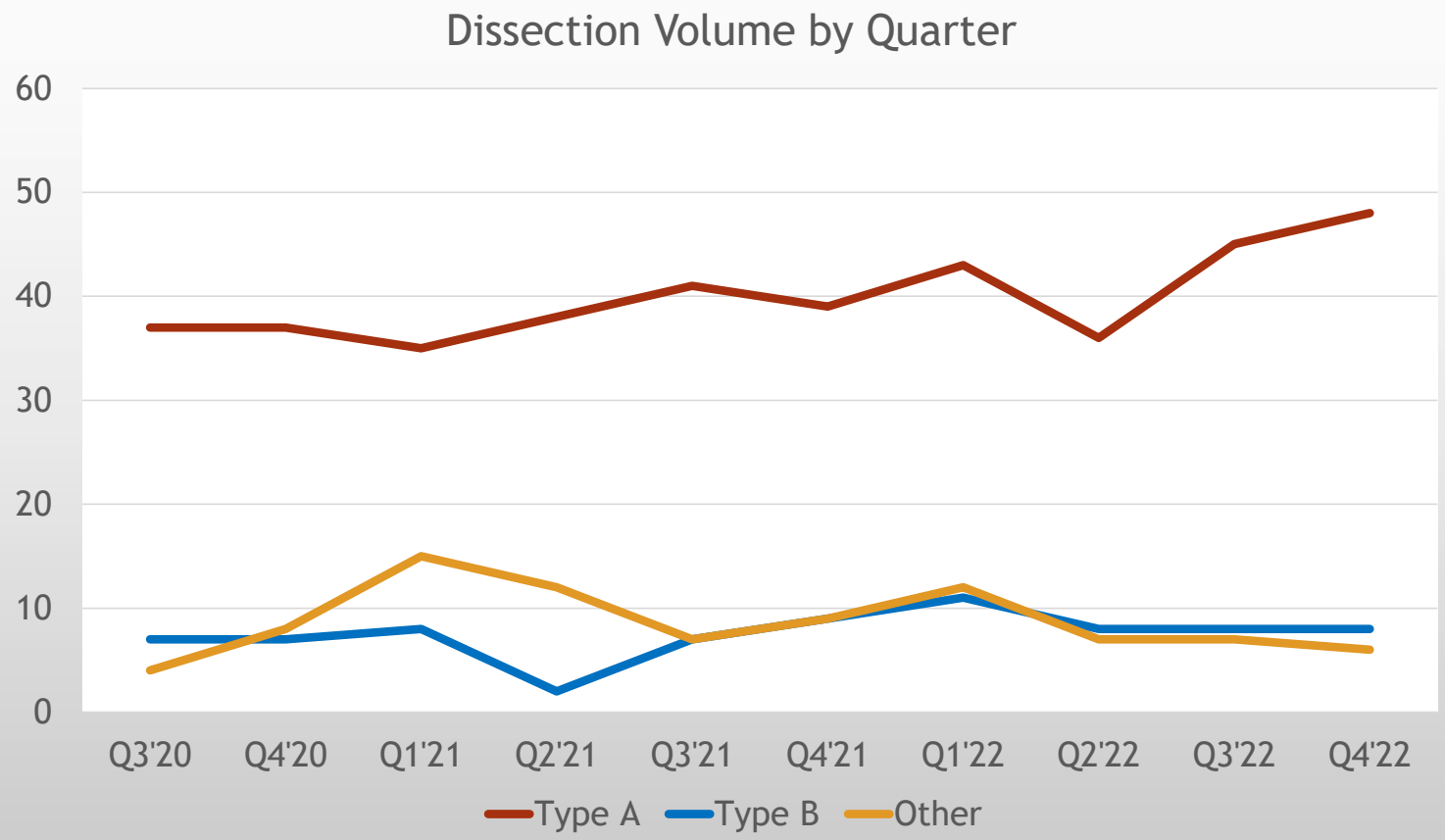
Kenan W Yount, MD MBA

Director, Structural Heart & Valve Center

Co-Director, Aortic Center

University of Virginia

Aortic Dissections in VCSQI: July 2020 – December ‘22



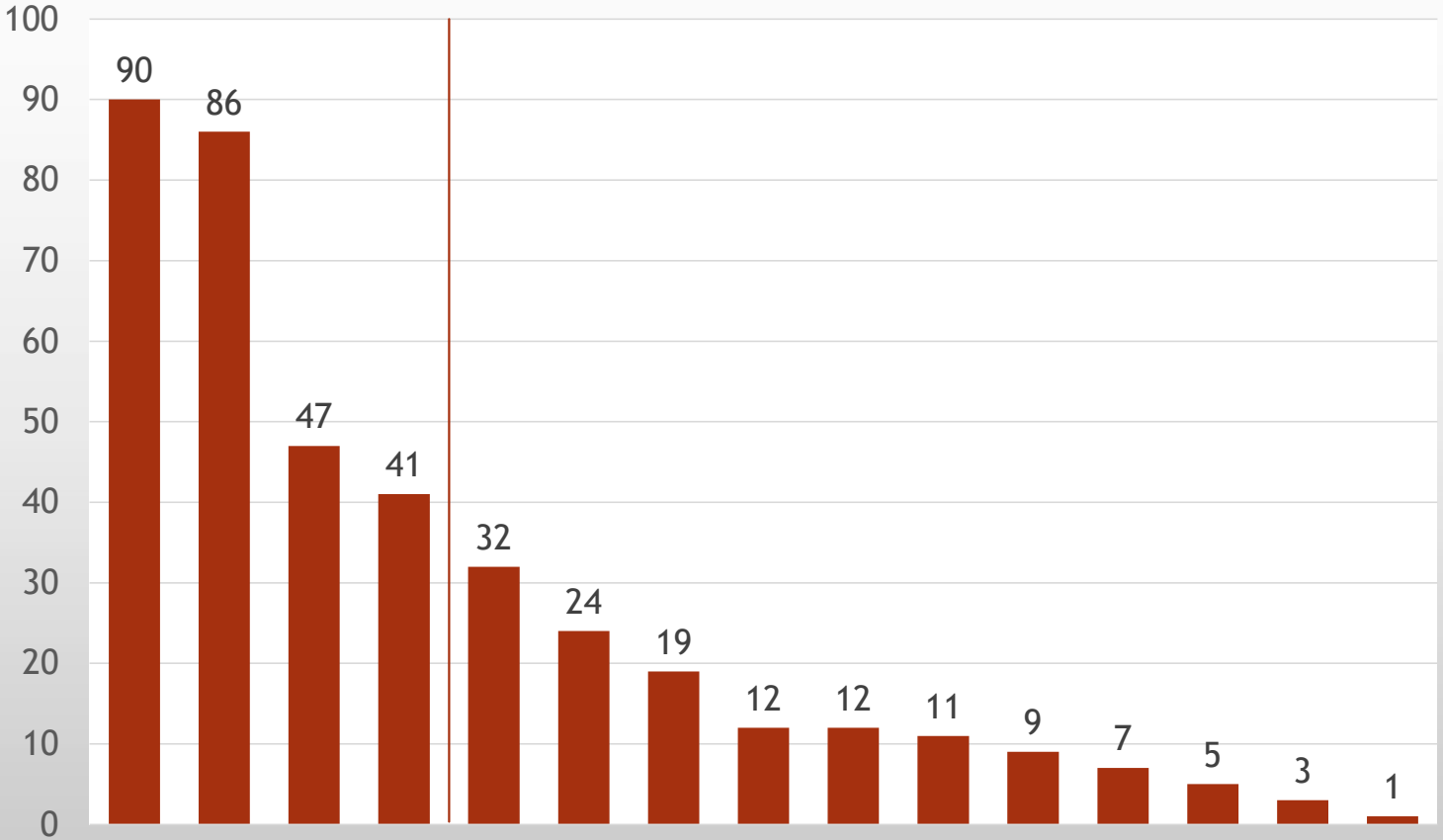
Totals

Type A: 399

Type B: 75

Other: 87

Type A Dissection by Center: July 2020 – December ‘22



Operative repair of three ascending aortic dissections in one day at Baylor University Medical Center

Charles Stewart Roberts, MD[a] and Lauren Zammerilla Westcott, MD[b]

[a]Department of Cardiac Surgery, Baylor University Medical Center, Dallas, Texas; [b]Department of Surgery, Baylor University Medical Center, Dallas, Texas

ABSTRACT

In a 24-hour period, three patients presented with acute aortic dissection involving the ascending aorta. Detailed analysis of these three patients was undertaken to compare preoperative factors, the emergency operative treatment, and postoperative outcomes, as well as pathological findings. A high-volume aortic referral center with specialized protocols and personnel can effectively manage this circumstance.

KEYWORDS Ascending aortic dissection; high-volume center; quality improvement; surgical volume

Transfer call to BUMC arrival time (mean 188 min)	73	383	108
BUMC arrival to OR time (mean 75 min)	13	210	4
In room to skin incision time (mean 61 min)	51	57	76
Skin incision to CPB time (mean 42 min)	39	51	37
CPB to HCA time (mean 19 min)	23	22	13
HCA time (mean 30 min)	36	30	26
CPB restarted to off CPB time (mean 52 min)	52	53	53
Off CPB to skin closure time (mean 56 min)	51	66	53
Skin incision to skin closure time (mean 197 min)	197	213	182
In room to out of room time (mean 269 min)	269	288	250
Temporary hemodialysis	No	Yes	No

Table 1. General operative technique for ascending aortic dissection

Step	Details
Median sternotomy	• Retractor to extreme cephalad. Innominate vein retracted inferiorly on Silastic loop. IA isolated and both branches encircled with Silastic loops (Potts). • Full heparin dose (3-min wait). • IA clamped proximally, branches snared, true lumen opened (11 blade/aortic punch ×2). • Graft (8/10 mm) sewn to IA (5-0 P). • CPB inflow cannula (21/23 mm) inserted into graft (silk ×3), connected to CPB. • Pericardial marsupialization (retractor placed inside silk stays). • RA cannulated and connected to CPB circuit.
CPB established	• Cooling to 28°C nasopharyngeal. • LV vent through right superior pulmonary vein; intrapericardial CO_2 inflow cannula. • Ascending aorta and proximal arch mobilized (cautery at 30, aorta lifted with fingers). • LCCA isolated on Silastic loop.
CPB discontinued	• At 28°C or 20 min, whichever comes later; IA clamped proximally.
Unilateral cerebral perfusion	• Via IA graft at 50 mL/min. (If cerebral saturations fall >20%, add perfusion via LCCA.) • Aorta divided from just proximal to IA to midpoint of lesser curve; lumen inspected for entry tear. • Ascending aorta resected to about 1 cm above sinotubular junction to try to include entry tear. *—Entry tear extending into noncoronary sinus (not R or L) can usually be resected.* *—Entry tear on lesser curve of arch can usually be resected followed by a hemi-arch anastomosis.* *—Entry tear on greater curve of arch usually requires arch replacement with branch grafts.* • Cardioplegia (Del Nido) given directly into coronary ostia (left main: 1 L; right: 200 mL). • ARCH ADDRESSED FIRST. • Drop suction into arch and LCCA snared if excessive back-bleeding.
Distal aortic reconstruction	• Felt inserted between dissected media (holding with interrupted 5-0 P), folded gauze in lumen, thin glue to both sides of felt, wall molded with fingertips, 5-0 P cut away. • Synthetic graft (28–34 mm) sewn to arch (continuous 4-0 P), with external felt strip (large aortic bites, each of varying depth, three folds (3 mm) on graft side, needle removed with curve). • At halfway, excessive graft length removed and drop suction shifted to inside of graft down arch. • Drop suction removed, snare on LCCA released, then IA clamp removed, to allow graft to fill (deair).
CPB reestablished	• Rewarming to 37°C (graft clamped and shifted superiorly). • ROOT ADDRESSED SECOND. • Inspection of aortic valve (number of cusps, calcium); aorta (entry tear and extent of dissection). • Valve-conduit (Bentall) if: aortic sinus diameter >5.5 cm, right or left sinus destroyed, severe aortic regurgitation with BAV. • Aortic valve suspended (4-0 pledgeted P) at nondissected commissural posts (usually the R/L).
Proximal aortic reconstruction	• Felt inserted between layers of dissected aorta (holding with interrupted 5-0 P), folded gauze in root, thin glue to both sides of felt, wall molded with fingertips, 5-0 P cut away. • Aortic valve resuspension completed of dissected, now reconstructed, commissural posts. • Graft filled and marked (noting greater and lesser curve differences), then clamp shifted toward arch and graft cut. • Proximal end of graft sewn to proximal aorta (4-0 P) with external felt strip (lesser curve *single line* on graft aligned with R/L commissure and greater curve *double line* aligned with midpoint of noncoronary sinus, marked with ink). • Vent placed in graft; graft cross-clamp removed in Trendelenburg with suction applied to both vents. • Ventilation reestablished and single ventricular temporary pacing wire placed; heart massaged to expel air. • LV vent then aortic graft vent removed when no left-sided air by transesophageal echocardiography.
CPB discontinued	• RA cannula removed and appendage snared (protamine, platelets, and plasma given). • At halfway on protamine, pump sucker switched to cell saver, pericardial stay sutures removed. • Surgical areas packed with gauze until hemostasis, then RA purse-string tied off and IA graft stapled at its base. • Mediastinal chest tubes (32 F) placed (one straight over heart and one angled over diaphragm).
Chest closed	• In four layers (7 sternal wires, 0 then 2-0 then 4-0 absorbable suture).

Aortic Alert Process

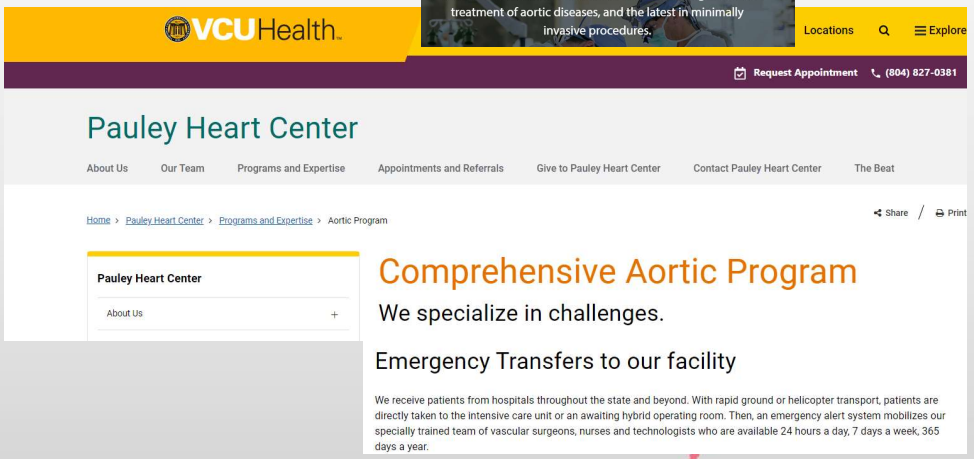
- Any mention of “aorta” triggers review by Transfer Center
- Pages the Cardiac & Vascular Attendings/Residents
  - Connects them with referring
- Images ideally reviewed on call
- Potential Decisions:
  - Transfer directly to OR
  - Transfer to ER (if images needed)
  - Transfer to ICU (if Type B or medical management)
  - Defer to outpatient visit
  - Decline
- Any acceptance → blast pages surgeons, anesthesia, perfusion, the OR team and/or IR team, nursing supervisors, blood bank

What is an Aortic Center?

- Exists physically, on the web, in spirit…
  - Cardiac & Vascular surgeons
  - Cardiac anesthesiologists
  - Intensivists
  - Radiologists
  - Nephrologists?
- Weekly conference to review upcoming aneurysm cases, prior week dissections

The Aortic Center at UVA

Our comprehensive care team and state-of-the-art technology are available to aortic patients in one central location – making us one of the premier aortic centers in the region. View Aortic Center transcript.



VCSQI

UVA Aortic Team

Kenan Yount
Director, Aortic Center
Director, Structural Heart & Valve

John Kern
Direction, CT Residency

Leora Yarboro
Section Chief, Adult Cardiac Surgery
Director, Heart Failure & Heart Transplant

Nick Teman
Director, ECMO & MCS

Ourania Preventza
Chief, Division of Cardiothoracic Surgery

Potential Statewide Opportunities

- Current issues:
  - Some centers are bowing out of Type A dissections (low volume, high acuity)
  - Some centers that perform dissection repair are struggling with OR & ICU capacity
  - All centers are struggling with staffing (MDs, RNs; ICU & OR)
  - Many centers are struggling with competing emergencies (*e.g.*, transplant)

- Opportunities
  - Optimize transfer patterns?
  - Image share?
  - Call center vs One week on/One week off?
  - Shared call schedules?
  - Shared best practices?
  - Outcomes tracking (STS vs IRAD)
    - Travel time, etc.

Thank You!