How We Maintain the Highest Quality of Cardiovascular Care in Our Surgical Program

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Chief, Adult Cardiac Surgery
Surgical Director, Aorta Center
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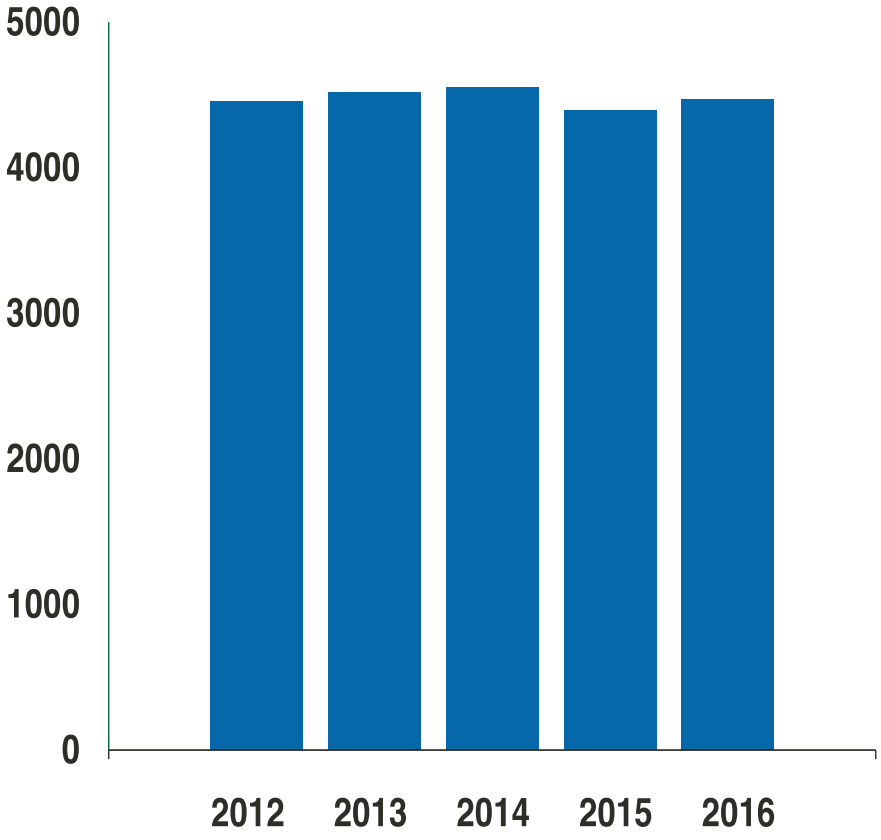
Quality Director
Heart and Vascular Institute, Cleveland Clinic

A snapshot of Cleveland Clinic

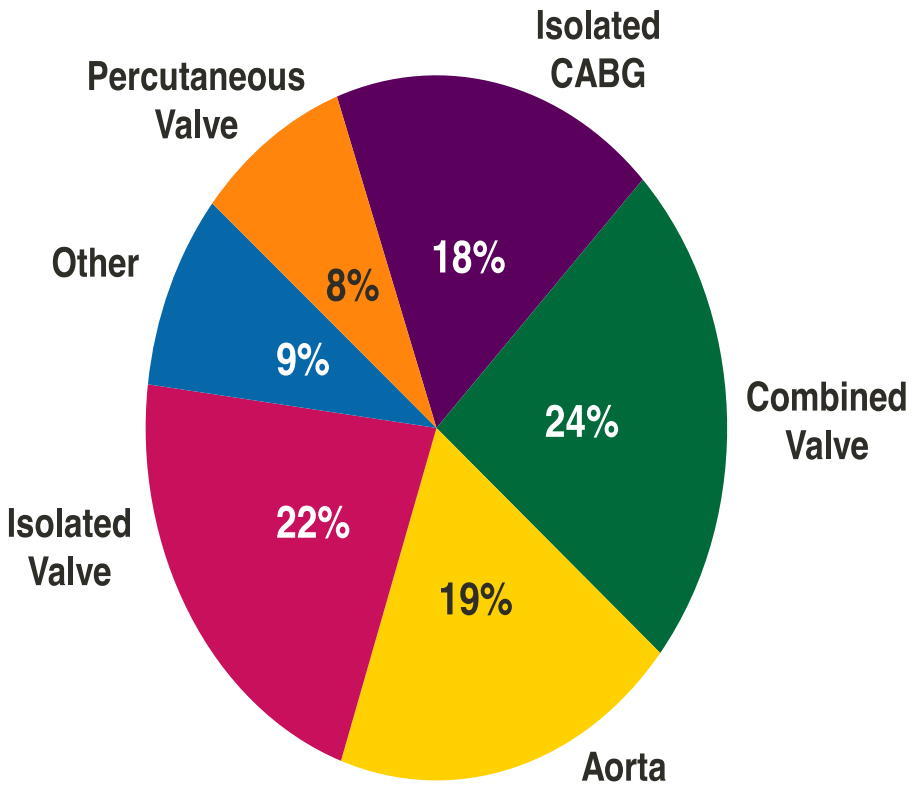
- **Group Practice Model**
  - 120 Specialties and Sub-Specialties
  - 52,000 Employees
- **Cleveland Clinic Health System**
  - Expansive Main Campus
  - 18 Family Health Centers in Ohio
  - 10 Regional Hospitals
  - Children's Hospital for Rehabilitation
- **Cleveland Clinic Florida**
  - Weston Clinic and Hospital
  - West Palm Beach Health & Wellness Center
- **Nevada Lou Ruvo Center for Brain Health, Las Vegas**
- **International Operations**
  - Canada Toronto Health & Wellness Center
  - Cleveland Clinic Abu Dhabi
  - Cleveland Clinic London

Adult Cardiovascular Surgery

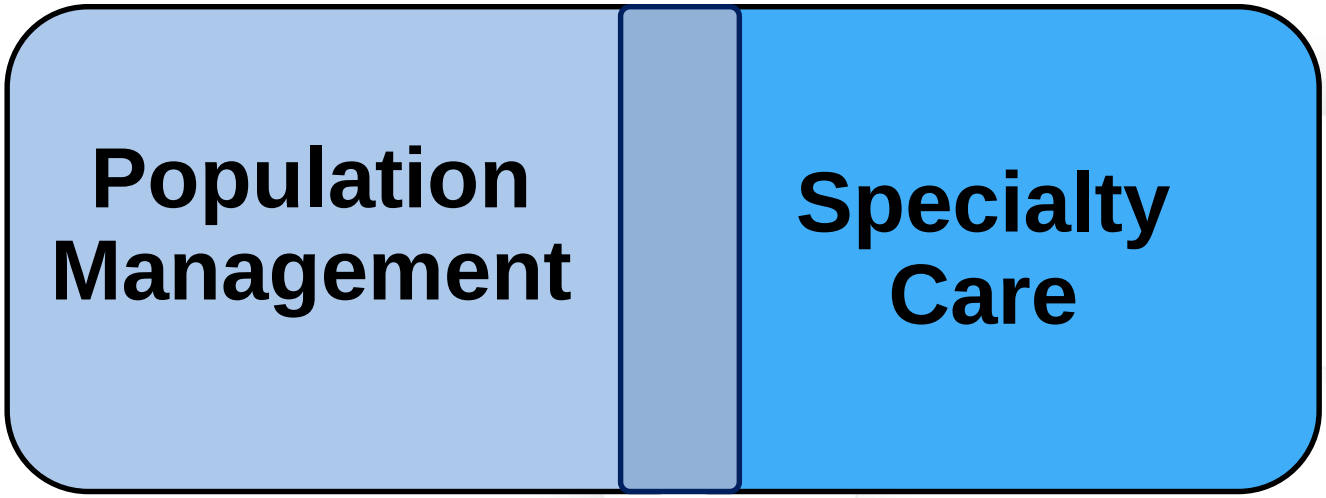
Annual Volumes



2016 Cardiac Operations (N = 4,471)



Two Distinct, Yet Interrelated Offerings



High Velocity Products

- CABG
- Isolated Valves (MIS)
- Lung resection (MIS)
- Emergencies

Our Core

- VAD, Transplant
- Multi-valve
- Aorta
- Esophagus
- High Risk Congenital

What is Quality?

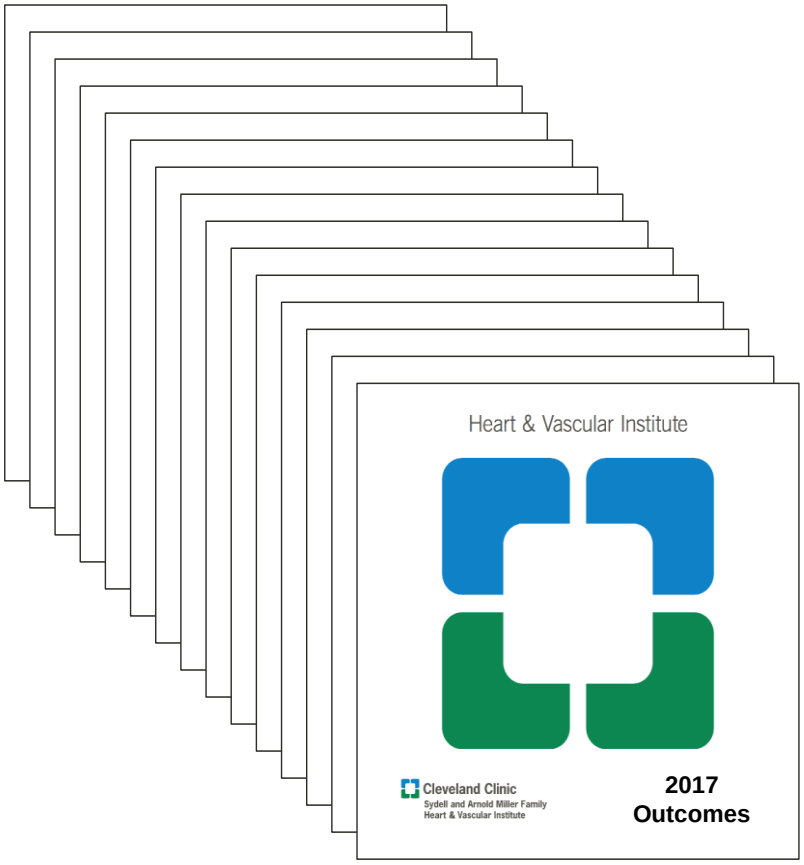
Institute of Medicine

"The degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge."

Quality

You know it when you see it

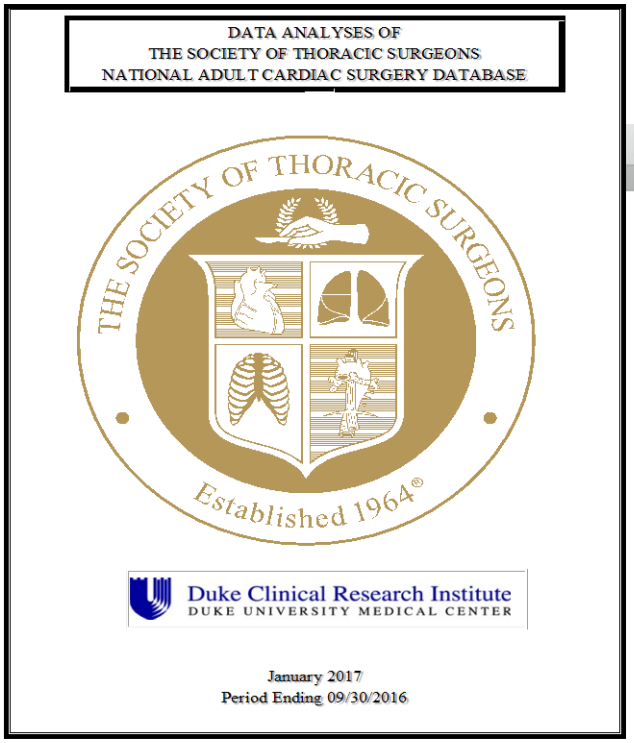
Innovating in Care Delivery: Transparency on Outcomes



http://clevelandclinic.org/outcomes

- Measuring and understanding outcomes of medical treatments **promotes quality improvement**
- Cleveland Clinic continues to be the **global leader on transparency** in healthcare
- Outcomes books are available for every institute, **available to the public for free** online or in print
- In addition to outcomes books, Cleveland Clinic supports **transparent public reporting of healthcare quality data** (Joint Commission Performance Measurement Initiative, CMS Hospital Compare, Cleveland Clinic Quality Performance Report)
- Reflection of Cleveland Clinic's **culture of continuous improvement** and leads to **informed decision making**

STS Public Reporting


DATA ANALYSES OF
THE SOCIETY OF THORACIC SURGEONS
NATIONAL ADULT CARDIAC SURGERY DATABASE

THE SOCIETY OF THORACIC SURGEONS
Established 1964®

Duke Clinical Research Institute
DUKE UNIVERSITY MEDICAL CENTER

January 2017
Period Ending 09/30/2016

Consumer Reports

publicreporting.sts.org

Cleveland, Ohio

CABG Results

Year	Overall Composite Score*	Absence of Operative Mortality	Absence of Major Morbidity	Use of Internal Mammary Artery	Receipt of Required Perioperative Medications
Jan. 2015 - Dec. 2015	97.6	98.1	88.5	99.6	99.7
Jan. 2016 - Dec. 2016	98.0	98.8	88.9	99.8	99.7

AVR Results

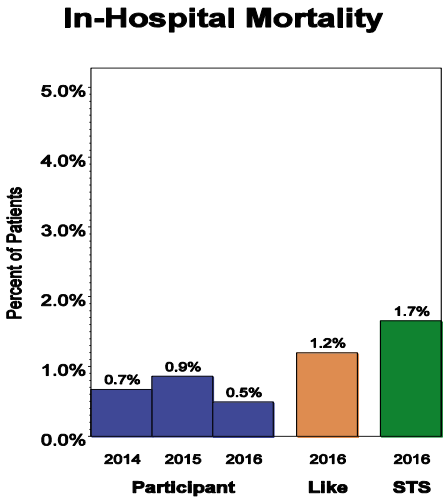
Year	Overall Composite Score**	Absence of Operative Mortality	Absence of Major Morbidity
Jan. 2014 - Dec. 2016	97.4	99.0	92.3

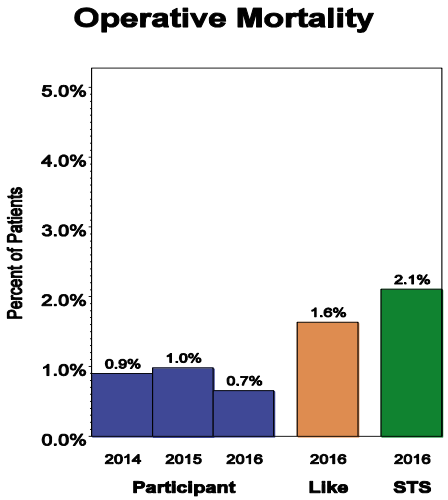
AVR + CABG Results

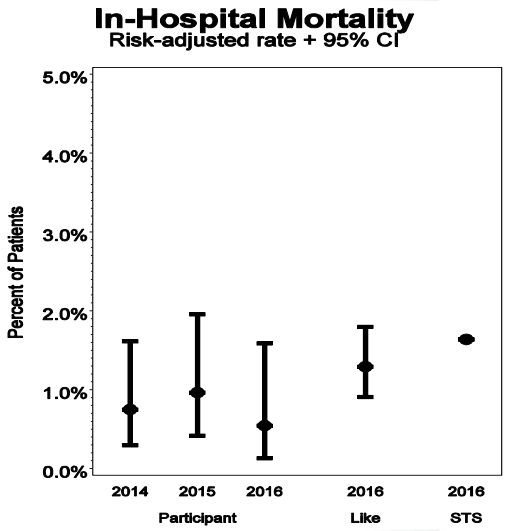
Year	Overall Composite Score***	Absence of Operative Mortality	Absence of Major Morbidity
Jan. 2014 - Dec. 2016	95.0	98.1	85.1

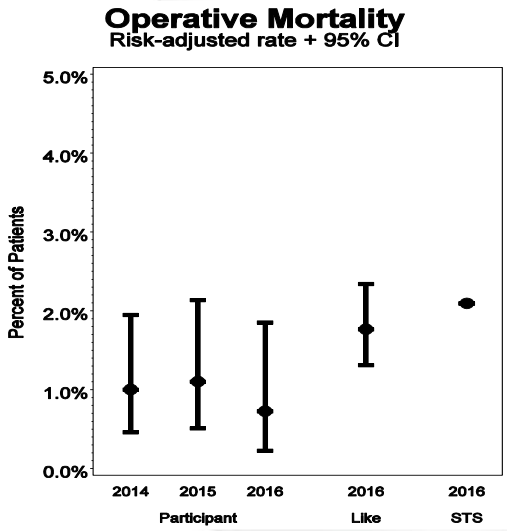
Cleveland Clinic

Isolated CABG

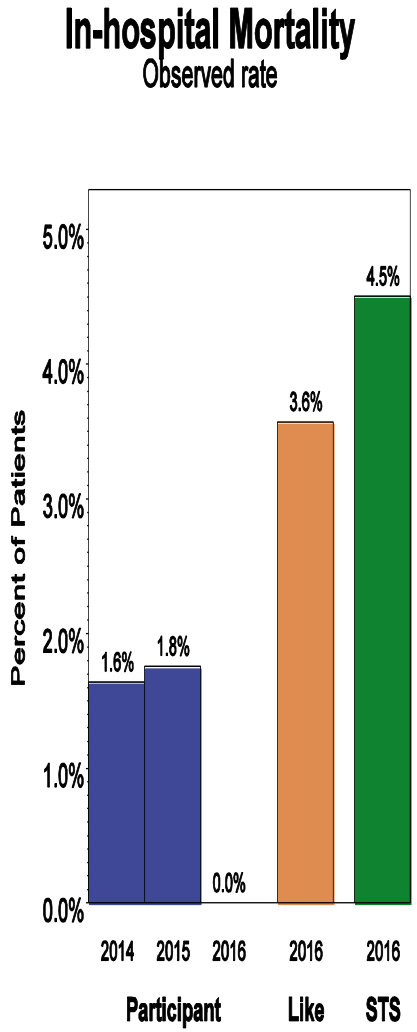


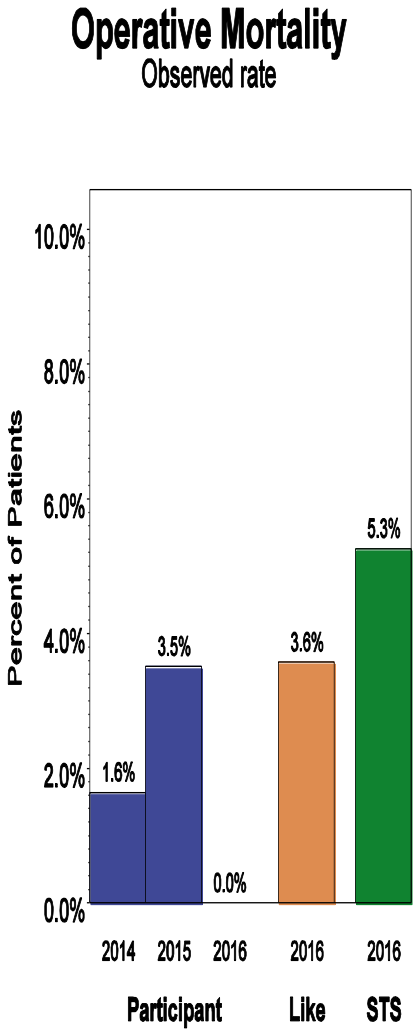






Redo CABG

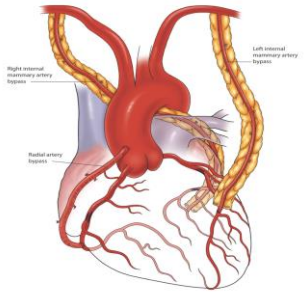

In-hospital Mortality
Observed rate
Percent of Patients
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
1.6%
1.8%
0.0%
3.6%
4.5%
2014
2015
2016
2016
2016
Participant
Like
STS


Operative Mortality
Observed rate
Percent of Patients
10.0%
8.0%
6.0%
4.0%
2.0%
0.0%
1.6%
3.5%
0.0%
3.6%
5.3%
2014
2015
2016
2016
2016
Participant
Like
STS

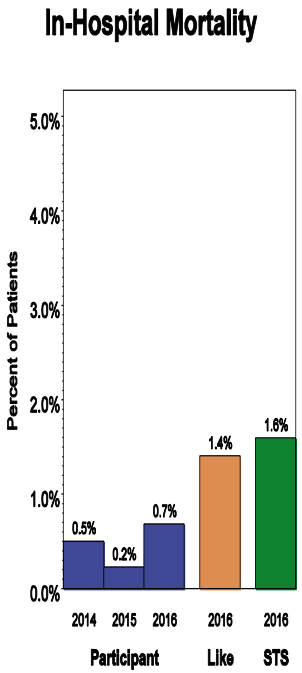
Arterial Conduit Use

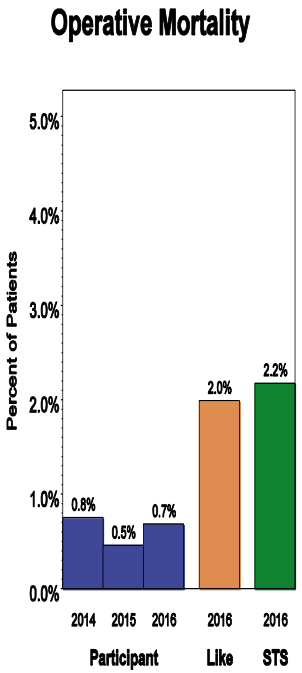
	Participant 30986			Like Group	STS
	2014	2015	2016	2016	2016
Internal Mammary Artery Used[4]					
Any	99.9%	99.9%	99.8%	99.6%	99.0%
Left	76.2%	77.8%	74.6%	90.5%	93.1%
Right	1.6%	1.2%	0.9%	0.6%	0.4%
Both	22.1%	20.9%	24.3%	8.5%	5.5%

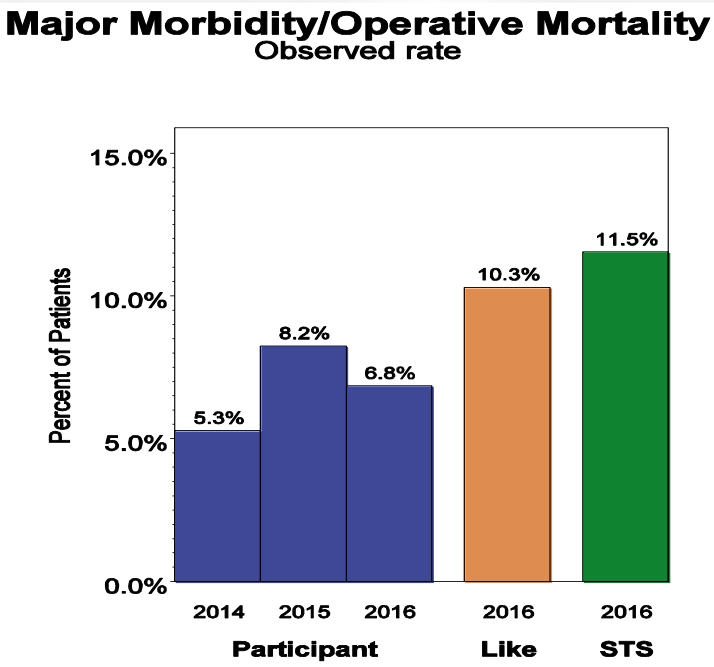
	Participant 30986			Like Group	STS
	2014	2015	2016	2016	2016
Radial Artery Used	4.8%	7.5%	11.1%	5.7%	5.0%



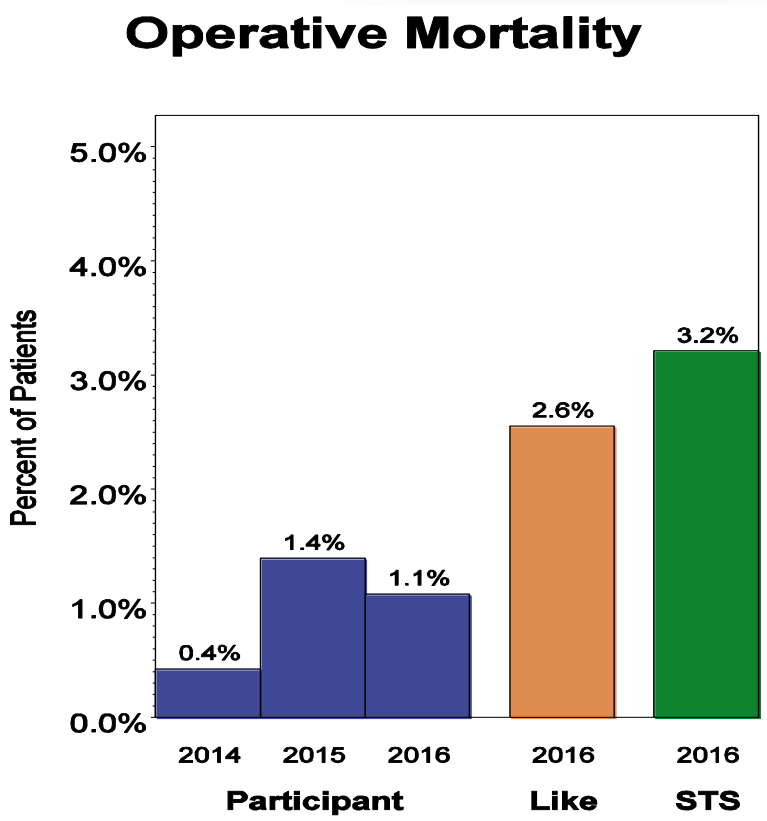
AVR


In-Hospital Mortality
Percent of Patients
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
0.5%
0.2%
0.7%
1.4%
1.6%
2014
2015
2016
2016
2016
Participant
Like
STS

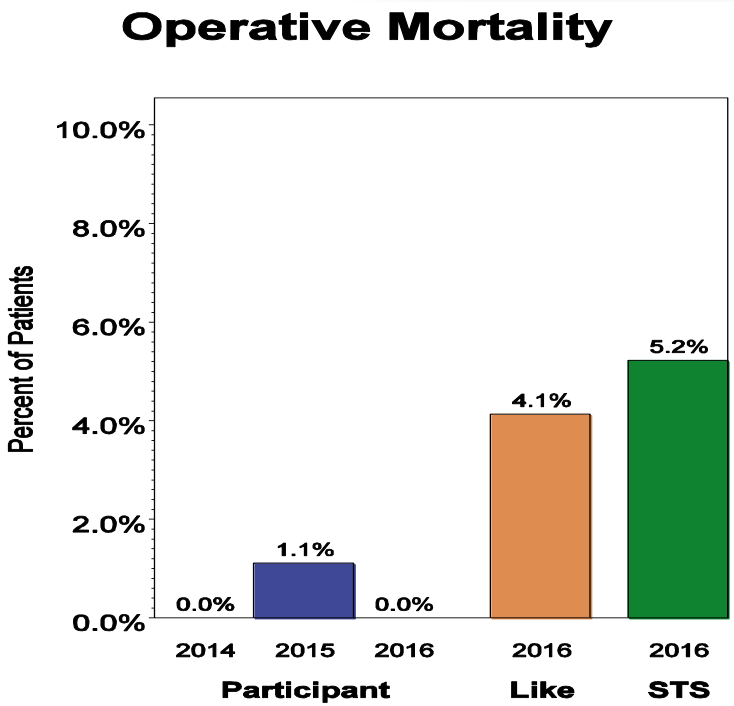

Operative Mortality
Percent of Patients
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
0.8%
0.5%
0.7%
2.0%
2.2%
2014
2015
2016
2016
2016
Participant
Like
STS


Major Morbidity/Operative Mortality
Observed rate
Percent of Patients
15.0%
10.0%
5.0%
0.0%
5.3%
8.2%
6.8%
10.3%
11.5%
2014
2015
2016
2016
2016
Participant
Like
STS

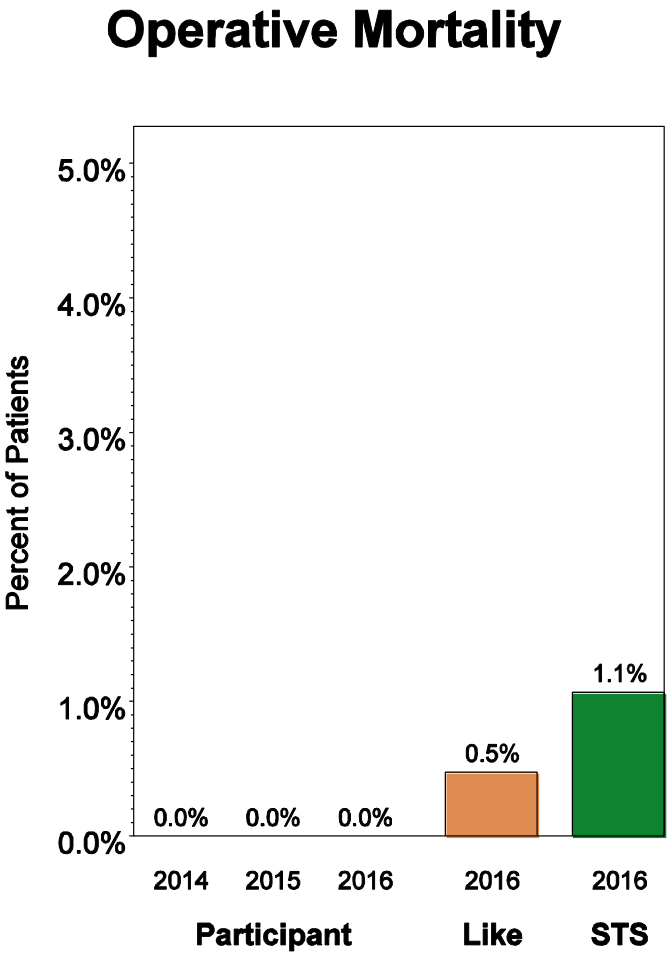
AVR+CABG


Operative Mortality
Percent of Patients
5.0%
4.0%
3.0%
2.0%
1.0%
0.0%
0.4%
1.4%
1.1%
2.6%
3.2%
2014
2015
2016
2016
2016
Participant
Like
STS

Mitral Replacement



Mitral Valve Repair



TAVR: TVT Registry

Cleveland Clinic Heart and Vascular Institute
TAVR Outcomes

2016
TAVR Implant Commercial and Research

	Q1	Q2	Q3	Q4	YTD
Volume and Outcomes by Discharge Date	*80*	*105*	*93*	*96*	***374***
In-Hospital Mortality	*0.0%*	*0.0%*	*0.0%*	*0.0%*	**0.0%**
30-Day Readmission (enterprise)	*5.0%*	*1.0%*	*0.0%*	*0.0%*	**1.3%**

TVT TAVR Risk Adjusted Registry Outcomes

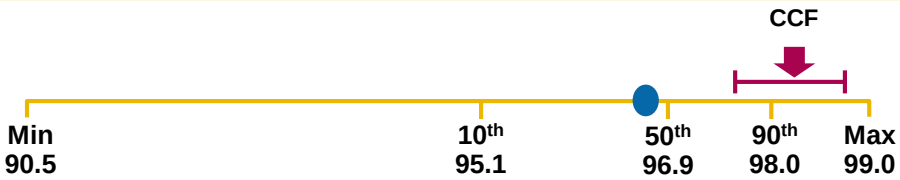
Risk Standardized Mortality Ratio	**0.69**	Rolling 3 years through 2016 Q1
TVT Registry 90th percentile	0.92	
Risk Adjusted Mortality Rate	**2.34**	Rolling 3 years through 2016 Q1
TVT Registry 90th percentile	3.13	

3 Stars in All 3 STS Categories!

CABG

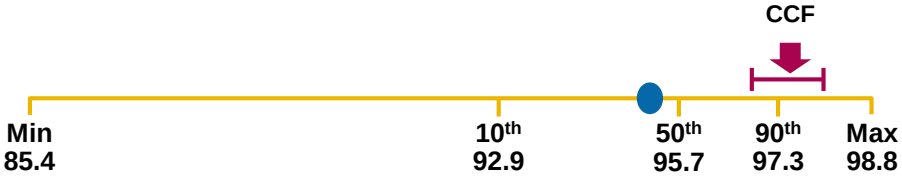
Rating

Overall ★★★



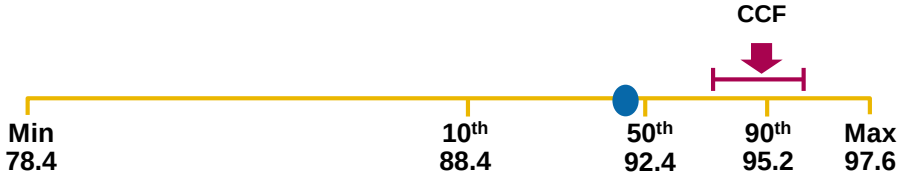
AVR

Overall ★★★

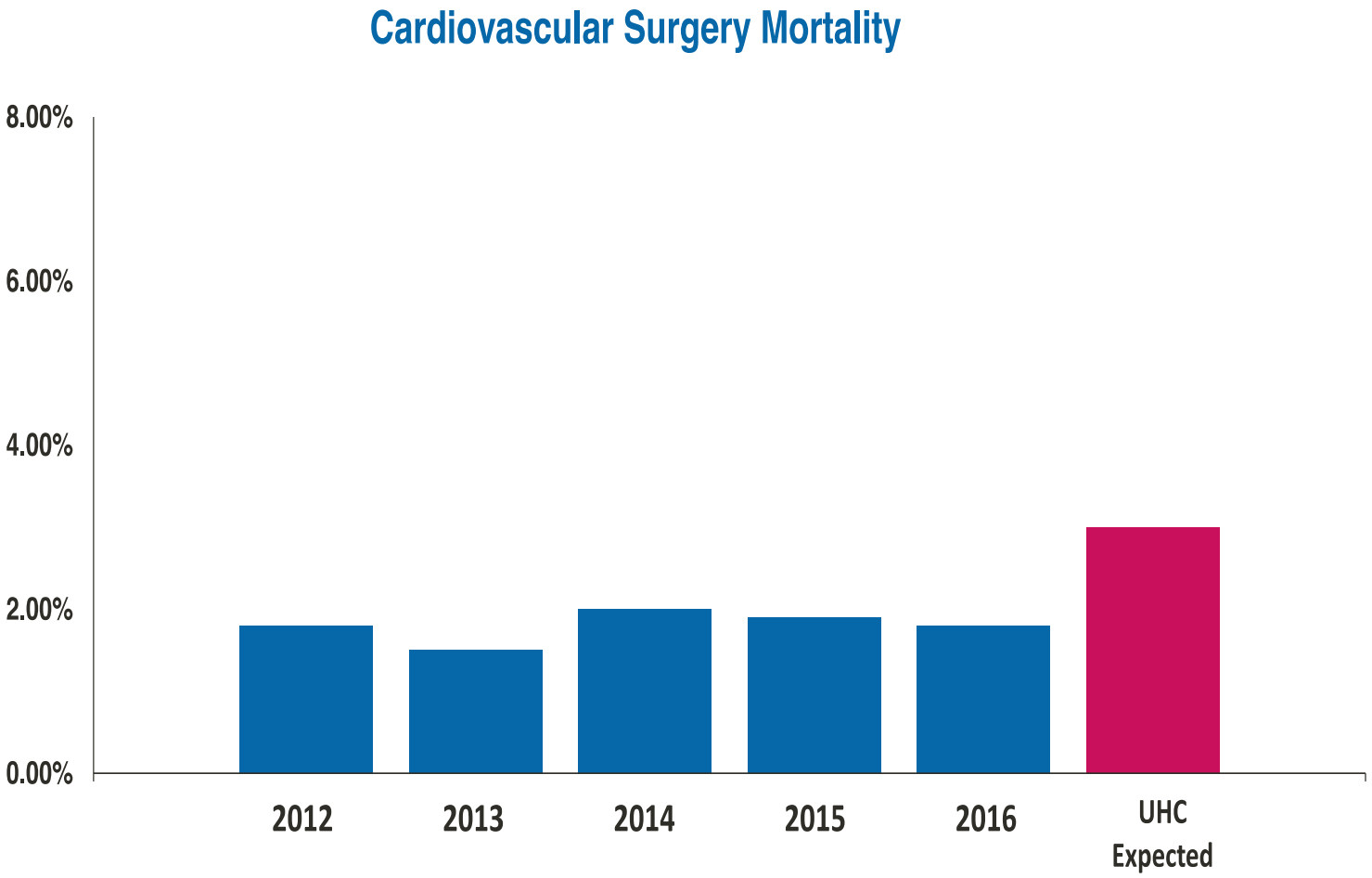


AVR + CABG

Overall ★★★



Adult Cardiovascular Surgery



Cleveland Clinic

NEOH All Adult Cardiac Surgery Outcomes - Main Campus, Fairview, Hillcrest

January 1, 2017 - June 30, 2017

STS Categories	Total Patients	Reop for Bleeding	Reop Bleeding %	Reop Any STS	Reop Any %	Prolonged Vent	Prolonged Vent %	Renal Failure	Renal Failure %	Stroke	Stroke %	DSW	DSW Infection %	Median HLOS Days	Mean HLOS Days	Operative Mortality	Operative Mortality %	Predicted Mortality	Readmission 30Day	Readmission %
Isolated CABG	409	5	1.2%	13	3.2%	26	6.4%	5	1.2%	5	1.2%	0	0.0%	9	10.6	2	0.5%	1.8%	8	2.0%
Isolated AVR	175	1	0.6%	3	1.7%	5	2.9%	0	0.0%	2	1.1%	0	0.0%	7	7.6	0	0.0%	1.7%	1	0.6%
AVR + CABG	83	4	4.8%	7	8.4%	9	10.8%	2	2.4%	1	1.2%	0	0.0%	9	11.3	1	1.2%	3.4%	1	1.2%
Isolated MVR	30	2	6.7%	3	10.0%	5	16.7%	1	3.3%	2	6.7%	0	0.0%	10	13.3	1	3.3%	3.6%	1	3.3%
MVR + CABG	9	0	0.0%	2	22.2%	2	22.2%	0	0.0%	1	11.1%	0	0.0%	12	14.2	0	0.0%	7.2%	0	0.0%
Isolated MV Repair	156	2	1.3%	5	3.2%	5	3.2%	0	0.0%	2	1.3%	0	0.0%	5	6.5	0	0.0%	0.6%	0	0.0%
MV Repair + CABG	35	0	0.0%	1	2.9%	4	11.4%	1	2.9%	2	5.7%	0	0.0%	10.5	13.5	0	0.0%	4.5%	0	0.0%
AVR + MVR	18	1	5.6%	2	11.1%	5	27.8%	1	5.6%	0	0.0%	0	0.0%	12.5	16.4	0	0.0%			
Subtotal	915	15	1.6%	36	3.9%	61	6.7%	10	1.1%	15	1.6%	0	0.0%	9.5	11.7	4	0.4%		11	1.2%
Non-STS Categories																				
Heart Transplant +/- VAD	21	3	14.3%	6	28.6%	15	71.4%	2	9.5%	0	0.0%	0	0.0%	28	38.6	1	4.8%		0	0.0%
VAD +/- Other (NoTransplant)	42	6	14.3%	14	33.3%	28	66.7%	3	7.1%	3	7.1%	0	0.0%	31	41.4	4	9.5%		0	0.0%
Aorta Surgery	431	10	2.3%	39	9.0%	75	17.4%	19	4.4%	19	4.4%	0	0.0%	8	12.6	9	2.1%		2	0.5%
Valve Other	379	11	2.9%	33	8.7%	60	15.8%	10	2.6%	8	2.1%	0	0.0%	11	14.4	13	3.4%		1	0.3%
CABG + Other w/o Valves	20	0	0.0%	0	0.0%	1	5.0%	0	0.0%	0	0.0%	0	0.0%	12.5	13.9	0	0.0%		1	5.0%
Septal Myectomy	107	0	0.0%	1	0.9%	2	1.9%	1	0.9%	0	0.0%	0	0.0%	6	7.5	0	0.0%		2	1.9%
TAVR	227	0	0.0%	1	0.4%	2	0.9%	0	0.0%	3	1.3%	0	0.0%	2	4.9	2	0.9%		0	0.0%
All Other Procedures (In STS)	67	3	4.5%	3	4.5%	3	4.5%	0	0.0%	0	0.0%	0	0.0%	7	9	1	1.5%		0	0.0%
Subtotal	1,294	33	2.5%	97	7.5%	186	14.4%	35	2.7%	33	2.5%	0	0.0%	9.5	17.8	30	2.3%		6	0.5%
Adult Cardiac STS Total	**2,209**	**48**	**2.2%**	**133**	**6.0%**	**247**	**11.2%**	**45**	**2.0%**	**48**	**2.2%**	**0**	**0.0%**	**9.5**	**14.7**	**34**	**1.5%**		**17**	**0.8%**

Data is subject to correction

**30-Day Readmissions reflect readmissions that occurred during the previous month*

Report data selected using discharge date

PROCEDURE CATEGORIES WITH NO VOLUMES WILL NOT BE DISPLAYED

Cleveland Clinic

Surgeon: Y

All Adult Cardiac Surgery Outcomes

January 1, 2017 - June 30, 2017

STS Categories	Total Patients	Reop for Bleeding	Reop Bleeding %	Reop Any STS	Reop Any %	Prolonged Vent	Prolonged Vent %	Renal Failure	Renal Failure %	Stroke	Stroke %	DSW	DSW Infection %	Operative Mortality	Operative Mortality %	Predicted Mortality	Readmission 30Day	Readmission %
Isolated CABG	68	0	0.0%	1	1.5%	7	10.3%	0	0.0%	1	1.5%	0	0.0%	1	1.5%	1.6%	0	0.0%
Isolated AVR	2	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	8.4%	0	0.0%
AVR + CABG	2	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2.6%	0	0.0%
Isolated MVR	1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	12.6%	0	0.0%
MVR + CABG	1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	14.0%	0	0.0%
Isolated MV Repair	1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0.7%	0	0.0%
MV Repair + CABG	7	0	0.0%	0	0.0%	2	28.6%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	4.2%	0	0.0%
AVR + MVR	1	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%		0	0.0%
Subtotal	83	0	0.0%	1	1.2%	9	10.8%	0	0.0%	1	1.2%	0	0.0%	1	1.2%		0	0.0%
Non-STS Categories																		
Aorta Surgery	27	0	0.0%	1	3.7%	7	25.9%	1	3.7%	2	7.4%	0	0.0%	1	3.7%		0	0.0%
Valve Other	27	0	0.0%	1	3.7%	4	14.8%	1	3.7%	1	3.7%	0	0.0%	2	7.4%		0	0.0%
CABG + Other w/o Valves	2	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%		0	0.0%
TAVR	9	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%		0	0.0%
All Other Procedures (In STS)	3	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%		0	0.0%
Subtotal	68	0	0.0%	2	2.9%	11	16.2%	2	2.9%	3	4.4%	0	0.0%	3	4.4%		0	0.0%
Adult Cardiac STS Total	**151**	**0**	**0.0%**	**3**	**2.0%**	**20**	**13.2%**	**2**	**1.3%**	**4**	**2.6%**	**0**	**0.0%**	**4**	**2.6%**		**0**	**0.0%**

Cleveland Clinic

Top Ratings

Consistent
&
Maintained

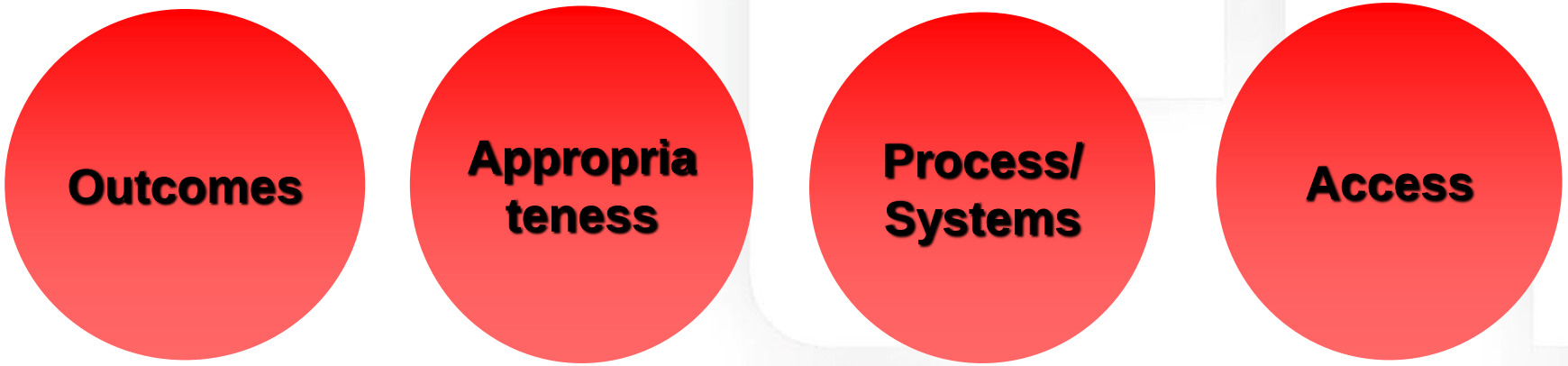
Heart & Vascular Excellence

Cleveland Clinic

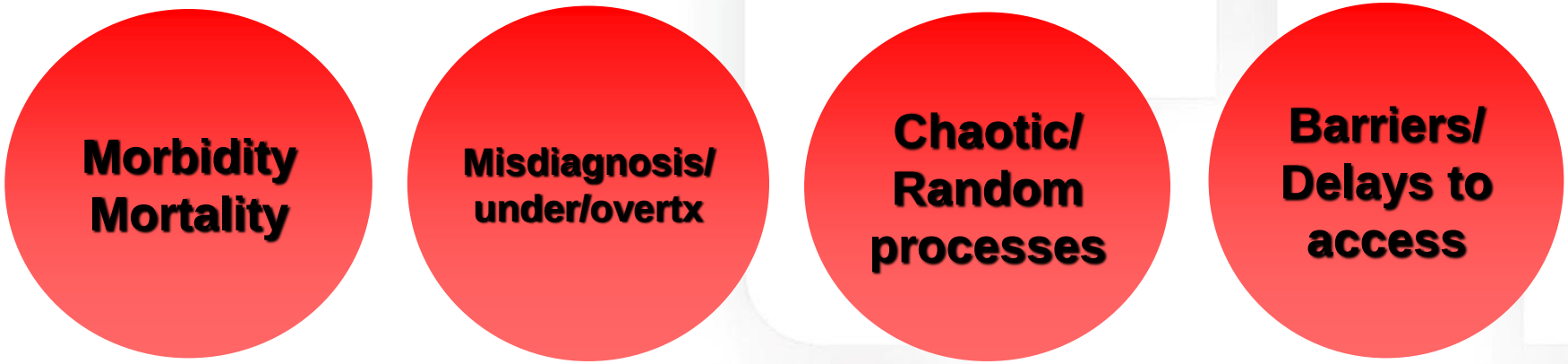
Does Quality = Outcomes?

Quality is Complicated

FOUR CIRCLES OF QUALITY



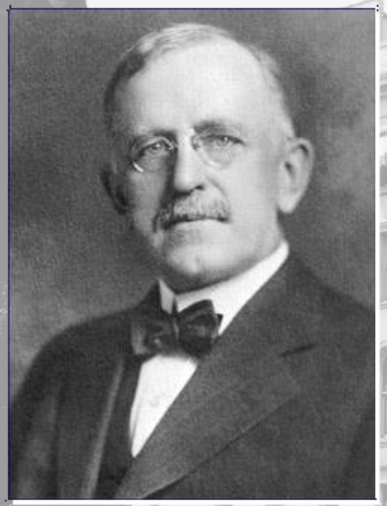
Poor QUALITY



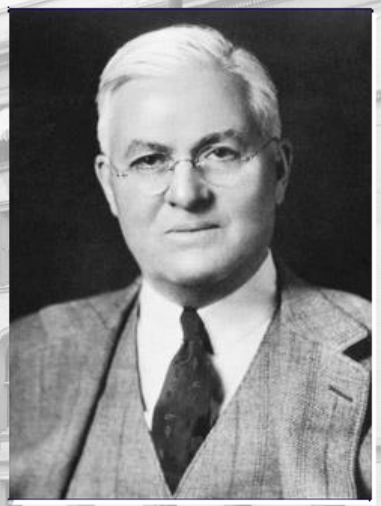
Achieving Quality

What we do will always change, but who we are should not. *Dan Gilbert*

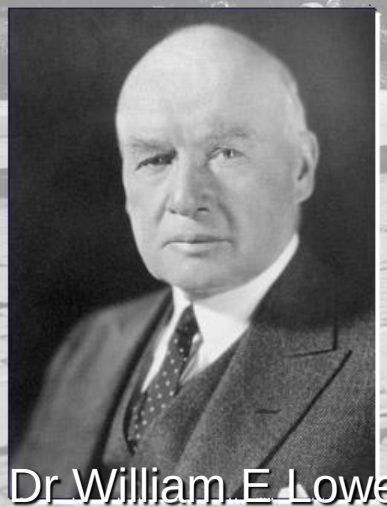
Our Mission



Dr Frank E Bunts



Dr George W Crile

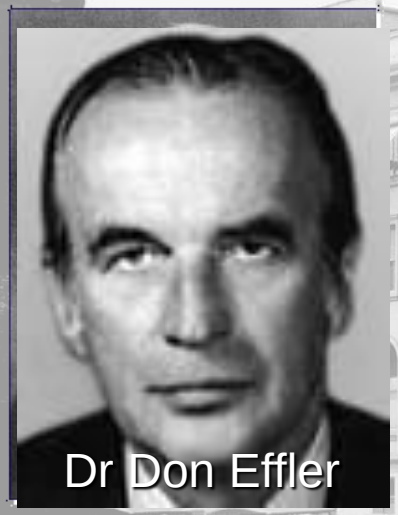


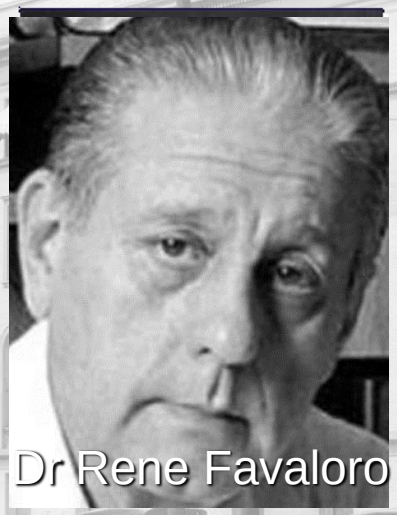
Dr William E Lower

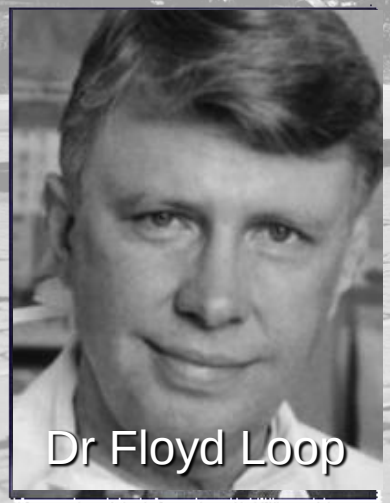
Dr John Phillips

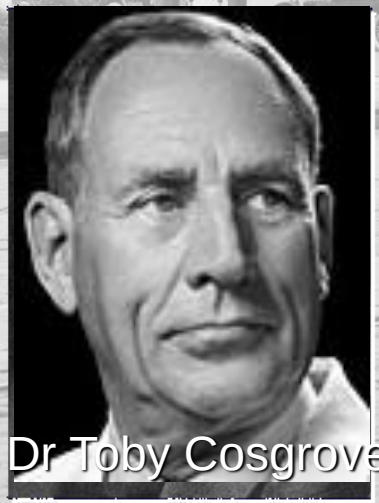
- Care for the sick
- Investigate their problems
- Educate those who serve

Thoracic and CV Surgery


Dr Don Effler


Dr Rene Favaloro


Dr Floyd Loop


Dr Toby Cosgrove

- A Legacy of excellence and innovation


Culture

HVI Strategic Principles

"We must:

Innovate and Change,

Preserve our Practice, Research and Education and

Keep Untouchable, high Quality Patient Care"

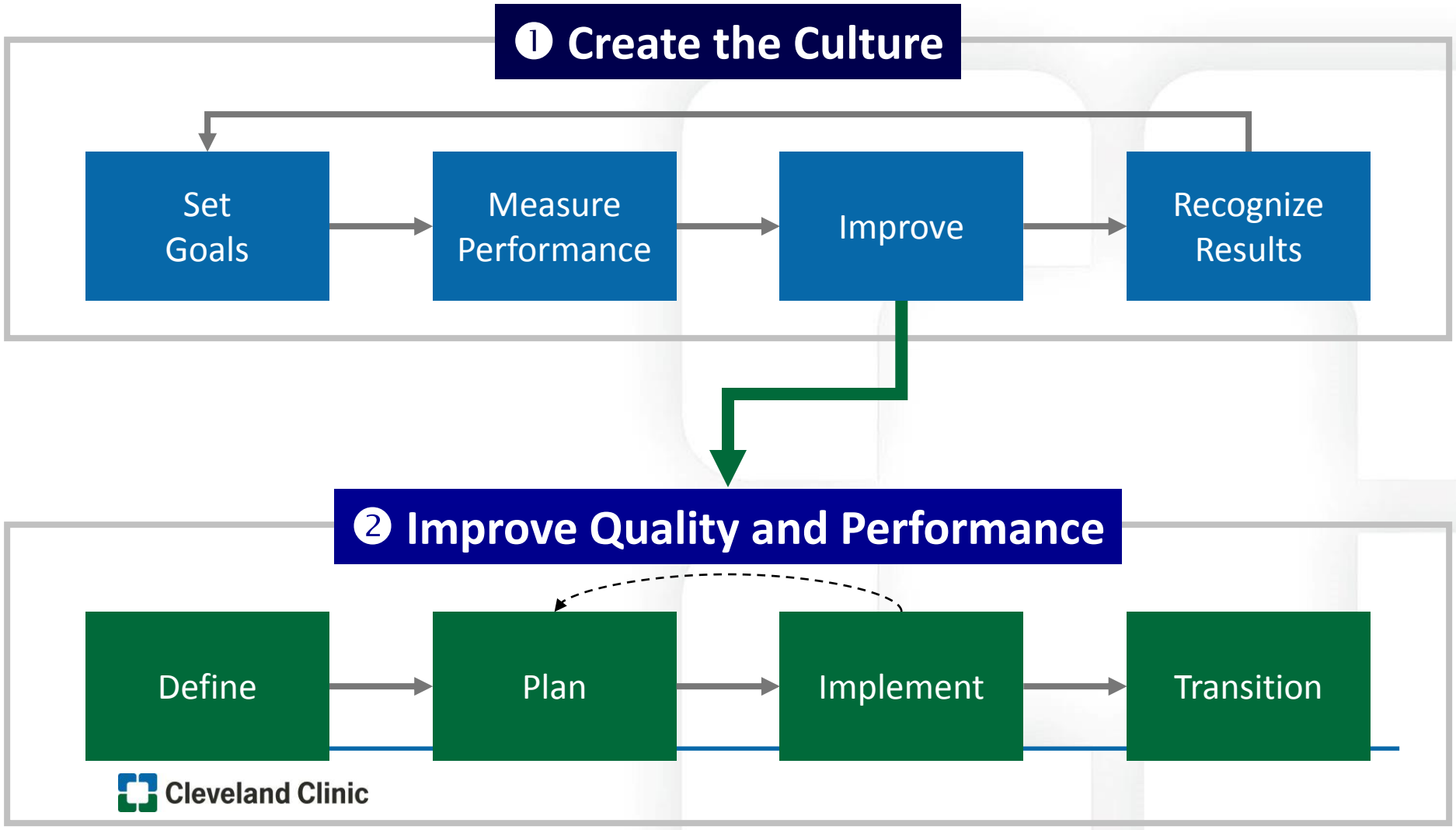
Lars Svensson

Three Key Elements

- Institutional and Institute Prioritization
- Leadership Integration
- Focus on Clinical Operations and Continuous Improvement

Quality, Safety, and Patient Experience

Continuous Improvement Model



IMPLEMENT

- Regular Meetings - at least bi-monthly
- Inertia Kills Most Projects
- Deadlines Matter
- Option 1: Gradual Rollout “Feel the Water”
  - Less Risky, Less Pushback, Minimal Drama
  - High Failure Rate – Never Get Traction
- Option 2: “Big Bang”
  - More Risky, Strong Pushback, Can Blowup
  - Higher Success Rate IF Done Right

Opportunities for Improvement 2016/2017

Surveillance, Observations, and Feedback

- Concerns about ease of access
  - Inconsistent access rout, long waits, dropped calls
  - Long waiting lists
- Bed crunch and case delays and cancellations
  - Length of stay
- More room to improve outcomes

New therapies bring new complications …

And new solutions.

Effective Teams are Smaller

- Ideal number is 5 to 9
- Larger teams are slow
  - Small teams (3-7) → 25% less time than teams > 20
  - 9 members = hingepoint
- Communication channels
  - N x (N-1) / 2

    N = 9 → 36 N = 20 → 190

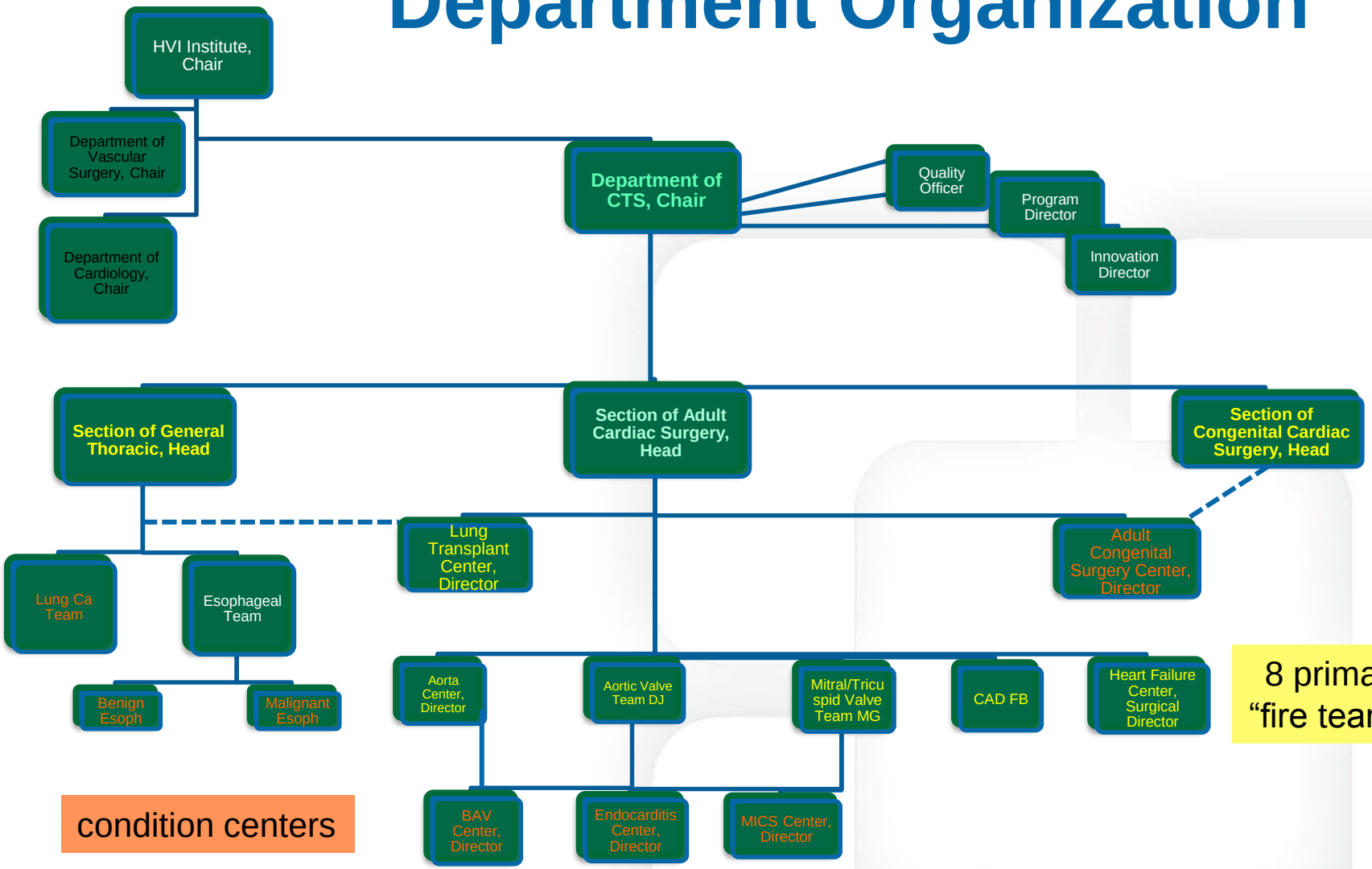
Frederick P. Brooks, Jr. *The Mythical Man-Month.* *1975*

Strategic Opportunities

Patient-centric & Physician-centric

- Smaller, nimble teams
- Interchangeable leaders

Department Organization



INITIATIVES

Cardiovascular Surgery Initiatives

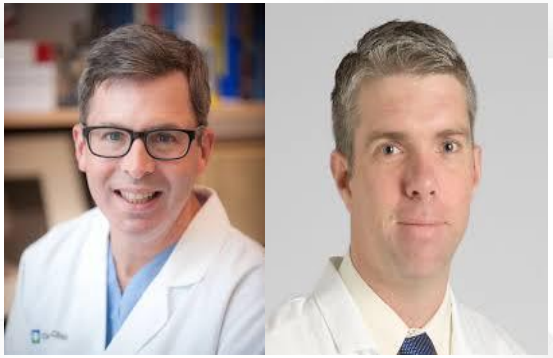
- Improve Access
- Length of Stay Project
- Standardized Protocols (Afib, anticoagulation, others)
- Improve M+M
- Improve complex Patient Management
  - Big Rescues and Near Misses Conference
  - Share best practices
    - Run it By Gosta (RBG)
    - Cardio-Aortic Weekly Conference (RBR)

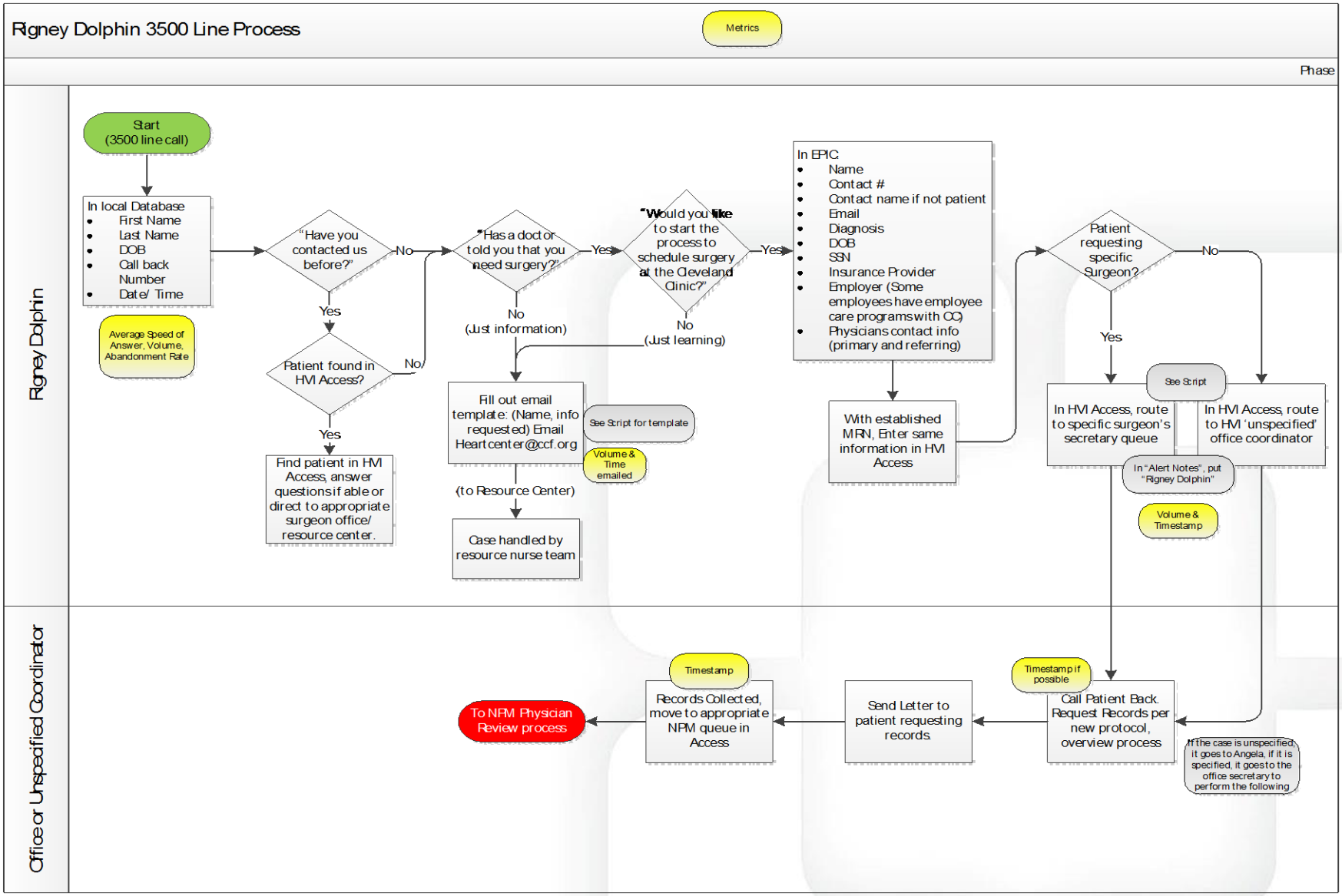
Improving Access

- All cardiac surgery phone calls (43500) routed to Rigney Dolphin
  - Enhance response rate
  - Enhance response time
  - Reduce dropped calls

  Translate into

  - Enhanced patient satisfaction
  - Increase volume
  - Enhance work flow and efficiency





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Optimizing Length of stay

Why is Length of Stay (LOS) Important?

- Impact scheduling and patient access
- Financial implications
- Surrogate for quality of care

Predicting LOS and Non-home Discharge

Sequentially Updated Discharge Model for Optimizing Hospital Resource Use and Surgical Patients' Satisfaction

Michael Z. Tong, MD, MBA, Gregory Pattakos, MD, MS, Jiayan He, ScD, Jeevanantham Rajeswaran, PhD, Michael W. Kattan, PhD, Wael K. Barsoum, MD, Eugene H. Blackstone, MD, and Douglas R. Johnston, MD

Department of Thoracic and Cardiovascular Surgery, Heart and Vascular Institute; Department of Quantitative Health Sciences, Research Institute; and Department of Surgical Operations, Medical Operations, Cleveland Clinic, Cleveland, Ohio

Background. The ability to estimate cardiac surgical patients' length of stay (LOS) and discharge to a continuing care facility (nonhome discharge) may allow earlier discharge planning and optimal use of limited hospital resources. We developed a sequentially updated tool for postoperative discharge planning.

Methods. Using preoperative, intraoperative, and postoperative day (POD) 2 and POD 4 variables, we created and validated a model to predict early discharge (less than 4 days), standard discharge (5 to 8 days), delayed discharge (9 to 14 days), late discharge (more than 15 days), and nonhome discharge.

Results. When predicting LOS, model accuracy using preoperative variables alone had a C-statistic of 0.80, but improved with sequential addition of intraoperative and POD 2 (0.87) and POD 4 variables (0.89). At 48 hours, the strongest predictors of longer LOS were higher preoperative creatinine, elevated blood urea nitrogen, lower postoperative albumin, atrial fibrillation, and longer intensive care unit stay. On POD 4, the strongest predictors were red blood cell transfusion, lower postoperative albumin, white blood cell transfusion, longer intensive care unit stay, and readmission to the intensive care unit. For nonhome discharge, however, preoperative variables alone produced a highly predictive model (C-statistic 0.88), and sequential addition of intraoperative and POD 2 (C-statistic 0.91) and POD 4 data (C-statistic 0.90) did not significantly improve it.

Conclusions. This sequentially updated model of postoperative LOS can be used by the discharge planning team to identify both patients imminently ready for discharge and patients with a high likelihood of nonhome discharge, with the goals of decreasing unnecessary hospital days, managing patients' expectations, and engaging patients early in the discharge process.

(Ann Thorac Surg 2015;100:2174–81)

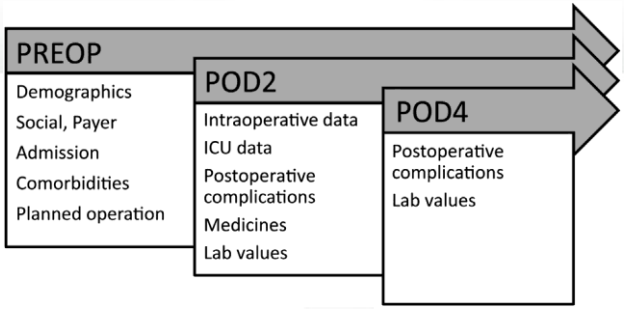


Fig 1. Sequential model of type of variables used to analyze hospital length of stay. (ICU = intensive care unit; Lab = laboratory; POD =

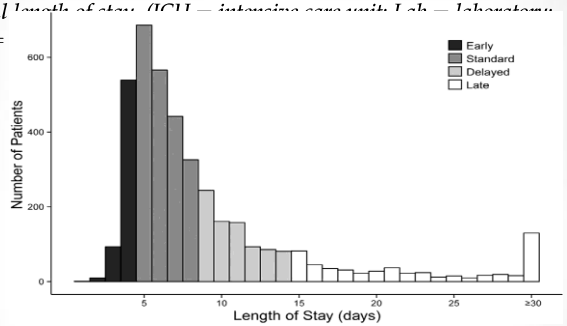


Fig 2. Distribution of length of stay: 16% of patients had early discharge (black bars), 50% standard discharge (dark gray bars), 20% delayed discharge (light gray bars), and 14% late discharge (white bars).

What Determines LOS?

- Medical factors

+

- Unit/hospital protocols and policies

Almashrafi *et al. BMC Health Services Research* (2016) 16:318
DOI 10.1186/s12913-016-1591-3

BMC Health Services Research

RESEARCH ARTICLE Open Access

Systematic review of factors influencing length of stay in ICU after adult cardiac surgery

Ahmed Almashrafi*, Mustafa Elmontsri and Paul Aylin

Abstract

Background: Intensive care unit (ICU) care is associated with costly and often scarce resources. In many parts of the world, ICUs are being perceived as major bottlenecks limiting downstream services such as operating theatres. There are many clinical, surgical and contextual factors that influence length of stay. Knowing these factors can facilitate resource planning. However, the extent at which this knowledge is put into practice remains unclear. The aim of this systematic review was to identify factors that impact the duration of ICU stay after cardiac surgery and to explore evidence on the link between understanding these factors and patient and resource management.

Methods: We conducted electronic searches of Embase, PubMed, ISI Web of Knowledge, Medline and Google Scholar, and reference lists for eligible studies.

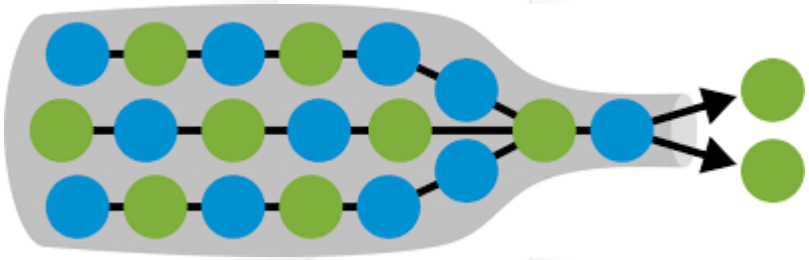
Results: Twenty-nine papers fulfilled inclusion criteria. We recognised two types of objectives for identifying influential factors of ICU length of stay (LOS) among the reviewed studies. These were general descriptions of predictors and prediction of prolonged ICU stay through statistical models. Among studies with prediction models, only two studies have reported their implementation. Factors most commonly associated with increased ICU LOS included increased age, atrial fibrillation/ arrhythmia, chronic obstructive pulmonary disease (COPD), low ejection fraction, renal failure/ dysfunction and non-elective surgery status.

Conclusion: Cardiac ICUs are major bottlenecks in many hospitals around the world. Efforts to optimise resources should be linked to patient and surgical characteristics. More research is needed to integrate patient and surgical factors into ICU resource planning.

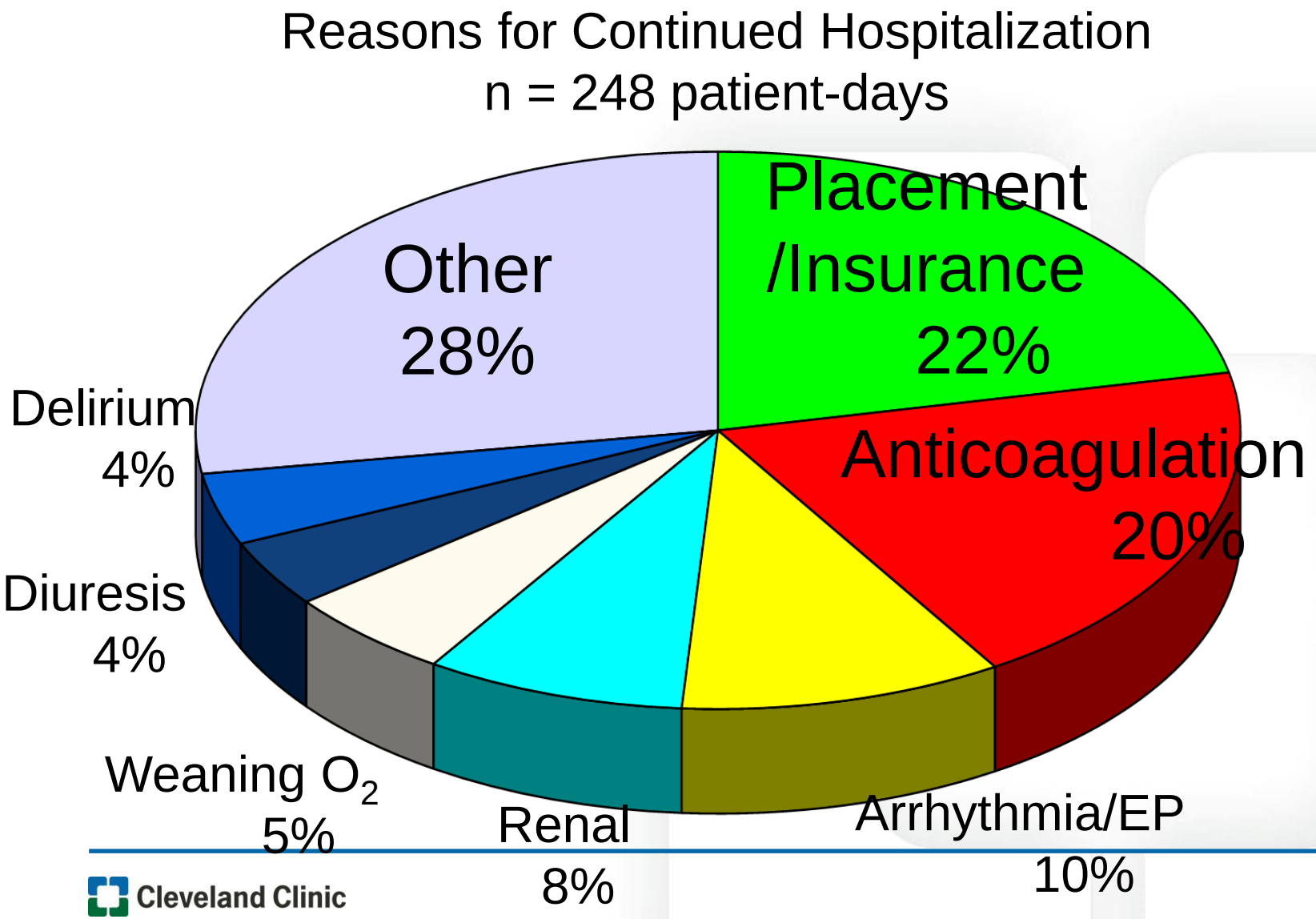
Keywords: Cardiac ICU resource utilisation, Length of stay, Cardiac surgery

Protocol Targets: Critical Bottle Necks

Mundane, but high yield



Identifying Bottlenecks



Postoperative Protocols

<u>Examples:</u>

- Afib management
- Anticoagulation for Afib and valves
- Chest tube removal
- Temporary Pacemaker Wires
- Permanent Pacemakers

The Protocols

- Inclusions:
  - All STS cases
  - Straightforward non-STS cases per Staff discretion

- Exclusions:
  - Open chest cases
  - Complicated cases (e.g., bleeders, high risk for thrombosis)

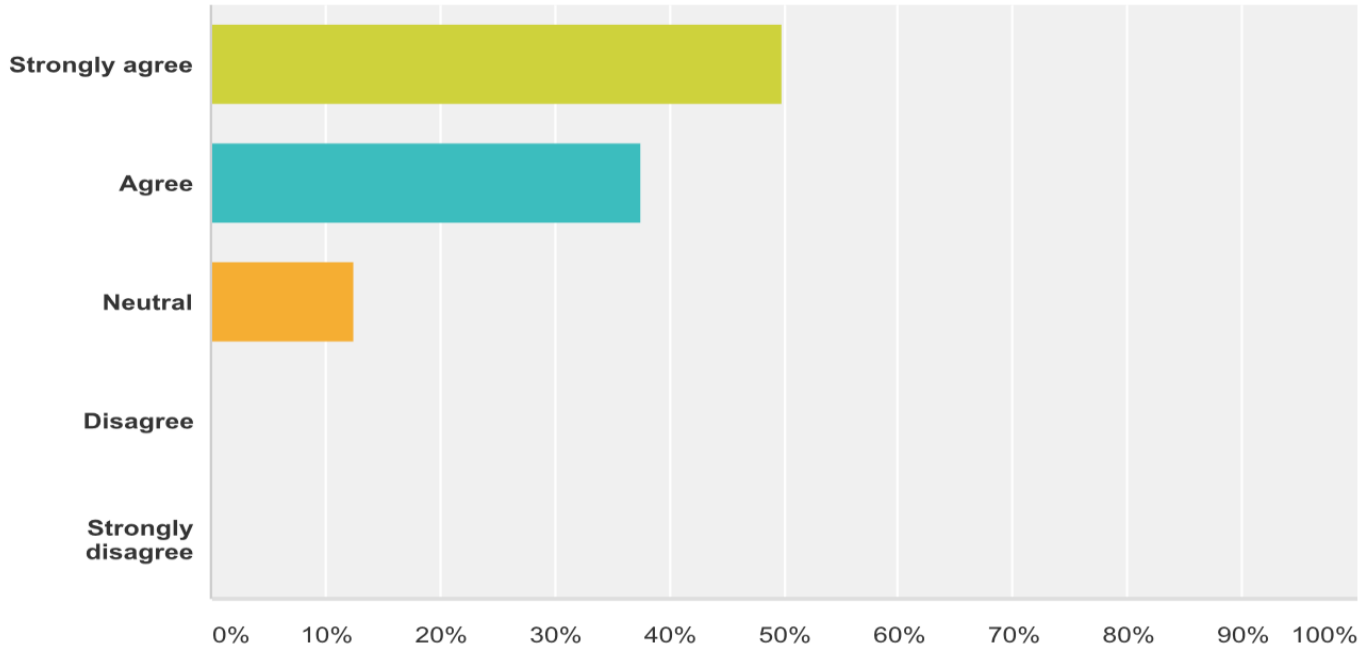
Not Set in Stone

- Developed with using Collective Feedback and consensus building
- Some are evidence-based, some are common sense
- Opportunity to opt out

SurveyMonkey

In hemodynamically stable patients with post op Afib, rate control is preferable to rhythm control unless the patient is symptomatic or heart rate persistently >100.

Answered: 8 Skipped: 0



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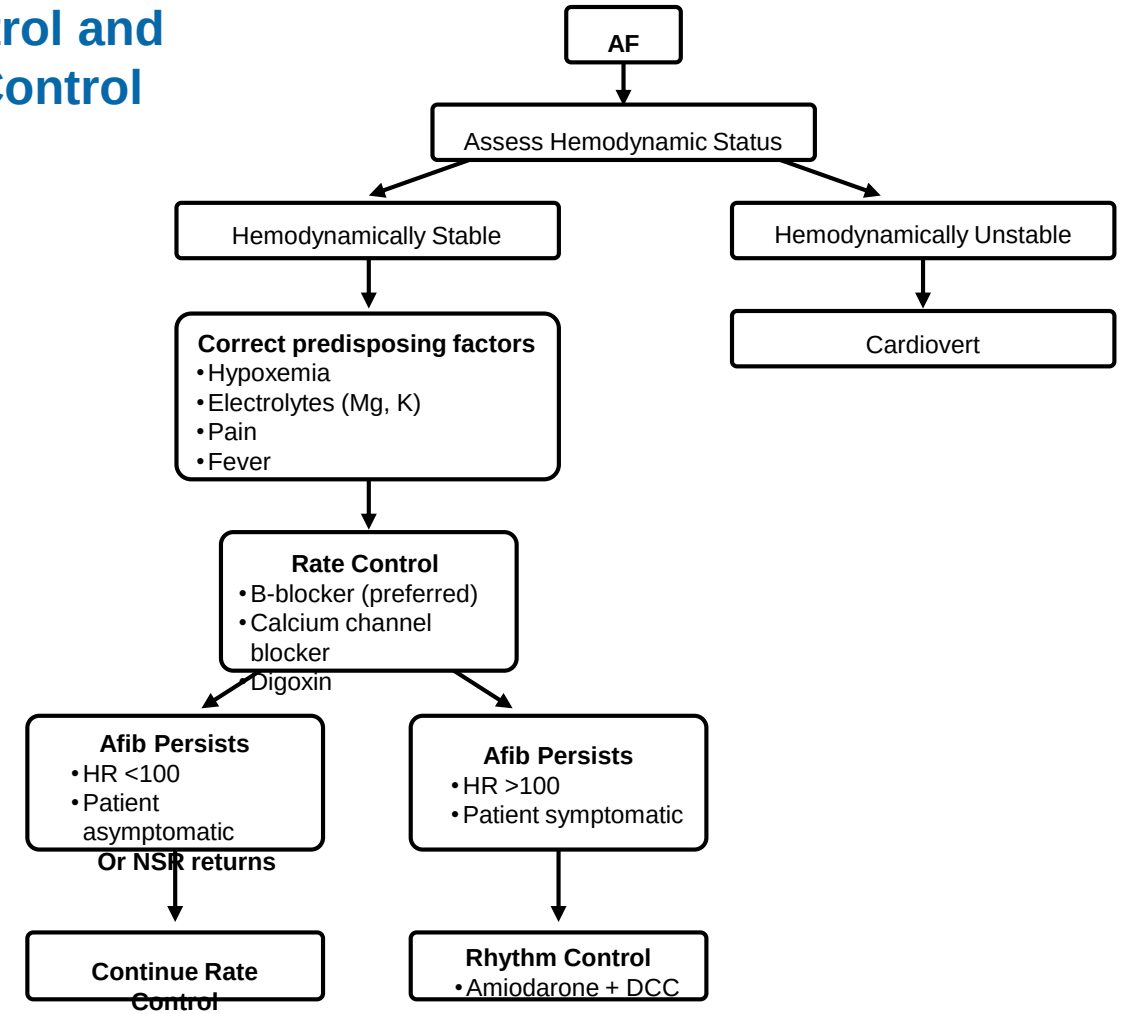
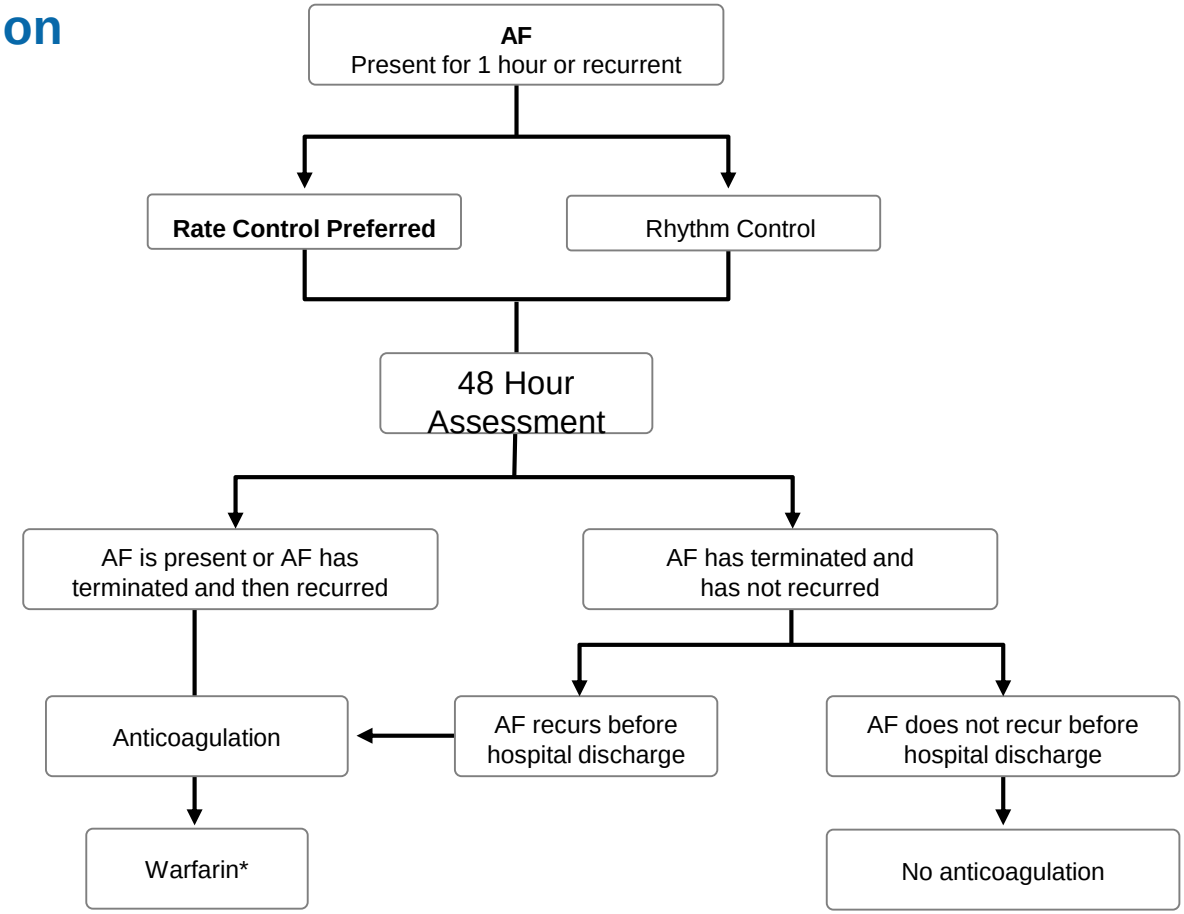
AF: Rate Control and Rhythm Control

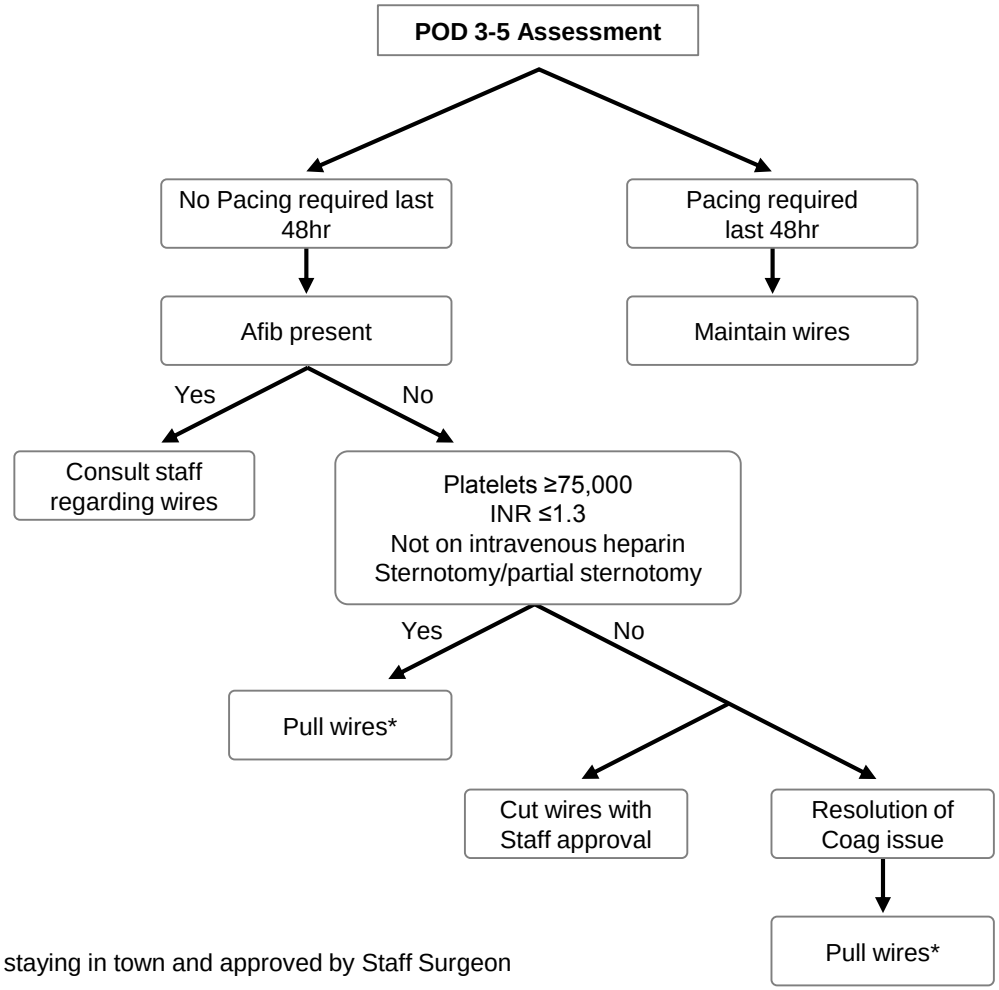


AF: Anticoagulation



*May discharge with INR <2.0

Pacing Wires



After pull wires

VS q15' x 1hr
q30' x 1hr
q1hr x 2hr

May DC same day as wires pulled if pt staying in town and approved by Staff Surgeon

*Thoracotomy or robotic approach → cut wires in most cases

Implementation

- Laminated cards
- i-phone mobile App
- Care giver education (pre- and post-op)
- Patient education and engagement

- Ad-hoc audits to check for compliance- (resident volunteers)

Post Implementation Surveillance

Efficacy

- LOS
- Post op Afib rate

Safety

- Rate of Readmissions
- Pericardial effusions
- Bleeding
- Thrombosis
- Stroke
- Pneumothorax
- Pleural effusion

POCMA

- Phase of Care Mortality Analysis
  - Enhance our understanding of the underlying cause of mortality
  - Understand the time and place
  - Better definition of contributing factors
  - Opportunities to identify and address gaps in care or deficiencies in resources

POCMA

Cleveland Clinic
Sydell and Arnold Miller Family Heart and Vascular Institute

Hospital Name: _____ **Surgeon (initials)** _____ **DOS** ___/_____/_____ **DOD** ____/____/_____

Procedures (1) _____ **(2)** _____ **(3)** _____ **STS Score:** _____ **Autopsy: Yes / No**

CASE Summary:

PHASE OF CARE MORTALITY ANALYSIS:

Pre-Operative Phase

Cardiac risk factor profile e.g.
- Cardiogenic shock
- Myocardial viability

Non-cardiac risk factor profile
- Renal failure on dialysis
- COPD
- Cirrhosis
- Combination

Judgment
- Timing of surgery
- Risk > benefit

Patient preparation
- Medical optimization failure

Patient evaluation
- Functional class
- ID occult disease(s)

Other: _____

Intra-Operative Phase

Anesthesia
- Technical (lines, TEE, ET)
- Pharmacologic management
- Recognition/treatment of decompensation

Surgeon
- Judgment
- Technical (lacs, grafts, emboli)
- Myocardial protection

Cardiopulmonary By-Pass
- Parameters (hct, MAP, mVO^2)
- Fluid management

CVA

Catastrophic event (specify):
_____

Other: _____

Post-Op ICU Phase

Hemodynamic management
- Inotrope titration
- Adequate O^2 delivery

Respiratory care
- Prevent lung injury and VAP
- Appropriate support plan

ICU care (Keystone criteria)
- DVT/PE prophylaxis
- Sepsis prevention/treatment
- Nutritional support

Multi-System Organ Failure

Failure to Thrive

Surveillance/recognition/Rx of Decompensation

Catastrophic event (specify):
_____

Other: _____

Post-Op Floor Phase

Pharmacologic management
- Coumadin
- Other

Pulmonary embolism

CVA

Dysrhythmia (Atrial or Vent)

Surveillance/recognition/Rx of decompensation

Sepsis prevention/treatment

Catastrophic event (specify):
_____

Other: _____

Discharge Phase

Appropriate disposition: e.g.
- Nursing home/ECF vs. home

Pharmacologic details

Adequate instruction and support network

Catastrophic event (specify):
_____

Other: _____

Seminal event and Mortality Avoidable? **Yes** **No** **If Yes: How:**

_____

_____

If Avoidable: What has been implemented to prevent future similar event:

_____

_____

Unique Platform:

Lessons learned from such cases may be as relevant if not more relevant than M&M

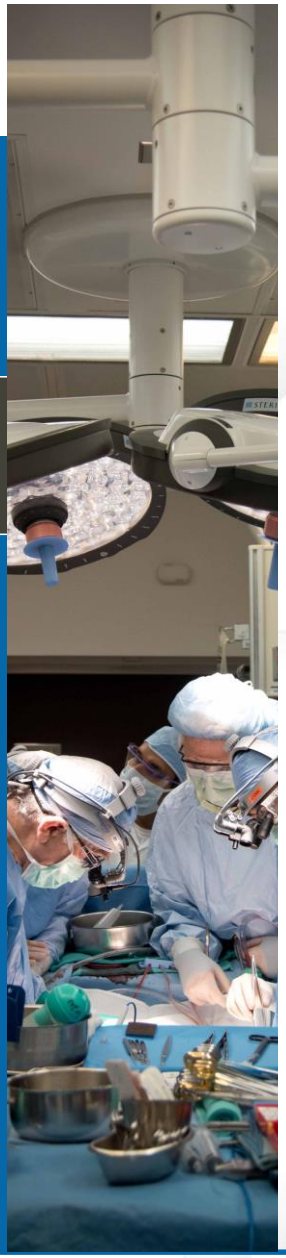
Cleveland Clinic

HVI & CT Anesthesia

Big Rescues and Near Misses Multi-disciplinary Case Conference

July 19, 2017
Q1-201, Conference Room
***7:00 - 8:00 a.m. (EST)**

7:00am	**Emergency aortic repair in a Hemodynamically Unstable Patient After Ortho Procedure: Immediate instinctive decision making – how and why!**
	Agenda: Surgical methods and repair options; Adequate resuscitation efforts; Value for multidisciplinary team and communication
	Moderator: Paul Cremer, MD
	Faisal Bakaeen, MD and Pierre DeVilliers, MD
7:20am	**Premature Prosthetic Valve Dysfunction in the Setting of ESRD and Polycythemia Vera**
	Agenda: Risk factors for early prosthetic valve degradation; Role of preoperative decision making; Role intraoperative imaging, bleeding concerns and hemodynamic management. A case for better patient monitoring and need for criteria for earlier reoperation;
	Moderator Gosta Pettersson, MD PhD
	Shinya Unai, MD, Andrew Bauer, MD
7:40am	**Elective Heart Surgery in Nonagenarians++**
	Agenda: Risks and benefits of the cardiac surgery at the extreme of age
	Moderator: Paul Cremer, MD
	Ann Gage, MD
7:50am	**Discussion**
8:00am	**Adjourn**



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Run it By Gosta (RBG) Cardio-Aortic Conference (RBR)

- **Peer review and discussion of challenging cases**
  - Upfront identification of challenges
  - Determine surgical candidacy
  - Better stratify risks
  - Better preparation for operative planning
  - Refine perioperative care

  Translate into
  - Collegiality and Team building
  - Improved outcomes

Other Platforms to Maintain Quality Edge

Research and Education

Impact: Research

Multi-Dimensional

Translational

Practical

- Clinical
- Outcomes
- Cohort, Big data
- Industry Trials (RCT)

Improving Outcomes
Increasing patient satisfaction

Robotic Mitral Repair

ACQUIRED CARDIOVASCULAR DISEASE

Robotic repair of posterior mitral valve prolapse versus conventional approaches: Potential realized

Tomislav Mihaljevic, MD,[a] Craig M. Jarrett, MD, MBA,[a] A. Marc Gillinov, MD,[a] Sarah J. Williams, MS,[b] Pierre A. DeVilliers, MD,[c] William J. Stewart, MD,[d] Lars G. Svensson, MD, PhD,[a] Joseph F. Sabik III, MD,[a] and Eugene H. Blackstone, MD[a,b]

Objective: Robotic mitral valve repair is the least invasive approach to mitral valve repair, yet there are few data comparing its outcomes with those of conventional approaches. Therefore, we compared outcomes of robotic mitral valve repair with those of complete sternotomy, partial sternotomy, and right mini-anterolateral thoracotomy.

Methods: From January 2006 to January 2009, 759 patients with degenerative mitral valve disease and posterior leaflet prolapse underwent primary isolated mitral valve surgery by complete sternotomy (n ¼ 114), partial sternotomy (n ¼ 270), right mini-anterolateral thoracotomy (n ¼ 114), or a robotic approach (n ¼ 261). Outcomes were compared on an intent-to-treat basis using propensity-score matching.

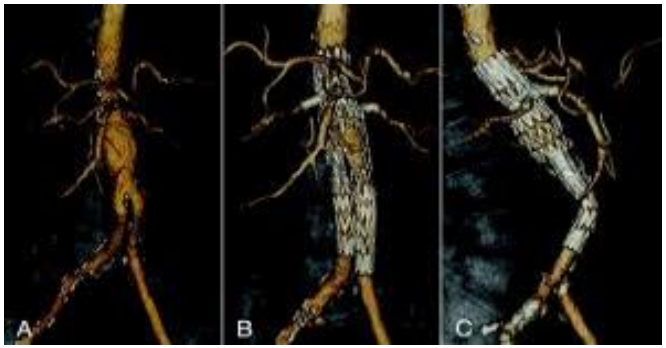
Results: Mitral valve repair was achieved in all patients except 1 patient in the complete sternotomy group. In matched groups, median cardiopulmonary bypass time was 42 minutes longer for robotic than complete sternotomy, 39 minutes longer than partial sternotomy, and 11 minutes longer than right mini-anterolateral thoracotomy (P< .0001); median myocardial ischemic time was 26 minutes longer than complete sternotomy and partial sternotomy, and 16 minutes longer than right mini-anterolateral thoracotomy (P< .0001). Quality of mitral valve repair was similar among matched groups (P ¼ .6, .2, and .1, respectively). There were no in-hospital deaths. Neurologic, pulmonary, and renal complications were similar among groups (P> .1). The robotic group had the lowest occurrences of atrial fibrillation and pleural effusion, contributing to the shortest hospital stay (median 4.2 days), 1.0, 1.6, and 0.9 days shorter than for complete sternotomy, partial sternotomy, and right mini-anterolateral thoracotomy (all P< .001), respectively.

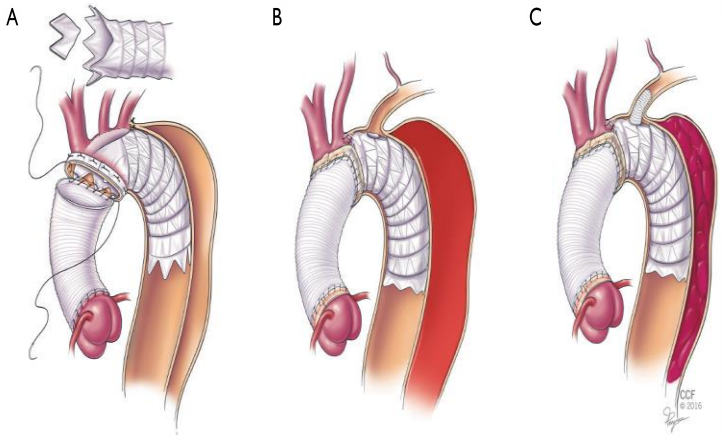
Conclusions: Robotic repair of posterior mitral valve leaflet prolapse is as safe and effective as conventional approaches. Technical complexity and longer operative times for robotic repair are compensated for by lesser invasiveness and shorter hospital stay. (J Thorac Cardiovasc Surg 2011;141:72-80)

Improving Outcomes
Increasing patient satisfaction

Endovascular Therapy

Hybrid Therapies





CrossMark

From the Society for Vascular Surgery

Fenestrated and branched endovascular aneurysm repair outcomes for type II and III thoracoabdominal aortic aneurysms

Matthew J. Eagleton, MD, Matthew Follansbee, BS, Katherine Wolski, MPH, Tara Mastracci, MD, and Yuki Kuramochi, BScN, *Cleveland, Ohio*

Objective: Thoracoabdominal aortic aneurysm (TAAA) repair remains a challenging clinical pathology. Endovascular technology, in particular the evolution of fenestrated and branched (F/B) endografts used in endovascular aneurysm repair (EVAR) has provided a less invasive method of treating these complex aneurysms. This study evaluated the technical and clinical outcomes of F/B-EVAR for extensive type II and III TAAA.
Methods: Data from 354 high-risk patients enrolled in a physician-sponsored investigational device exemption trial (2004-2013) undergoing F/B-EVAR for type II and III TAAA were evaluated. Technical success, perioperative clinical outcomes, and midterm outcomes (36 months) for branch patency, reintervention, aneurysm-related death, and all-cause mortality were analyzed. Data are presented as mean ± standard deviation and were assessed using Kaplan-Meier, univariate, and multivariate analysis.
Results: F/B-EVARs incorporating 1305 fenestration/branches were implanted with 96% of target vessels successfully stented. Completion aortography showed 2.8% patients had a type I or III endoleak. Procedure duration (6.0 ± 1.7 vs 5.5 ± 1.6 hours; $P < .01$) and hospital stay (13.1 ± 10.1 vs 10.2 ± 7.4 days; $P < .01$) were longer for type II TAAA. Perioperative mortality was greater in type II repairs (7.0% vs 3.5%; $P < .001$). Permanent spinal cord ischemia occurred in 4% and renal failure requiring hemodialysis occurred in 2.8% of patients. Twenty-seven branches (7.6%) required reintervention for stenosis or occlusion; and celiac artery, superior mesenteric artery, and renal artery secondary patency at 36 months was 96% (95% confidence interval [CI], 0.93-0.99), 98% (95% CI, 0.97-1.0), and 98% (95% CI, 0.96-1.0), respectively. Eighty endoleak repairs were performed in 67 patients, including 55 branch-related endoleaks, 4 type Ia, 5 type Ib, and 15 type II endoleaks. At 36 months, freedom from aneurysm-related death was 91% (95% CI, 0.88-0.95), and freedom from all-cause mortality was 57% (95% CI, 0.50-0.63). The treatment of type II TAAA ($P < .01$), age ($P < .01$), and chronic obstructive pulmonary disease ($P < .05$) negatively affected survival.
Conclusions: F/B-EVAR is a robust treatment option for patients at increased risk for conventional repair of extensive TAAAs. Technical success and branch patency are excellent, but some patients will require reintervention for branch-related endoleak. Aneurysm extent portends a higher risk of perioperative and long-term morbidity and mortality. Additional efforts are needed to improve outcomes and understand the utility of this treatment option in the general TAAA population. (J Vasc Surg 2016;63:930-42.)

Masters of Cardiothoracic Surgery

Frozen elephant trunk for DeBakey type 1 dissection: the Cleveland Clinic technique

Eric E. Roselli, Michael Z. Tong, Faisal G. Bakaeen

Aorta Center, Department of Thoracic and Cardiovascular Surgery, Heart and Vascular Institute, Cleveland Clinic, Cleveland, Ohio, USA
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Submitted Mar 10, 2016. Accepted for publication May 09, 2016.
doi: 10.21037/acs.2016.05.03
View this article at: http://dx.doi.org/10.21037/acs.2016.05.03

Cleveland Clinic

“True creativity in medicine doesn't take place within disciplines so much as it does at the boundaries between disciplines.”

Toby Cosgrove

Organizational Realignment

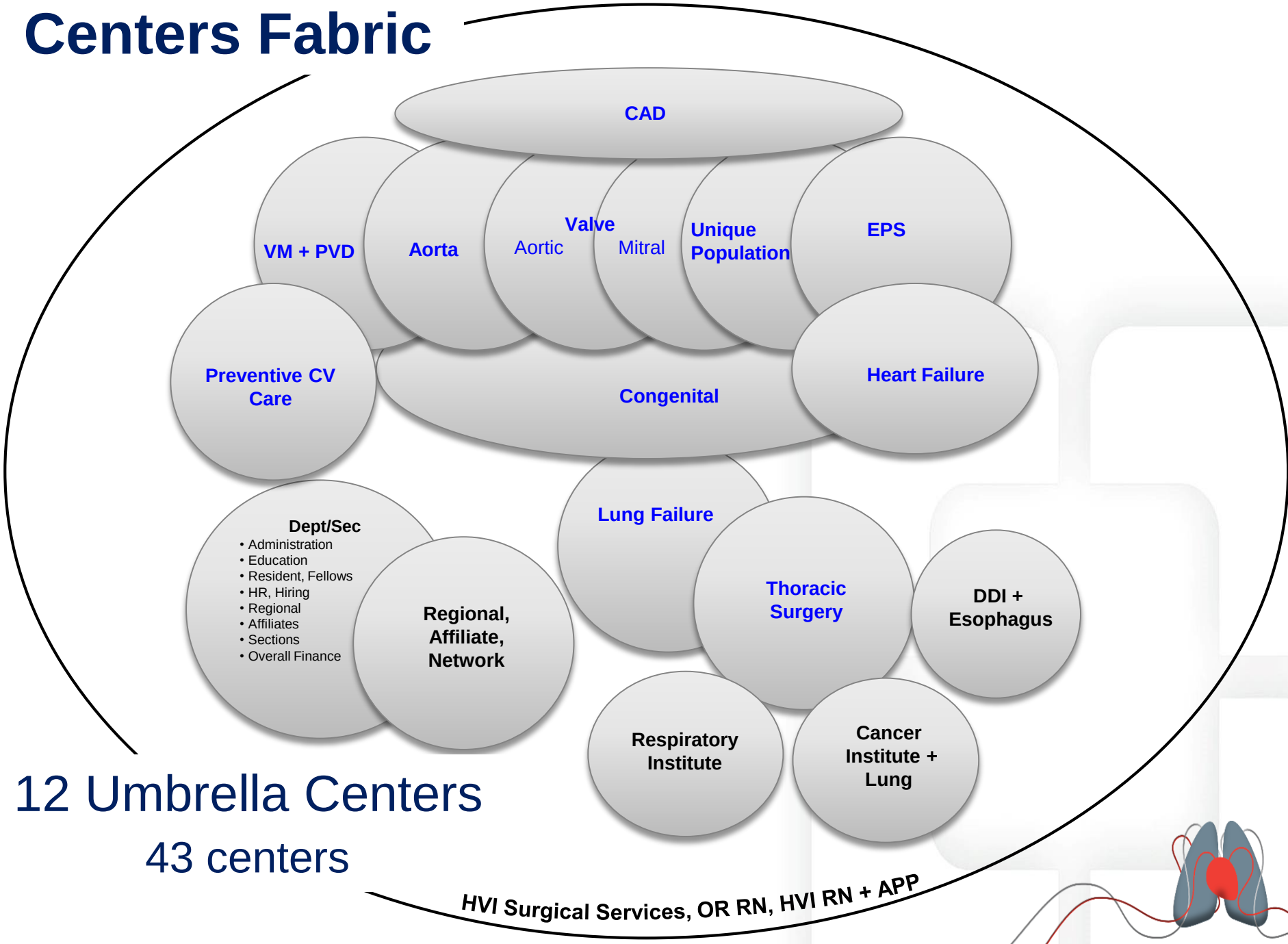
- Conventional → Radical : Institutes

"Older models are built for the convenience of the doctors. Institutes are built for the convenience of patients and their families."

Toby Cosgrove

- Need further development of our disease centers

Centers Fabric



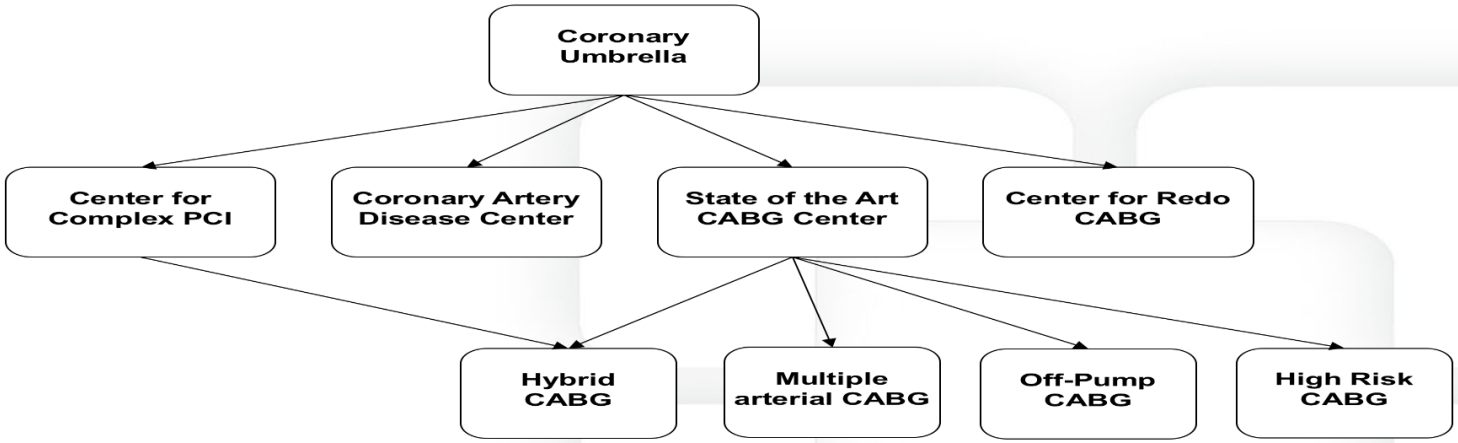
12 Umbrella Centers

43 centers

Innovation in Organizing Care-lines

- **Umbrellas and Centers of Excellence**
  - To keep up with emerging technologies and super-specialization
  - To come up with innovative care pathways
  - Enhance team-approach and collaboration
  - To cope with cost constraints (e.g., CABG bundle payment)

Example:



Aorta Center Collaboration

Intradisciplinary

Daily operations

- Cardio-Aortic Team
- Friday case reviews
- Shared Block Time
- Standard TEVAR pulls
- Follow-up protocols
- Fellow training

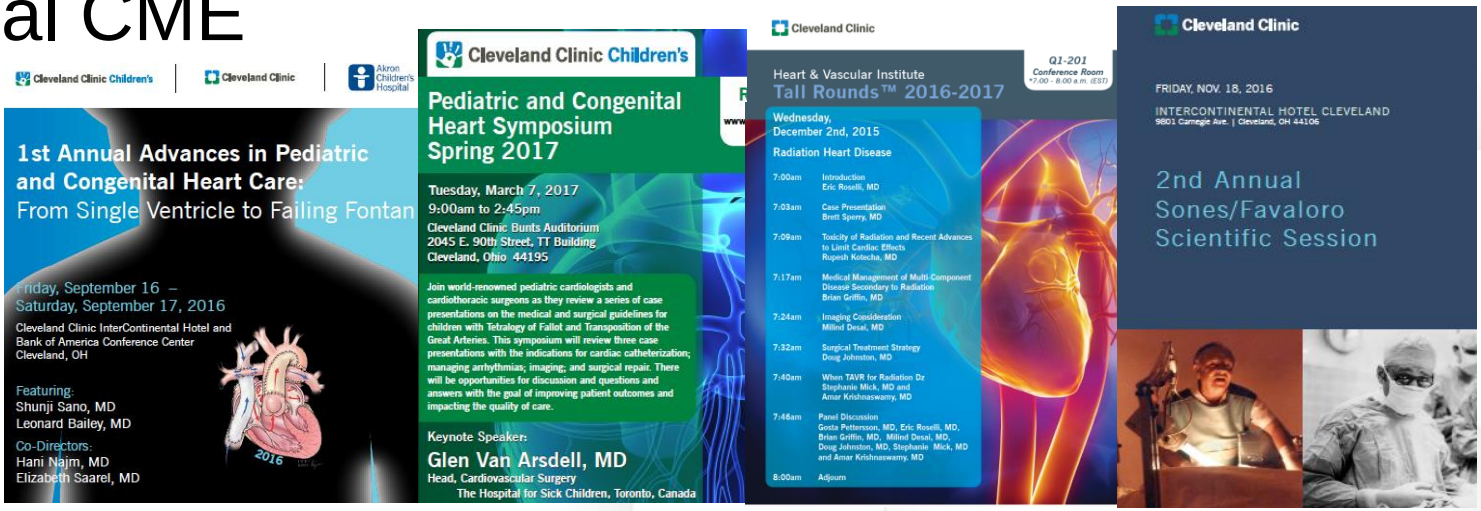
Interdisciplinary

Research, Education, +

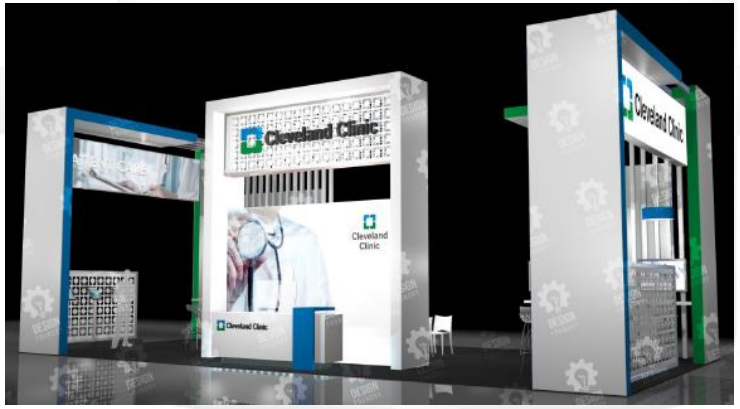
- Shared research: MATADORS study, Lerner Center Of Excellence, Device trials
- ED Outreach program
- Type B Dissection Carepath ✓
- Type A Dissection Carepath
- Thoracic aneurysm screening
- Genetics program

Educational Symposia/Events

- Local CME



- Society Meetings: Booth and Satellite Sessions

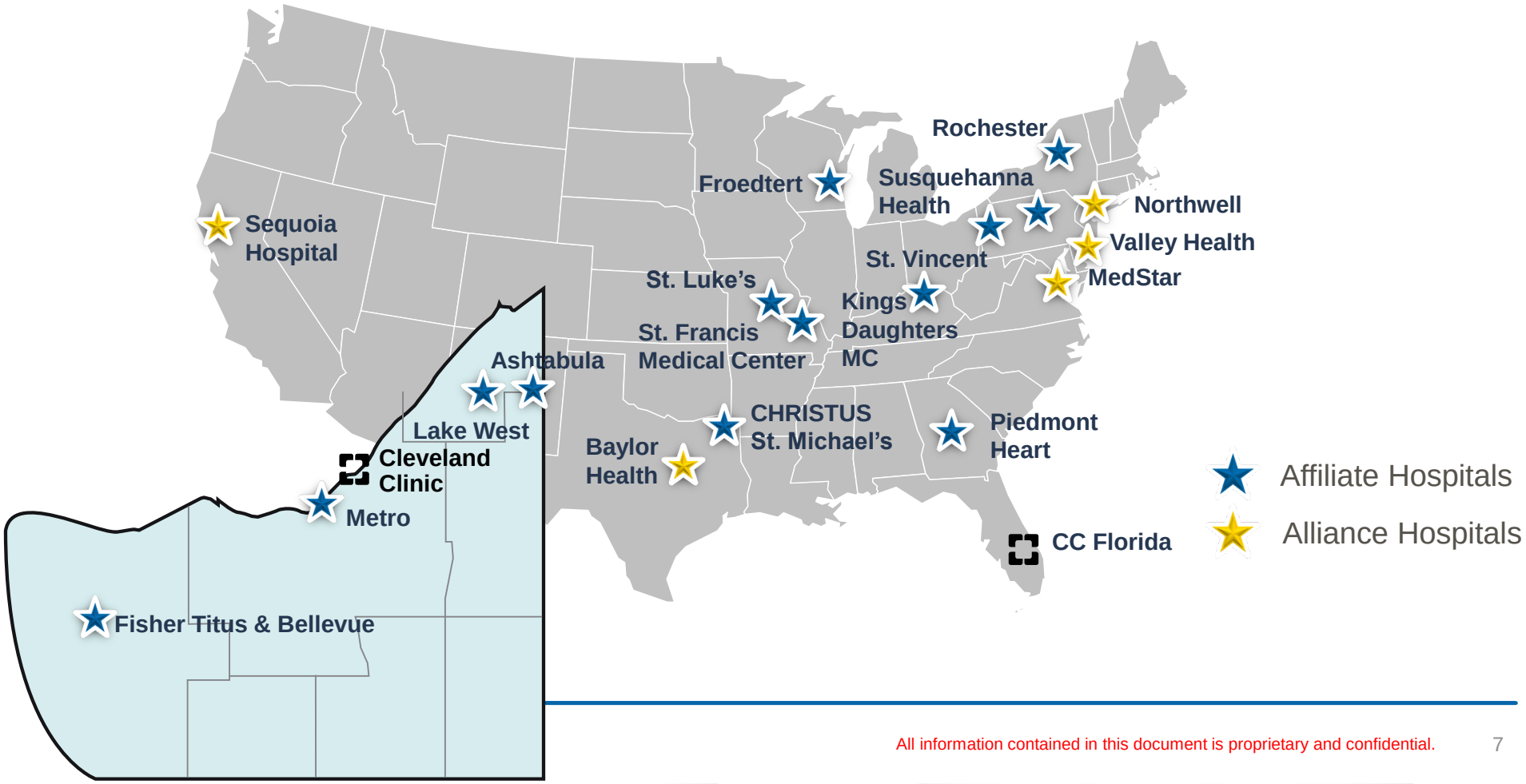


Patient Engagement

- Education about procedure and process
- Set expectations about discharge
- Continued Access: Affinity Program

Quality is Contagious

The Affiliation program extends nationally with broad membership profile



We offer Affiliates a range of services to fit their specific needs

Quality & Patient Care

Protocols, care paths, mortality reviews and case reviews/consultations

Operations Management

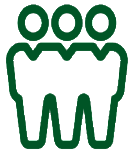
Operational efficiency, resource utilization, standardization, and supply chain review

Quality Infrastructure & Data Management

Collect and analyze data for quality improvement, cost savings and compliance

Business Services

Coding and documentation optimization, strategy development, organizational structure, practice assessments

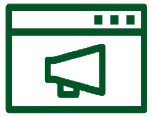


Personnel Management

Staff organization, physician and support team recruitment

Education

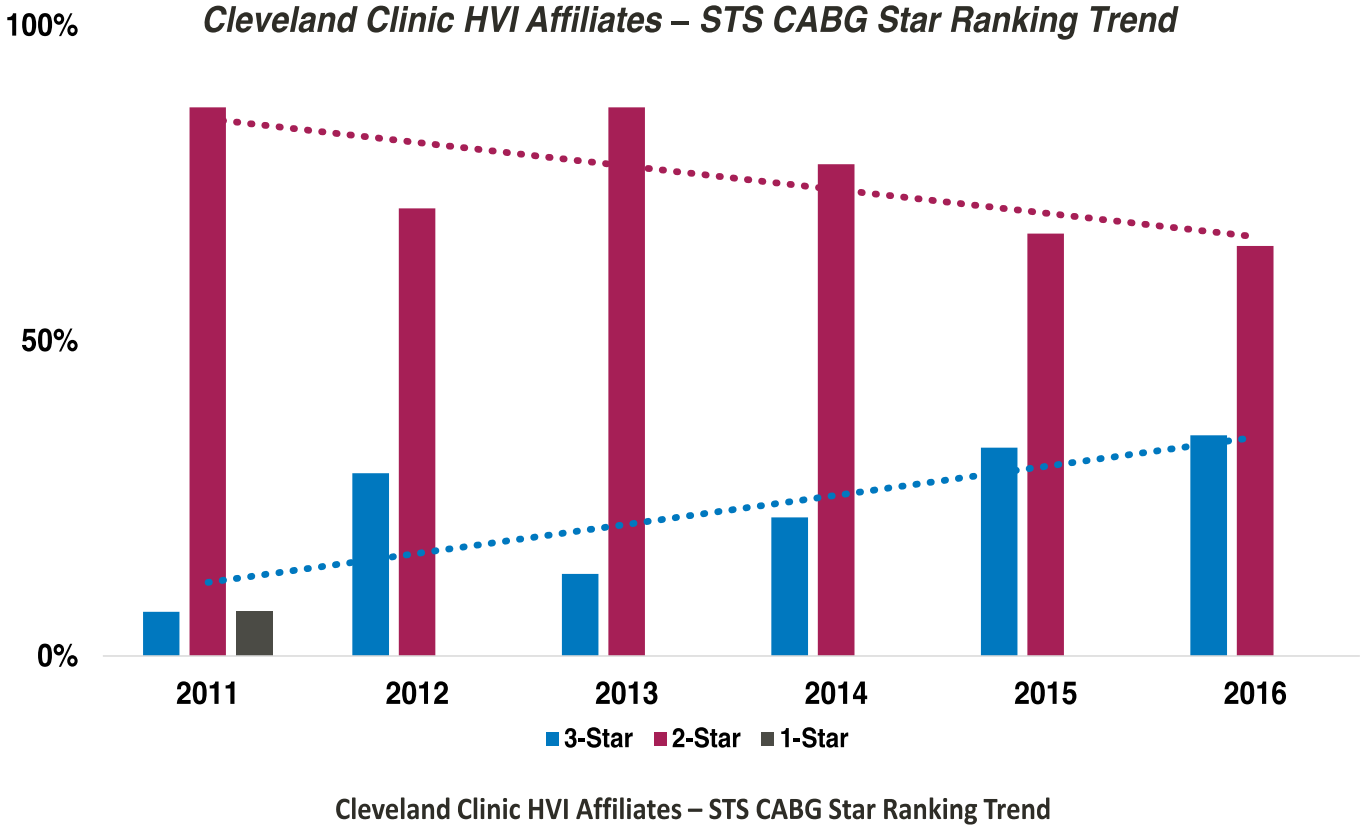
Grand rounds, CME, onsite observations at Cleveland Clinic, data and registry boot camps, executive and leadership education



Marketing

Sharing of best practices in marketing, PR, media relations, and marketing strategy development

Proven ability to improve CABG Star Ratings for cardiac surgery programs



Cleveland Clinic HVI Affiliates – STS CABG Star Ranking Trend

57% of Alliance* partners have 3-star STS CABG programs

Four affiliate programs have improved to 3-star CABG rating after affiliating with the Cleveland Clinic

** Alliance partners are the highest quality programs invited to participate in National Network programs*

Summary

- Quality comes from a culture that embraces continuous improvement and innovation.
- Team Sport: Multiple interventions enhance quality and efficiency
- Quality is contagious
- Success is achievable with little additional resources


Thank You