Isolated CABG Preoperative Beta Blocker Documentation Improvement

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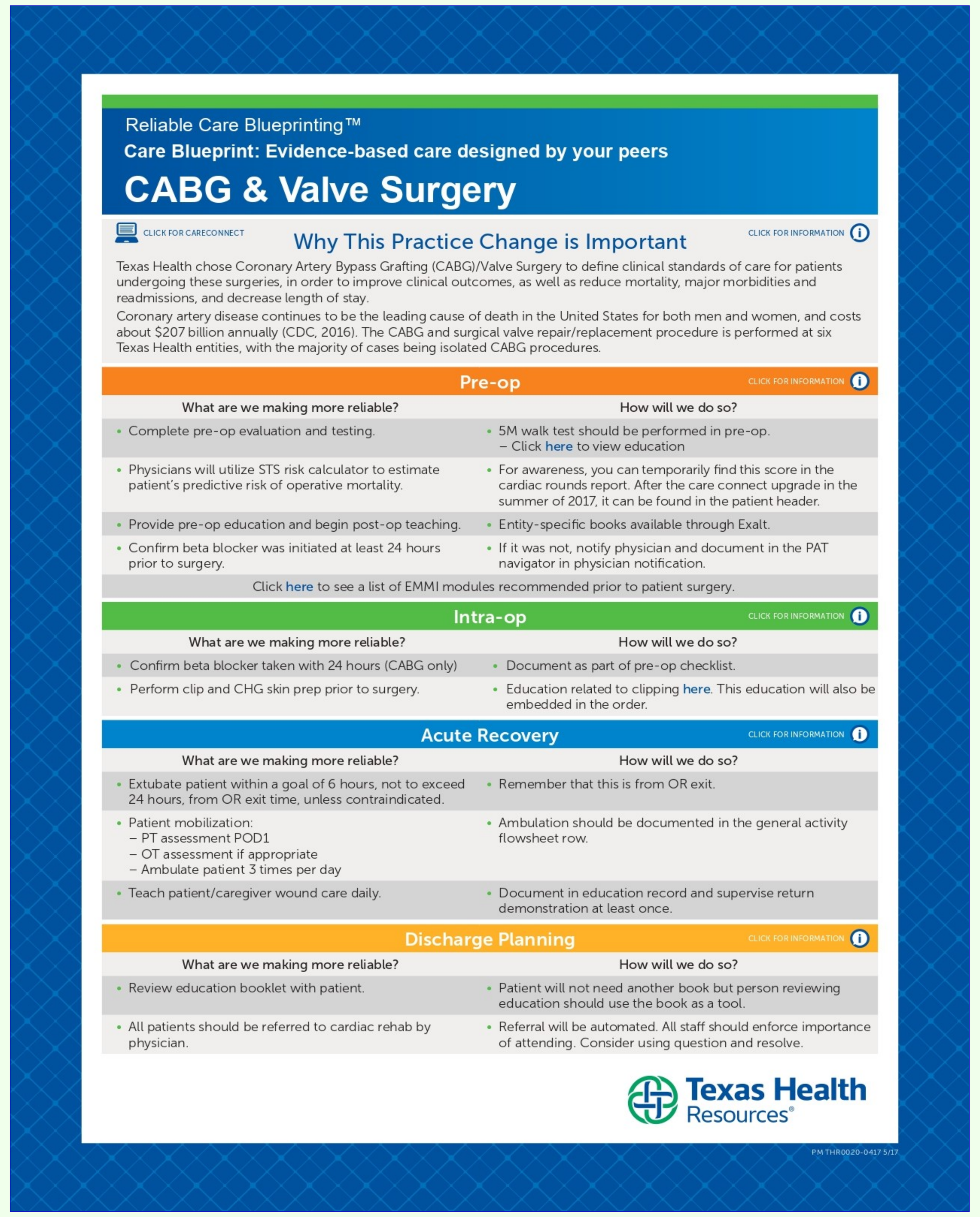
1 Background/

- NQF Endorsed Process Measures includes the Perioperative Medication Performance Domain.
- Perioperative Medication Domain consists of four medication measures: 1. preoperative beta blocker within 24 hours of incision time; 2. discharge beta blocker therapy; 3. discharge anti-lipid medication; 4. discharge anti-platelet medication.
- Performance on the perioperative medication domain impacts the overall STS composite score and star rating.
  - 0.81 x Score Mort + 0.10 x ScoreMorb + 0.07 x ScoreIma + 0.03 x ScoreMed
- Perioperative Medication Performance domain is an "all-or-none" measure.
  - Failure to document preoperative beta blockers nullifies achieving the entire measure thus, lowers overall composite score.
- Preoperative beta blockers improve patient outcomes, especially reducing rhythm disturbances after cardiac surgery.
- Texas Health Resources (THR) is a large system of hospitals of which 6 perform adult cardiac surgeries.
  - Although system-wide, THR's performance score was equal to the national average, 3 of our 6 hospitals scored less than the national average performance for preoperative beta-blockers.
- Brainstorming with physicians, nurse practitioners and physician assistants revealed a lack of knowledge about the need to document a contraindication when a beta blocker is not indicated.

Table 1—Reliable Care Blueprint—CABG & Valve



Reliable Care Blueprinting™

Care Blueprint: Evidence-based care designed by your peers

CABG & Valve Surgery

CLICK FOR CARECONNECT — **Why This Practice Change is Important** — CLICK FOR INFORMATION

Texas Health chose Coronary Artery Bypass Grafting (CABG)/Valve Surgery to define clinical standards of care for patients undergoing these surgeries, in order to improve clinical outcomes, as well as reduce mortality, major morbidities and readmissions, and decrease length of stay.

Coronary artery disease continues to be the leading cause of death in the United States for both men and women, and costs about $207 billion annually (CDC, 2016). The CABG and surgical valve repair/replacement procedure is performed at six Texas Health entities, with the majority of cases being isolated CABG procedures.

Pre-op (CLICK FOR INFORMATION)

What are we making more reliable?	How will we do so?
Complete pre-op evaluation and testing.	5M walk test should be performed in pre-op. – Click here to view education
Physicians will utilize STS risk calculator to estimate patient's predictive risk of operative mortality.	For awareness, you can temporarily find this score in the cardiac rounds report. After the care connect upgrade in the summer of 2017, it can be found in the patient header.
Provide pre-op education and begin post-op teaching.	Entity-specific books available through Exalt.
Confirm beta blocker was initiated at least 24 hours prior to surgery.	If it was not, notify physician and document in the PAT navigator in physician notification.

Click here to see a list of EMMI modules recommended prior to patient surgery.

Intra-op (CLICK FOR INFORMATION)

What are we making more reliable?	How will we do so?
Confirm beta blocker taken with 24 hours (CABG only)	Document as part of pre-op checklist.
Perform clip and CHG skin prep prior to surgery.	Education related to clipping here. This education will also be embedded in the order.

Acute Recovery (CLICK FOR INFORMATION)

What are we making more reliable?	How will we do so?
Extubate patient within a goal of 6 hours, not to exceed 24 hours, from OR exit time, unless contraindicated.	Remember that this is from OR exit.
Patient mobilization: – PT assessment POD1 – OT assessment if appropriate – Ambulate patient 3 times per day	Ambulation should be documented in the general activity flowsheet row.
Teach patient/caregiver wound care daily.	Document in education record and supervise return demonstration at least once.

Discharge Planning (CLICK FOR INFORMATION)

What are we making more reliable?	How will we do so?
Review education booklet with patient.	Patient will not need another book but person reviewing education should use the book as a tool.
All patients should be referred to cardiac rehab by physician.	Referral will be automated. All staff should enforce importance of attending. Consider using question and resolve.

Texas Health Resources®

PM THR0020-0417 5/17

2 Objective

GOAL

The goal of this project was to improve the NQF Endorsed Process Measures Score for all 6 Texas Health Resources (THR) hospitals, and the overall score for THR as a system, by improving documentation of preoperative beta blockers.

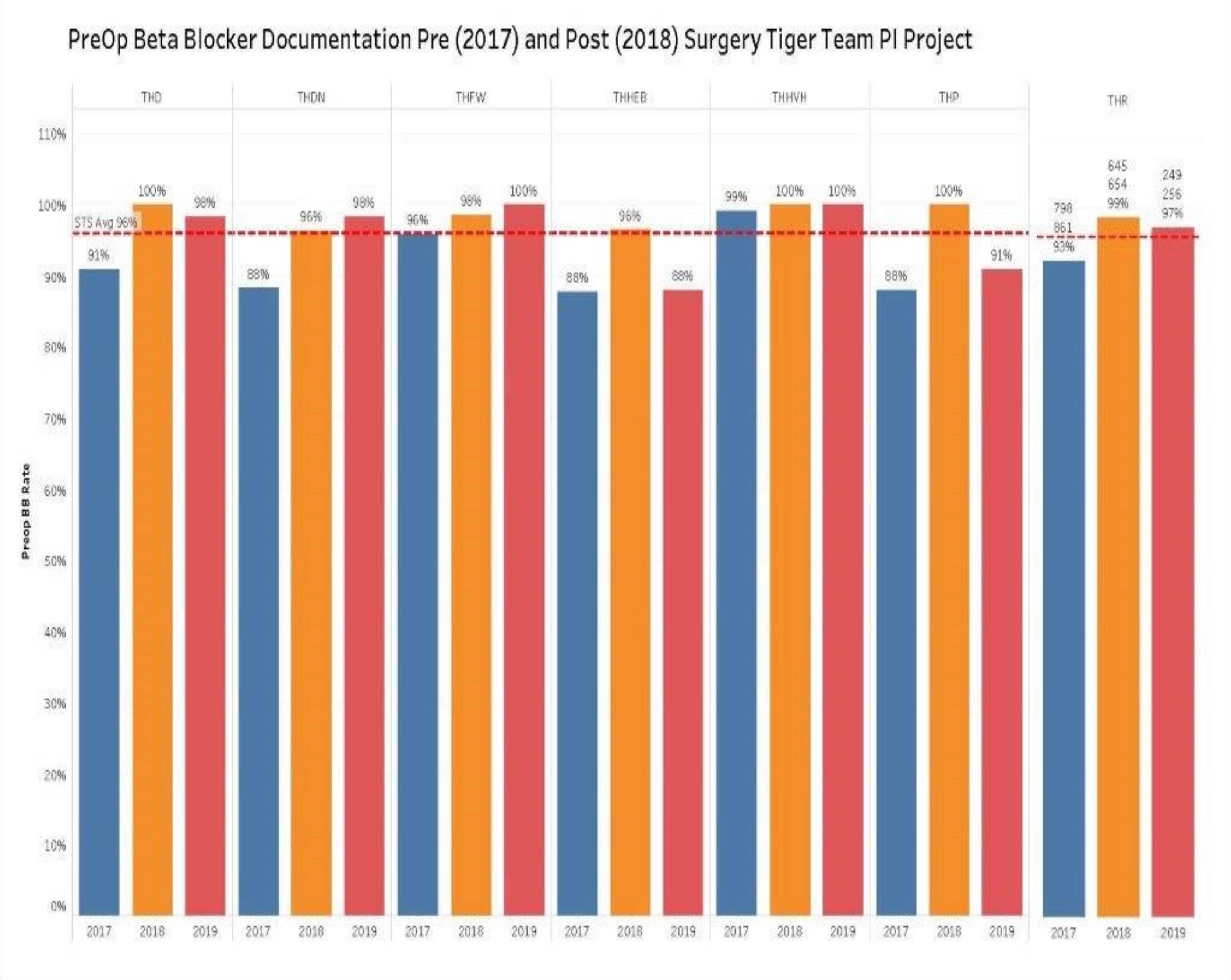
PICOT

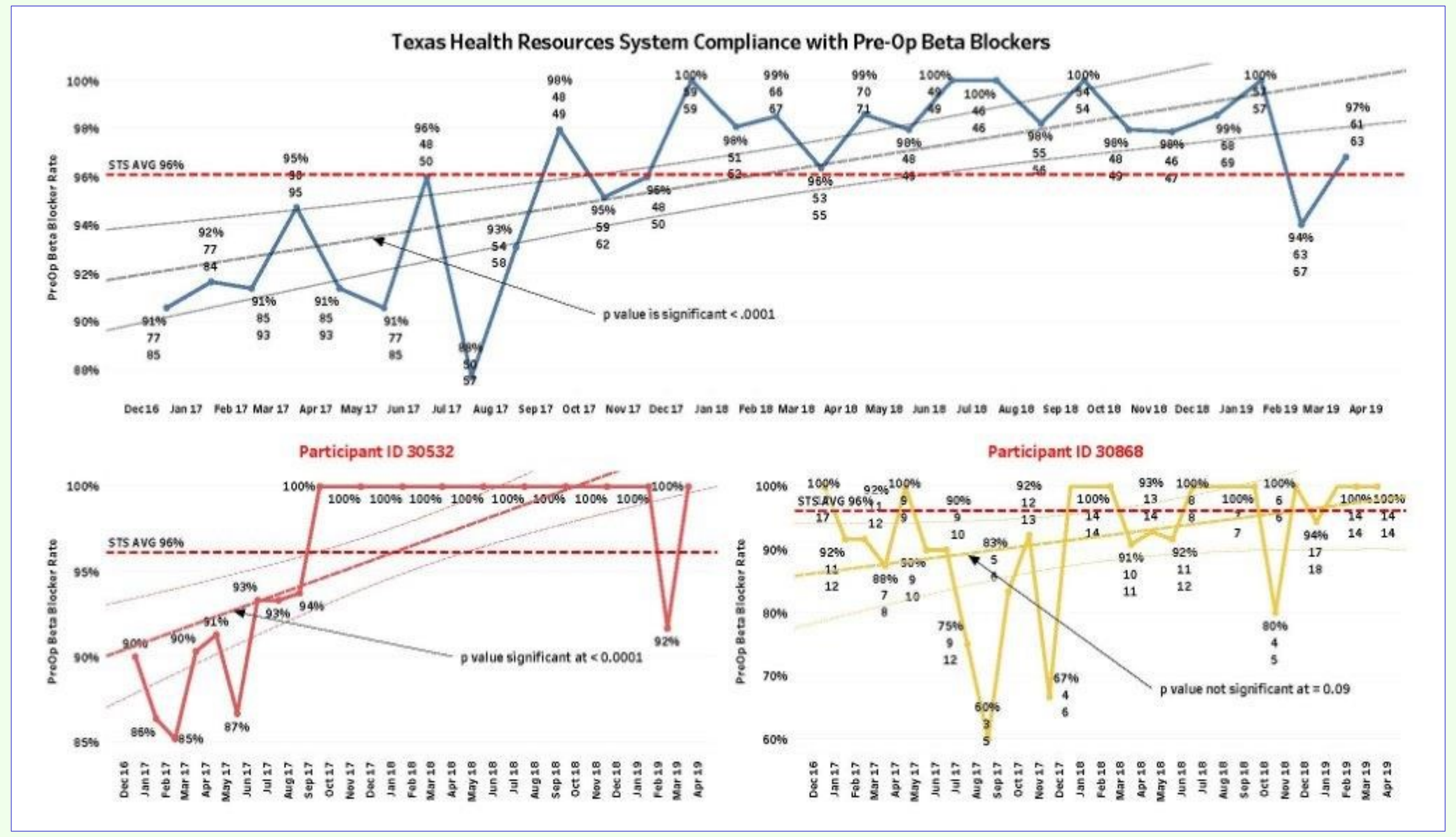
Will creating collaborative communication channels such as CareConnect queries, Reliable Care Blueprinting ™ (RCB), and using existing heart and vascular meetings to educate providers regarding documentation of preoperative beta blockers improve Texas Health Resources' (THR) agreement rate for preoperative beta blocker medication measure compared to the current method of sending emails only for 2018 when compared to 2017?

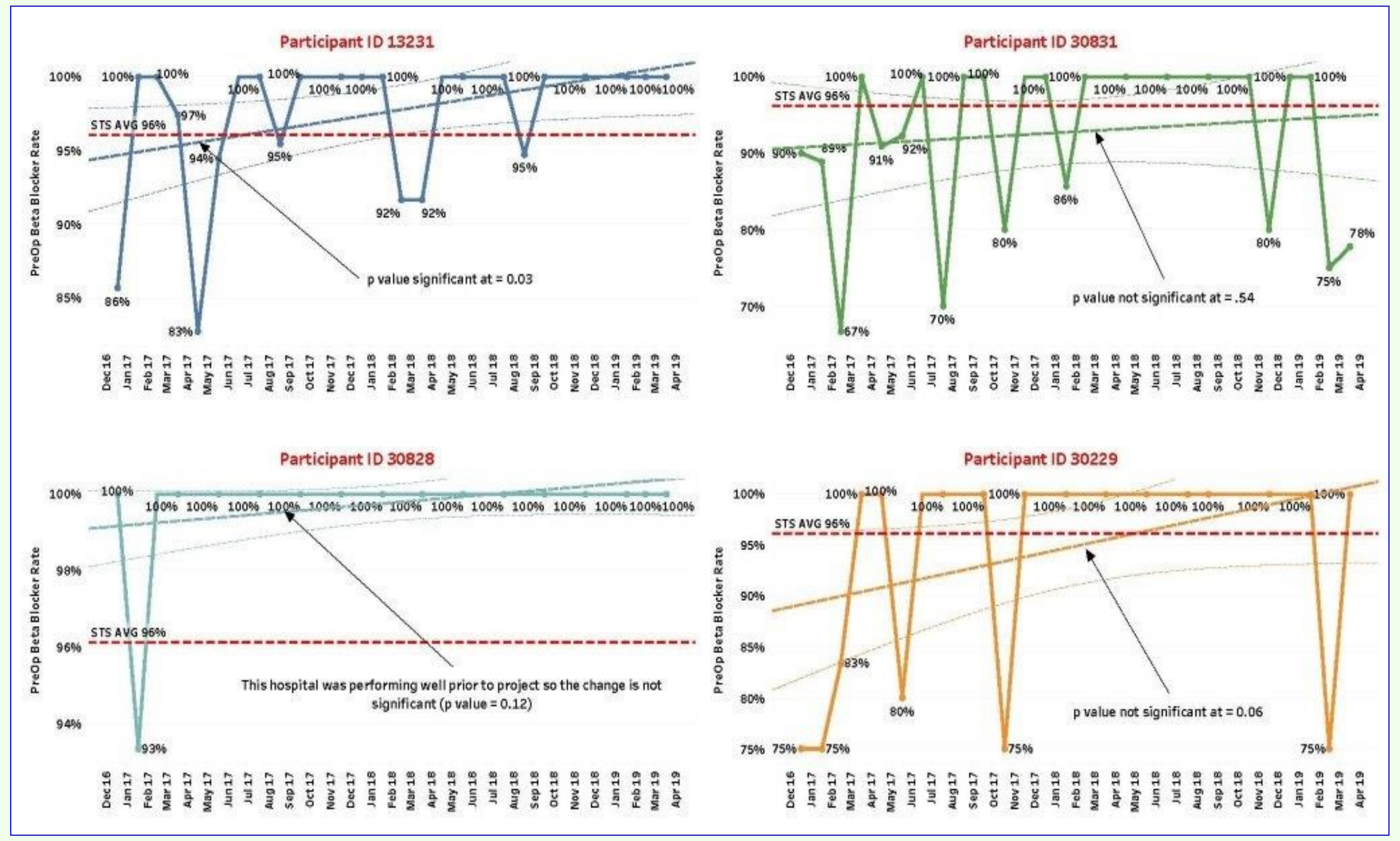
3 Methodology

Education via Heart and Vascular Executive Quality Meetings and Surgical Tiger Team Meetings

- Executive level Quality/Technology meetings held monthly. These meetings are hybrid online and face-to-face to facilitate increased participation.
  - The Executive Quality/Technology meetings include representatives from multiple disciplines (Nurses, IT, allied health, Quality) along with senior level executives and physicians.
  - The purpose of the executive Quality/Technology meetings is to approve new processes, medication formularies, review STS outcome reports to set KPIs.
  - The stakeholders were reminded about the NQF medication measure and educated about the importance of ordering and documenting either the administration of the medication or writing a contraindication when applicable.
- The Heart and Vascular (H&V) Service Line hosts monthly, system wide surgical Tiger Team meetings. These meetings are a hybrid of online and face-to-face meetings.
  - The surgical tiger team committee consists of representatives of multiple disciplines from corporate and all six hospitals (physicians, nurses, allied health, administration, IT, quality, supply chain and pharmacy). These stakeholders represent more of the "front-line" caregivers.
  - The purpose of the Surgical Tiger Team is to share best practices, identify areas for process improvements, disclose issues and problems at their respective hospitals and to work as a system to standardize and solve these issues.
  - The stakeholders were educated about the NQF medication measure. Brainstorming sessions ensued about how to improve documentation.
- **Reliable Care Blueprinting™** (RCB) committee was asked to address the preoperative beta blocker measure to ensure standardization across the system.
  - RCB's purpose is to streamline and standardize workflows across the THR system for our patients to achieve the best patient outcomes possible. Design teams agree upon critical things we must do for the patient, then design a workflow to achieve these critical elements.
  - The RCB Dashboard is used to gather data to measure our processes and adjust them for improved patient outcomes.
- **CareConnect Queries (CC) within our EPIC Electronic Health Record System were created.**
  - The preoperative beta blocker CareConnect query is a letter template asking the surgeon, and/or the nurse practitioner/physician assistant to clarify if the patient received a beta blocker prior to surgery or to document the reason a beta blocker was not given, if applicable.
    - These templates are sent within the patient's electronic health record (CC) so when the provider logs in, they will automatically be directed to that patient's medical record.
  - A concurrent review of the previous day's adult cardiac surgery procedures was performed and for each patient that did not have a preoperative beta-blocker or a contraindication documented, a query was sent to the surgeon, anesthesiologist, nurse practitioner and/or physician assistant asking for a contraindication addendum to be added to the medical record if appropriate.
  - If a reply within CC is not received within 5 days, the coordinator sends an email to the hospital's H&V director who then follows-up with the provider asking them to address their CC query.
- **Order Sets** are reviewed and revised every few years. The H&V Executive Quality Meetings and the Surgical Tiger Teams are the venues where discussions about desired changes occur. Final approval for revisions are given by the H&V Executive Quality Committee.
  - CABG order sets were revised to include, as a regularly scheduled medication, the administration of a preoperative beta blocker and included specific parameters to hold the beta blocker if indicated.







4 Results

- **Results from executive Quality/Technology meetings**:
  - The anesthesiologists revised their preop anesthesia template to address whether the beta blocker was given and if not a reminder to provide a contraindication.
  - The committee approved the revisions to the surgical order sets to include addressing the preoperative beta blocker and specifying parameters to hold the medication.
- **Results from Surgical Tiger Team meetings**:
  - Nursing informatics team worked with the clinical nurses to standardize the pre-procedure nursing flowsheet to include the date and time the preop beta blocker was taken/administered.
  - The OR nurses restructured the time-out check list to include ensuring documentation of the date and time the preoperative beta blocker was administered/taken by the patient prior to arrival or, when applicable, a contraindication is written in the chart.
- **Results from Reliable Care Blueprinting:**
  - Confirming preoperative beta blocker is addressed added to the CABG/Valve blueprint.
- **Results from CareConnect Queries:**
  - Surgeons, NPs/PAs are responding to the CareConnect Queries and providing contraindications where applicable.

Summary

Four of the 6 hospitals improved documentation of preoperative beta blockers as evidenced by an improvement of scores in the data summary portion of the STS Outcomes Reports and THR Analytical Reports. One hospital's scores dropped from 2017 to 2018. It is hypothesized that the reason for this decline is the retirement of the clinical nurse specialist who performed most of electronic health record reviews for preoperative beta blockers. One hospital had a pre-intervention score of 100% and maintained this perfect score throughout the interventional period.

5 Conclusion

Establishing and utilizing various communication avenues and tools for educating stakeholders about preoperative beta blocker requirements and eliciting multi-disciplinary collaborations for developing ways to improve documentation requirements is an effective approach for not only this type of improvement initiative, but for most quality improvement proposals. STS Registry Coordinators will continue to emphasize the importance of quality documentation regarding NQF perioperative medication domain requirements, especially focusing on charting a contraindication whenever a beta blocker is not indicated.

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The STS Adult Cardiac Risk Calculator: A Comparison of Clinician and Data Manager Risk Scoring

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Background

- The STS Adult Cardiac Surgery (ACS) Risk Calculator is a valuable clinical tool that can assess patient surgical risks at the point of care but relies on strict data definitions best known to STS ACS data managers (DM) to provide the most accurate prediction of risks.
- This quality improvement project seeks to assess the extent to which clinician and DM ACS risk scoring varies between the same patients within the 2018 STS ACS risk models (CABG, Valve, CABG+Valve).

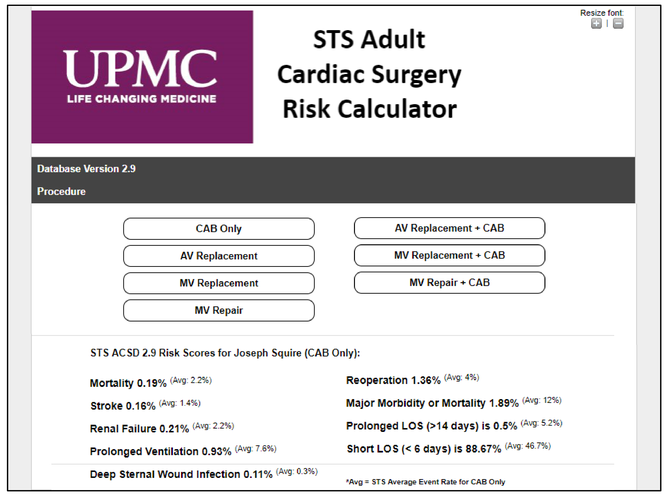
Objectives

- Capture clinician data from STS ACSD risk calculator
- Assess the differences in risk scoring between clinicians and Data Managers
- Build the foundation for more accurate risk assessment at the point of care

Methods

- An internal STS ACS Calculator was built using 2018 risk models on the Research Electronic Data Capture (REDCap) platform to capture clinician risk scoring data.
- Data was then retrospectively compared using a sample of 306 patients from a multi-site organization encompassing both urban, suburban, teaching and non-teaching hospitals .
- Comparison included clinician and DM risk variable agreement percentages and the average differences of predicted outcome percentages between the groups.

Clinician View of Internally Built Risk Calculator with Risk Scores



Principal Findings

Table 1. Differences in Predicted Outcome Percentages; Clinician scoring compared to STS ACSD Data Manager scoring

Predicted Outcome*	STS ACSD Data Manager Overall Average Risk Score	Clinician Overall Average Risk Score	Absolute % Difference (Clinician Scoring - DM Scoring)	Relative % Difference ((Clinician Scoring -DM Scoring)/DM Scoring)
Mortality	2.08%	1.82%	-0.26%	-12.37%
Deep Sternal Wound Infection	0.208%	0.202%	-0.006%	-3.00%
Reoperation	2.77%	2.60%	-0.17%	-6.15%
Permanent Stroke	1.38%	1.17%	-0.21%	-15.09%
Prolonged Ventilation	8.06%	7.43%	-0.62%	-7.75%
Renal Failure	1.99%	2.12%	0.13%	6.56%
Morbidity and Mortality	12.23%	11.61%	-0.62%	-5.08%

**Includes all STS ACSD Risk Modeled Procedures (CABG, Valve and CABG+Valve Catergories)*

Table 2. Comparison of Risk Factors Entered by Clinicians versus STS ACSD Data Mangers and their Overall Agreement

Variable	Agreement
Medications	
ACEI within 48 hours of Incision	78.43%
ADP within 5 days of Incision	94.44%
ADP Disconinutation in Days Prior to Incision	21.74%
Beta Blocker within 24 hours of Incision	86.27%
Glycoprotein Inhibitor within 24 hours of Incision	99.35%
Inotropes within 48 hours	99.35%
Steroids within 24 hours of Incision	97.71%
Demographics	
Age	98.04%
Gender	99.35%
Ethnicity (Hispanic)	99.35%
African American	99.35%
Asian	99.35%
Native American	99.35%
Pacific Islander	99.02%
Primary Payor	42.16%
Secondary Payor	10.13%
Measurements/Labs	
Creatinine	38.89%
Platelet Count	33.01%
White Blood Cell Count	35.29%
Height	56.54%
Weight	22.22%
Hemodynamics	
Ejection Fraction (within 5% variation)	75.49%
Coronary Anatomy Disease Known	94.44%
Left Main Stenosis	89.47%
Number of Diseased Vessels	81.58%
Proximal Left Anterior Descending Stenosis	70.07%
Aortic Valve Insufficiency	78.76%
Aortic Valve Stenosis	95.75%
Mitral Valve Insufficiency	65.69%
Mitral Valve Stenosis	94.12%
Tricuspid Valve Insufficiency	69.28%
Arryhthmia	92.81%
Second Degree Block	71.79%
Ventricular Fibrillation/Ventricular Tachycardia	70.51%
Complete Heart Block	67.95%
Sick Sinus Syndrome	71.79%
Atrial Flutter	65.38%
Atrial Fibrillation	45.00%
Atrial Fibrillation Type	71.79%

Variable	Agreement
Patient History/Current State	
Alcohol Use	67.97%
Cancer within 5 years	95.42%
Cardiac Symptoms at Time of Admission	49.67%
Cardiogenic Shock	99.35%
Cerebral Vascular Disease	88.89%
CVA	46.67%
CVA Timing	73.68%
TIA	46.67%
Carotid Stenosis	34.85%
Carotid Stenosis RIGHT	25.00%
Carotid Stenosis LEFT	20.00%
Previous Carotid Artery Surgery	88.33%
CHF	80.39%
NYHA Class	18.32%
CHF Timing	27.48%
Chronic Lung Disease	84.97%
Diabetes	93.46%
Diabetes Control	72.73%
Dialysis	99.02%
Endocarditis	98.69%
Endocarditis Type	33.33%
Family History CAD	80.72%
Home O2	97.39%
Hypertension	90.85%
Illicit Drug Use	96.73%
Immunosuppressed	94.77%
Liver Disease	98.37%
Mediastinal Radiation	97.39%
Peripheral Arterial Disease	95.42%
Pneumonia	74.51%
Previous Cardiac Intervention	92.48%
Previous CABG	75.93%
Previous Valve	73.15%
Previous Valve Proc1	66.67%
Previous Valve Proc2	50.00%
Previous PCI	81.48%
Previous PCI Interval	82.02%
Previous PCI When	64.04%
Previous Other Cardiac Intervention	70.37%
Previous Other Cardiac Intervention Proc1	35.29%
Previous Other Cardiac Intervention Proc2	23.53%
Previous MI	74.51%
Previous MI Timing	35.71%
Resuscitation	99.67%
Sleep Apnea	91.50%
Syncope	97.39%
Tobacco Use	85.95%
Unresponsive State	100.00%
Incidence	99.02%
Status of Surgery	77.78%

Agreement less than 80% is highlighted in red

Results

- Clinicians generally underscored patient risks when compared to DM scores with predicted mortality and stroke having the highest relative differences between the groups (-12.37% and -15.09% respectively) (Table 1).
- Individual risk factors showed wide variability in agreement between DMs and clinicians with 51% of variables scoring below 80% agreement (Table 2).

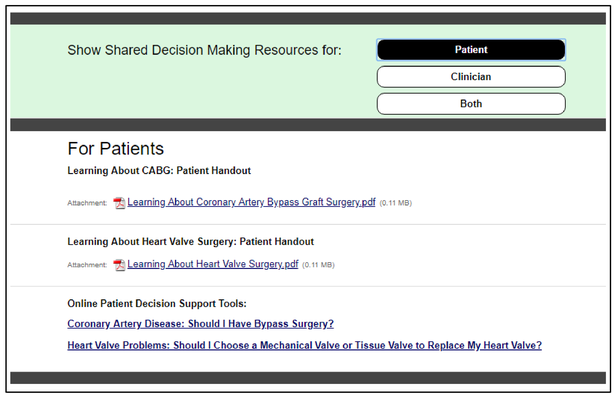
Conclusions

- Differences in risk scoring between clinicians and DMs on the same patients demonstrate a gap in accurate patient risk scoring.
- This gap may ultimately impact patient safety and outcomes both at the point of care and in estimating risk adjusted outcomes in STS feedback reports. Causality of these difference has not been determined and investigation into the variances is warranted.

Future Directions

- Assess causality of differences in risk factor agreement rates
- Development of education sessions focused on reducing risk factor agreement variability
- Automated transfer of data from calculator into STS ACSD data entry tool for Data Manager validation
- Automated population of data into the calculator from the EHR
- Development of a formal shared decision making process where the calculator will serve as a delivery vehicle for materials

Preliminary Shared Decision Making Efforts on Internally Built Risk Calculator



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DISCLOSURES: THE AUTHORS HAVE NO DISCLOSURE OR CONFLICTS OF INTEREST

The Aortic Worksheet:
Enhancing Data Manager Efficiency and Surgeon Compliance

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Background

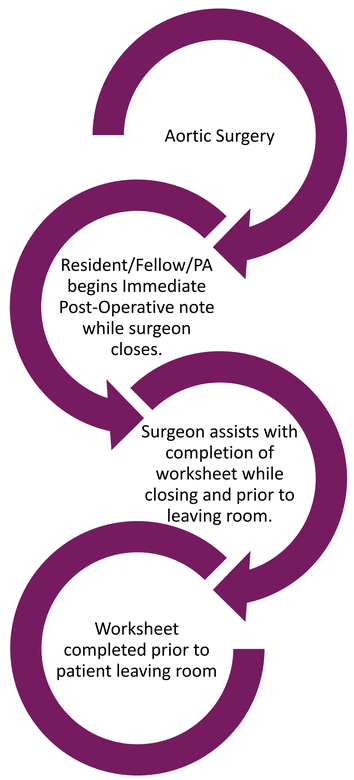
- With the STS Adult Cardiac Surgery Database (ACSD) upgrade to version 2.9, the Aorta Section was added presenting the need to abstract this data effectively and efficiently to reduce increased burden on data managers.
- The aim of this quality improvement project was to develop a logic driven electronic version of the Aortic Worksheet and seamlessly fit it into the clinical workflow across a multi-site institution. Facilitation of surgeon compliance and ensuring that affected case abstraction was efficient and thorough were also top priorities.

Objectives

- Seamlessly fit STS Aortic Worksheet into clinical workflow
- Design a process that facilitates surgeon compliance in filling worksheet out
- Increase efficiency for Data Mangers in abstraction of aortic procedures

Methods

- Support was gathered from surgeon leadership to create an electronic version of the Aortic Worksheet
- Clinical workflow was assessed in the operating room
- The Immediate Procedure note was identified as an opportune place to seamlessly insert the worksheet.
- Parent/child logic was used to condense the worksheet for better-quality viewing and workability within the Immediate Procedure note.
- The worksheet completion process was standardized by training Physician Assistants in how to utilize the worksheet and assist the surgeon in completing it at the end of surgery.

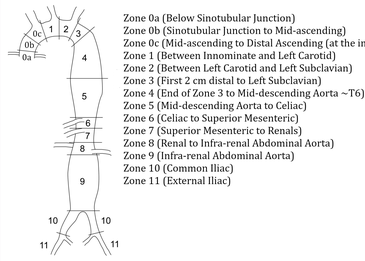


Worksheet Design

Aortic Worksheet, Clinician Entry View

Aorta Surgery Worksheet	
	Aorta Surgery Worksheet ⓐ / ⓑ / ⓒ / ⓓ / ⓔ / ⓕ / ⓖ / ⓗ / ⓘ
Procedure Location	Right Click for Reference Information / Aneurysm / Dissection / Open Descending Thoracic Aorta or Thoracoabdominal Procedure / Endovascular Procedures
Presentation	Aneurysm+ / Endoleak+ / Dissection+ / Infection+ / Trauma+
Root Etiology	Aorto-annular ectasia / Asymmetric Root Dilation+ / Sinus of Valsalva aneurysm+
Aortic Arch Type:	Right / Left / Aberrant subclavian+ / Kommerell / Bovine / Variant vertebral origin / Patent IMA bypass graft
Ascending Aorta	Asymmetric Dialation / Proximal coronary artery bypass graft
Intervention	Planned stage hybrid / Open Procedure+ / Arch Branch Reimplantation+
Open Descending Thoracic Aorta or Thoracoabdominal Procedure	Intercostal reimplantation / Visceral vessel intervention+
Endovascular Procedure ->	
	Endovascular Procedure
Intra-Op (Check all that apply) ->	Spinal drain placement: Pre-Aortic procedure / Post-Aortic procedure
	IntraOp Motor Evoked Potential: Yes+ / No
	IntraOp Somatosensory Evoked Potential: Yes+ / No
	IntraOp EEG: Yes+ / No
	IVUS Performed IntraOp
	IntraOp Transcutaneous Doppler Performed IntraOp:
	IntraOp Angiogram: Volume of Contrast === mL / Fluoro time === min

Reference Image Embedded in Worksheet



Zone 0a (Below Sinotubular Junction)
Zone 0b (Sinotubular Junction to Mid-ascending)
Zone 0c (Mid-ascending to Distal Ascending (at the innominate artery))
Zone 1 (Between Innominate and Left Carotid)
Zone 2 (Between Left Carotid and Left Subclavian)
Zone 3 (First 2 cm distal to Left Subclavian)
Zone 4 (End of Zone 3 to Mid-descending Aorta ~T6)
Zone 5 (Mid-descending Aorta to Celiac)
Zone 6 (Celiac to Superior Mesenteric)
Zone 7 (Superior Mesenteric to Renals)
Zone 8 (Renal to Infra-renal Abdominal Aorta)
Zone 9 (Infra-renal Abdominal Aorta)
Zone 10 (Common Iliac)
Zone 11 (External Iliac)

The aortic worksheet was developed within ***Cerner Powerchart*** as a ***PowerNote.*** Parent/child logic was used to hide fields that did not need filled out by the clinician unless the hidden fields were opened by an answer the clinician provided. This reduced the perceived length of the worksheet and confusion surrounding what fields needed filled out and what fields did not.

Aortic Worksheet, Completed View
with Immediate Post-Operative Section

Operative Information

PATIENT NAME: [redacted]
FIN: [redacted]
CASE NUMBER: [redacted]
SURGERY START: [redacted]
SURGERY STOP: [redacted]

PRE-OP DIAGNOSIS: thoracic aortic aneurysm
POST-OP DIAGNOSIS: thoracic aortic aneurysm

PRIMARY SURGEON: [redacted]

ASSISTANT(S): [redacted] Resident, Surgical

PROCEDURE: STERNOTOMY
CARDIOPULMONARY BYPASS
RESECTION / REPAIR ASCENDING AORTIC ANEURYSM (primary)

ANESTHESIA: General

SPECIMENS: 1. sebacous cyst

TUBES AND DRAINS: Blake
Blake

ATTENDEE(S): [redacted] Anesthesiologist, Primary
[redacted] CRNA, Relief

Postoperative Information
Estimated Blood Loss: 750 ml.
Findings: Ascending aortic replcaement and hemiarch (28 mm Vascutek), DHCA, RCP

Blakes x2 (mediastinal and right pleural)
A and V wires
A paced at 80
Cell saver - 675 ml.

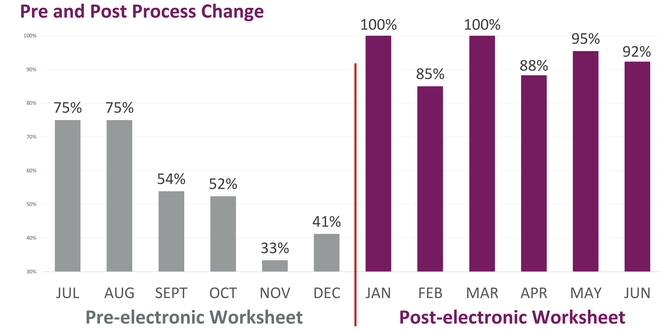
Aorta Surgery Worksheet
Procedure Location: Aneurysm: Aneurysm- Location (Zone 0a, Zone 0b, Zone 0c).
Presentation: Aneurysm: Etiology (Atherosclerosis), Type (Fusiform), Rupture (No).
Root Etiology: Aorto-annular ectasia.
Aortic Arch Type:: Left.
Ascending Aorta: Asymmetric Dialation.
Intervention: Open Arch Procedure: Distal Technique+ (Open), Site (Hemiarch), Extension (No).
Intra-Op:
IntraOp Motor Evoked Potential: Yes+, Documented Abnormailty (No).
IntraOp Somatosensory Evoked Potential: Yes, Documented SEP Abnormality (No).
IntraOp EEG: Yes, Documented EEG abnormaility+ (No).

Professional Services
Credentials Title and Author
Credentials: MD.
Title: Fellow.
Supervising MD: [redacted]

Results

- Compliance rates for completing the Aortic Surgery worksheet increased from 50.56% overall in the six months leading up to implementation to 92.55% overall in the six months following implementation of the electronic process.
- Also, with this change in process, the aortic worksheet is now found in the same place, every time, enhancing data manger efficiency by removing the need to search through scanned documents that was posed by the former process.
- Additionally, essential fields on the aortic worksheet were thoroughly abstracted for all cases without the data manager needing to follow up with the surgeon for clarity, further enhancing abstraction efficiency.

Aortic Worksheet Completion Rate
Pre and Post Process Change



Conclusions

- By focusing on seamlessly integrating the aortic worksheet into clinical workflow and partnering with key clinicians, compliance greatly increased followed by data manager efficiency. Future work will entail the automation of this data into the STS ACSD registry.

Future Directions

Automatic transfer of data entered into the aortic worksheet to the STS ACSD registry vendor tool

Issues Encountered During Implementation

- Multi-Site participation saw poorer initial use of electronic aortic worksheet at sites that did not perform many aortic surgeries
- As new fellows and residents came through the teaching sites, initial completion rates would drop as the new clinicians did not know about the process change.

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STS Predicted Risk of Isolated CABG: when is a CABG not a CABG?

Samantha Nemeth, MA, MPH; Columbia University, NYC, NY

Background/Methods

- The STS has well-validated risk models for a variety of postoperative outcomes across 7 procedure groups, one being Isolated CABG. However, the Isolated CABG group is an umbrella term; patients may also have other procedures and still be considered an Isolated CABG and get a predicted risk score (See Table 1).
- Although the 2.9 STS risk models now account for ECMO, IABP, and catheter-based assist devices [group (3) High-Risk CABG+Other], the question remains whether current risk models adequately adjust for the group (4) Low-Risk CABG+Other.
- If group (1) CABG Only and group (4) Low-Risk CABG+Other are accurately represented by the current STS risk scores, then patients with similar predicted risks in both groups should have similar proportions of outcomes.
- The morbidity/mortality risk model was chosen to be evaluated as it has the most incidences.
- Using July 2014—Dec 2018 STS data from a diverse, 13 hospital network, we compared Morbidity/Mortality between group (1) CABG Only (n=6,412) and group (4) low-risk CABG+Other (n=998) cases.
- Propensity score matching (PSM) using 3:1 nearest neighbor matching with a 0.25 caliper with group designation as the dependent variable and predicted risk of Morbidity/Mortality and surgical year as the independent variables was performed.
- These well-matched groups were compared via the Chi-Squared test.

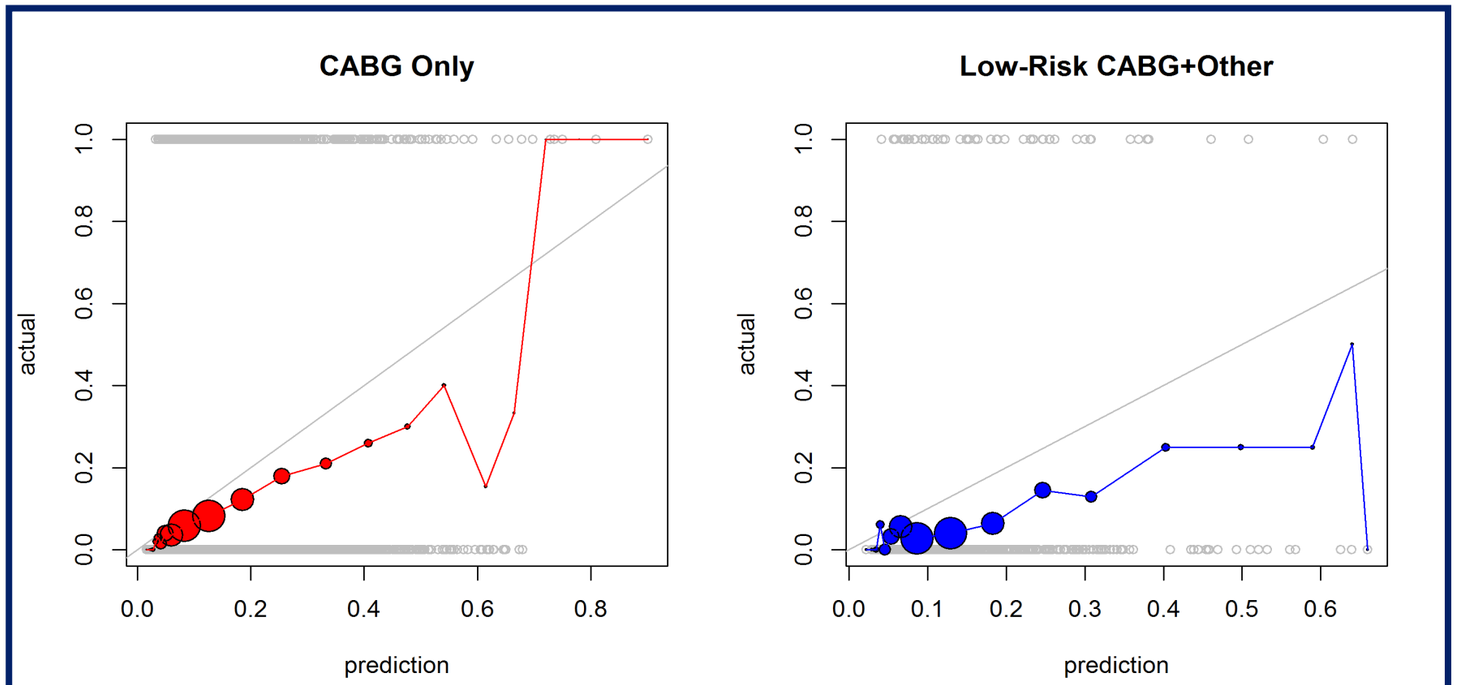
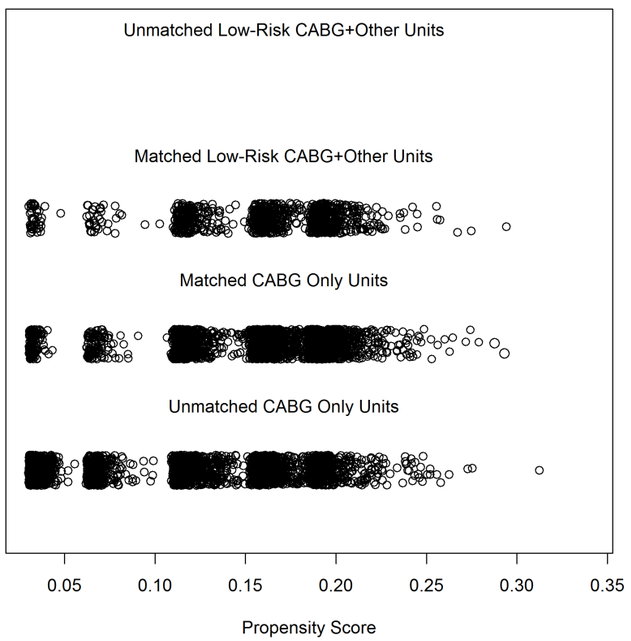


Table 1: Types of Cases that are included in STS Isolated CABG Group

Group	Definition	Shortname	N(%)
(1)	Only had a CABG	CABG Only	6,412
(2)	Had a CABG and unplanned procedure due to surgeon complication	CABG+Unplanned	4
(3)	Had a CABG and certain higher-risk other cardiac procedures including VAD, ECMO, IABP, and Catheter-based assist device	High-Risk CABG+Other	783
(4)	Had a CABG and certain lower-risk other cardiac procedures including epicardial atrial fibrillation, ICD, atrial appendage procedure, etc.	Low-Risk CABG+Other	998
Total	Isolated CABG	Isolated CABG	8,197

Table 2: Predicted Risk of Morbidity/Mortality Unmatched and Matched Groups

	Unmatched		Matched		
Group	No M/M N (%)	M/M N(%)	No M/M N (%)	M/M N(%)	P-value
(1)	5,860 (91.39%)	552 (8.61%)	2,741 (93.45%)	252 (8.42%)	0.002
(4)	942 (94.39%)	56 (5.61%)	942 (94.39%)	56 (5.61%)	



Conclusion/Next Steps

The current risk models are not well-calibrated for low-risk CABG+Other cases in our cohort. This result warrants further research in a larger dataset to determine whether these findings are site-specific or can be generalized to the STS population. Perhaps weights given to previously identified risk factors may be different for low-risk CABG+Other cases than for CABG Only or perhaps additional fields may better account for the difference between the two groups.

**The author has no disclosures*

Early Extubation after Isolated Coronary Artery Bypass Surgery:
Keep your Eyes on the Prize

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MUNSON HEALTHCARE

BACKGROUND

Early extubation has been reported to promote earlier mobility and return of native respiratory function as well as decreased ventilator associated complications, strain on hospital resources, and overall medical costs. The use of ventilator communication logs had previously been trialed at our center as part of a quality initiative project in 2014 and 2015.

As the care team moved forward with new quality initiatives in 2016, the ventilator logs were abandoned. By the end of 2016, the early extubation rate among isolated CAB patients at our center decreased to 25.6% while the Society of Thoracic Surgeons national average steadily improved.

METHODS

In early 2017, ventilator logs were redesigned and reinstituted within the CICU following education to the entire care team. The logs were designed to track the patient's progress toward extubation every two hours through hemodynamic stability, level of consciousness, medications, and respiratory status.

The information obtained was then analyzed to identify barriers to early extubation and re-education was provided. Successes and barriers were tracked on a scorecard and discussed monthly with the multidisciplinary team.

CTS Ventilator Extubation Log
(for all heart surgery patients)

Patient Sticker

Date:
Time out of OR:
Temperature on arrival:
Sedation meds on arrival:

Order not to extubate? Yes No
ATS Given? Yes No Amount ml

Extubation Barrier	2 Hours	4 Hours	6 Hours	8 Hours
Actual time to check…				
Temperature				
Hemodynamically stable? If NO, why?				
Drips				
LOC/Strength				
Respiratory Status (FiO2, weaning parameters, communication with RT)				

Immediate post-op pain/anxiety/sedation medications administered at the bedside:

Medication	Time	Dose/Route

Medication	Time	Dose/Route

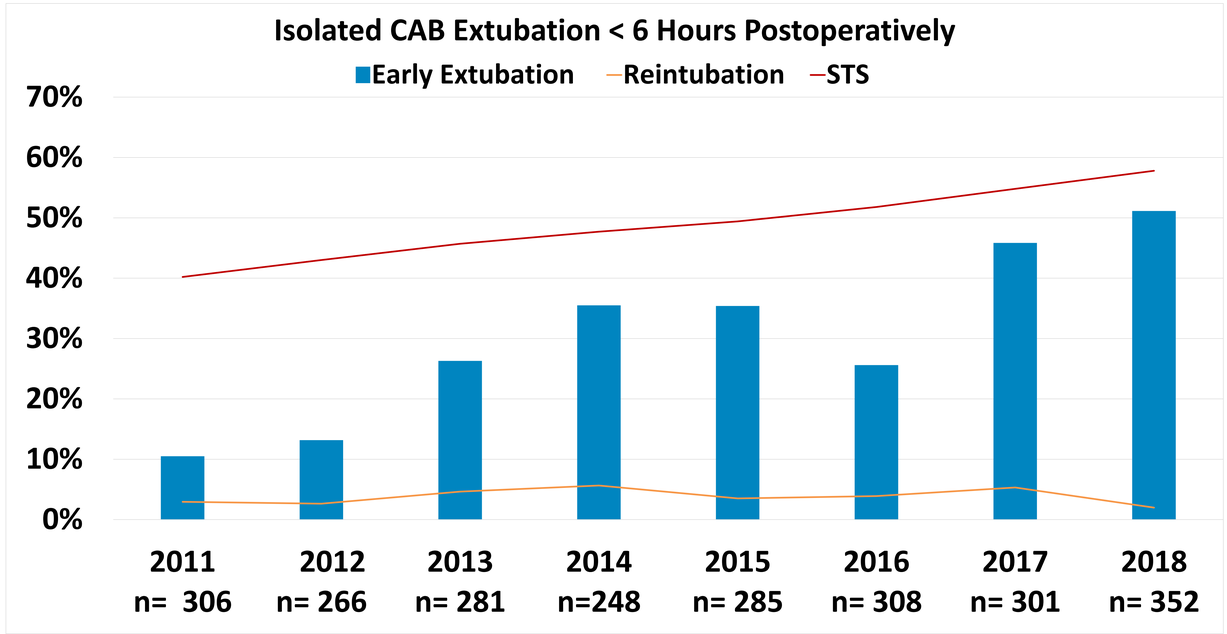
Time of Extubation:
Total Time Intubated:
If > 24 hrs – state primary barrier to extubation:

Name of Nurse:
Name of RT:
Anesthesia Provider:

	2018					
Indicators	Q1	Q2	Q3	Q4	Rolling YTD	Goal
Initial Extubation <6hrs	51.3%	54.3%	52.2%	48.3%	52.0%	55.0%

RESULTS

Ventilator logs were completed on 82.6% of isolated CAB cases in 2017 and 2018.The early extubation rate improved from 25.6% (79/308) in 2016 to 51.4% (180/352) in 2018 p<0.01.



CONCLUSION

Enhancing team communication with the use of ventilator logs resulted in a significant increase in the rate of early extubation without negatively impacting reintubation rates when used consistently. Results were not sustained when monitoring, feedback, and team discussions were withdrawn.

Routine monitoring of successful quality improvement projects can ensure sustainability of results. without associated increases in reintubation rates.

THE BELL-LATHAM MEMORIAL FUND

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Improving Pump Thrombosis Identification, Communication, and Reporting

Geralyn Lerg MS, RN, AGCNS, CPTPC

SPECTRUM HEALTH

Background

- In 2018, our VAD program began a project aimed to reduce pump thrombosis (PT) rates for our patients with a durable VAD. Through this work the team discovered opportunities in identification, communication and reporting of PT
- Initiation of new interventions to reduce PT was halted when the team discovered the need to confirm baseline PT rates
- At the start of the project, the abstraction for STS Intermacs was overseen by the site coordinator. Therefore, there was a perceived lack of transparency and understanding of the registry data

Aim

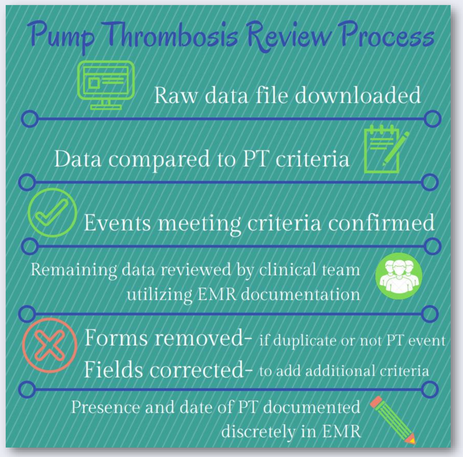
- To determine the true pump thrombosis rate in our VAD program to:
  - Improve the accuracy of data and the registry
  - To have accurate baseline data for any future improvements aimed at reducing pump thrombosis in our patients
- Sub-aim: To improve the integrity of ongoing data entry in the STS Intermacs registry and improve communication and transparency of center data within STS Intermacs

Methods

- Pump thrombosis events were confirmed through an in-depth clinical review
  - PT events reported to STS Intermacs from the start of the program (2009) to present were reviewed utilizing center specific STS Intermacs live data download, the electronic medical record (EMR), and PT adverse events definitions by the program quality manager/clinical nurse specialist
  - The number of reported PT events was recorded prior to the start of the review
  - Confirmed and erroneous events were tracked during the clinical review process

Interventions

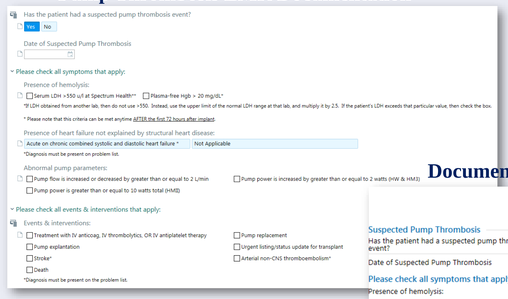
- PT event information was compared to the STS Intermacs PT adverse event criteria and confirmed in the EMR
- Unclear, potentially overreported, or duplicate events were reviewed with the VAD team and medical director
- Team collaborated with STS Intermacs nurse monitor for definition clarification and to confirm process for revision to data was appropriate
- After confirmation of each event as “true” or “not true,” events were deleted or amended in STS Intermacs accordingly
- Corrections in STS Intermacs were confirmed by comparing the project report and a current PT report through the live data download function
- Confirmed PT events were documented in the newly developed EMR PT flowsheet



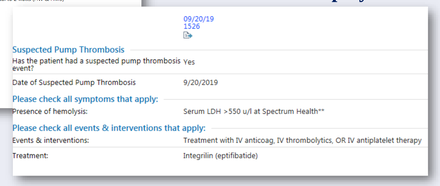
Additional Interventions

- Additional interventions were completed in an effort to meet the sub-aim:
  - Movement of STS Intermacs registry oversight (site administration) to the VAD & Transplant Quality Manager
  - Registry abstractor role was moved to report to the VAD & Transplant Quality Manager (new hire)
  - VAD coordinators were trained in STS Intermacs abstraction to:
    - Improve coordinator understanding of STS Intermacs definitions to enhance communication and documentation
    - Fill abstraction gap during hiring of abstractor
    - Provide back-up to the abstractor
- EMR documentation for PT was created to align with the STS Intermacs criteria in an effort to make diagnosis of PT and definition criteria discrete

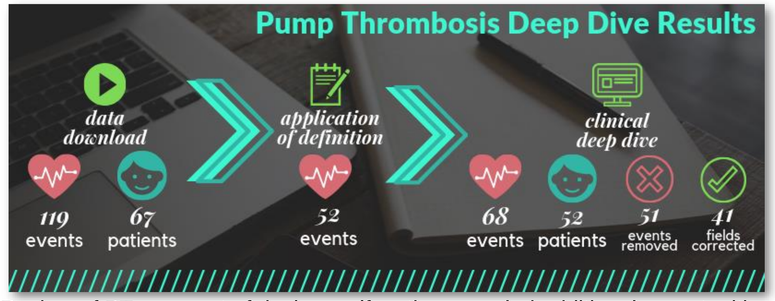
Pump Thrombosis EMR Documentation



Documentation Flowsheet Display



Results



- Review of PT as a part of device malfunction revealed additional opportunities to improve accuracy of reporting for other adverse events

Discussion

- The team was able to identify key strategies to refine the documentation and abstraction of PT to improve the integrity of registry data
- Accurate registry data was then used to inform the team on the need for improvement work around PT
- Re-evaluation of data showed our center has PT rates comparable to national benchmarking.
  - Prevented unnecessary quality improvement work
  - Prevented initiation of interventions intended to reduce PT rates that could have led to adverse events outcomes (such as bleeding) for our patients

Conclusion

- STS Intermacs relies on the accuracy of manually entered data and is a key source for evidence-based inquiry
- A robust process to identify, document, and communicate adverse events that aligns with registry criteria is essential to achieving reliable registry data
- Teams should consider having processes in place to:
  - Evaluate and improve the accuracy of baseline data, especially prior to developing interventions aimed at improving a metric
  - Promote communication and transparency between the clinical team and database abstractor to improve the integrity of the data
  - Provide oversight of registry data entry- separate abstractor and site admin role

Thank you to the Spectrum Health VAD and VAD & Transplant Quality Teams

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Author has no financial or regulatory disclosures

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A Collaborative Approach to Improving Preoperative Beta-blocker Therapy Compliance on CABG Patients

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Milagros Masri, PA-C
Leandro Dimi, RRT

Background

The care of patients undergoing coronary artery bypass grafting (CABG) involves orchestration of efforts from the preoperative, intra-operative, and post-operative periods. Part of preoperative care is beta-blocker (BB) therapy. Prophylactic BB therapy had been a National Quality Forum (NQF)-endorsed measure since 2007 for patients undergoing CABG.

Prophylactic BB can decrease post-operative supraventricular and ventricular arrhythmias and reduce the possibilities of negative outcomes i.e., prolonged length of stay and increased hospital cost. Although some studies prove otherwise, our goal was to improve compliance to meet the measure and promote collaboration among our team members.

Problem

In June, 2017, there was 85.7 % compliance on use of evidenced-based perioperative medications for our CABG patients. Upon review, majority of the failure (95.1%) was preoperative BB therapy. We identified an opportunity for improvement to increase compliance.

Plan

The team's goal was to improve compliance to pre-operative BB therapy to meet standards of care for this patient population by establishing a process improvement initiative through a collaborative approach among our team members.

Do/Study

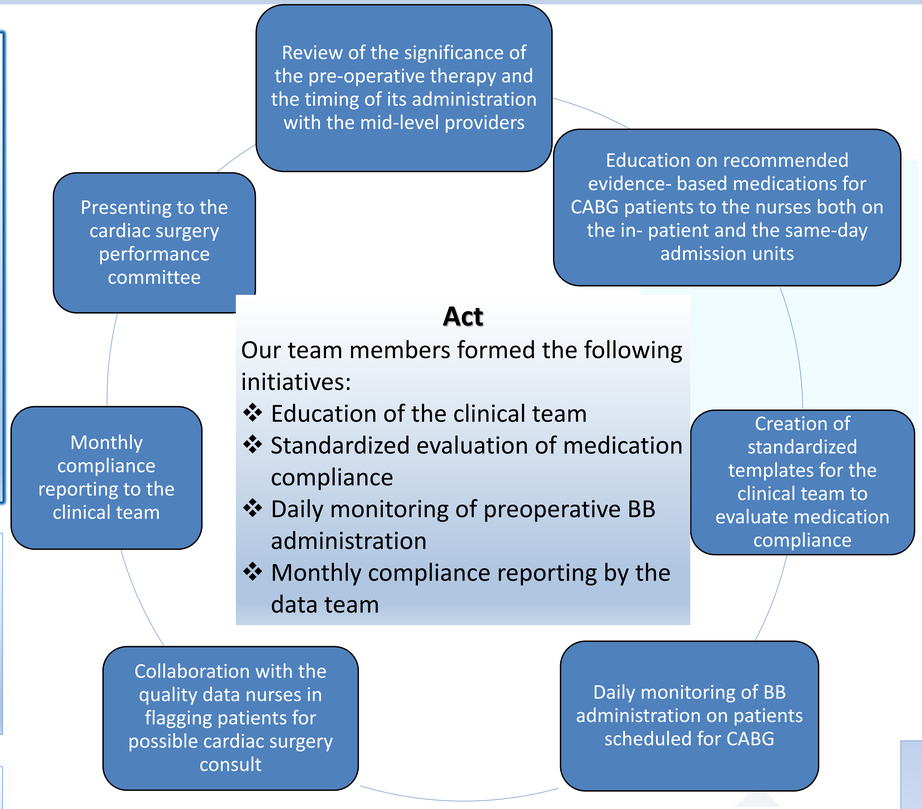
We reviewed our data set on perioperative medications for our CABG patients for trends and variances. The data review process revealed:

- The prescribing and timeliness of pre-operative beta blockade therapy was inconsistent.
- Contraindications to recommended medications were not consistently documented by the providers.

Act

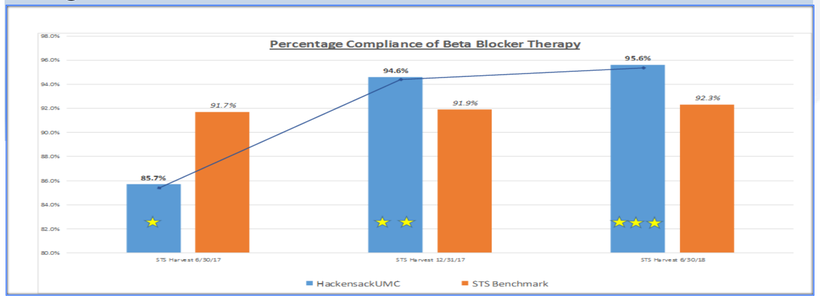
Our team members formed the following initiatives:

- Education of the clinical team
- Standardized evaluation of medication compliance
- Daily monitoring of preoperative BB administration
- Monthly compliance reporting by the data team

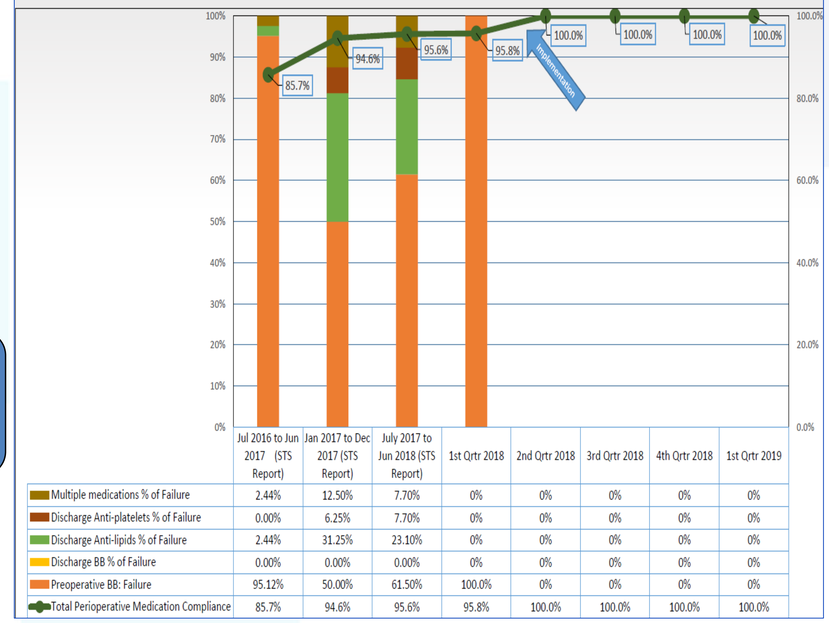


Result

Since implementation in April, 2018, our pre-operative BB therapy and all perioperative medications consistently met 100% compliance. Our organization now performs above STS benchmark and our cardiac surgery program has achieved an overall 3-star rating as of 2018.



Perioperative Medication Compliance and Failures



	Jul 2016 to Jun 2017 (STS Report)	Jan 2017 to Dec 2017 (STS Report)	July 2017 to Jun 2018 (STS Report)	1st Qrtr 2018	2nd Qrtr 2018	3rd Qrtr 2018	4th Qrtr 2018	1st Qrtr 2019
Multiple medications % of Failure	2.44%	12.50%	7.70%	0%	0%	0%	0%	0%
Discharge Anti-platelets % of Failure	0.00%	6.25%	7.70%	0%	0%	0%	0%	0%
Discharge Anti-lipids % of Failure	2.44%	31.25%	23.10%	0%	0%	0%	0%	0%
Discharge BB % of Failure	0.00%	0.00%	0.00%	0%	0%	0%	0%	0%
Preoperative BB: Failure	95.12%	50.00%	61.50%	100.0%	0%	0%	0%	0%
Total Perioperative Medication Compliance	85.7%	94.6%	95.6%	95.8%	100.0%	100.0%	100.0%	100.0%

Conclusion

Collaboration between the data team and the clinicians to share real-time data and relevant outcomes can lead to objective decision-making and affect process change in a timely manner. This process can be applied to other aspects of patient care.

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No disclosure or COI to declare

Hackensack Meridian *Health*
Hackensack University Medical Center

STS National Database™
Participant 2019

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Improving Performance on the STS Isolated CABG Quality Metric for Pre-operative Beta Blockade Across Multiple Campuses

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NewYork-Presbyterian, New York, Department of Analytics

Background

NewYork-Presbyterian performs cardiac surgery at several campuses. Data from The Society of Thoracic Surgeons (STS) indicate improvement opportunities in prescribing, administering, and documenting pre-operative beta-blocker (BB) medications to CABG patients. According to the American Heart Association, "All CABG patients should be prescribed perioperative BB therapy to prevent postoperative atrial fibrillation, ideally starting before surgery, unless contraindicated" (ACCF/AHA, 2011). Furthermore, this process measure is endorsed by the National Quality Forum (NQF) and impacts publicly-reported STS star ratings (part of the medication bundle, which accounts for 3% of the star rating calculation). We have identified that our organization has struggled to meet or exceed the STS Benchmark. A previous improvement effort conducted retrospective reviews of all CABG procedures performed monthly and/or quarterly to verify accuracy in data abstraction. It was somewhat successful, but it was not sufficient to reach the STS benchmark.

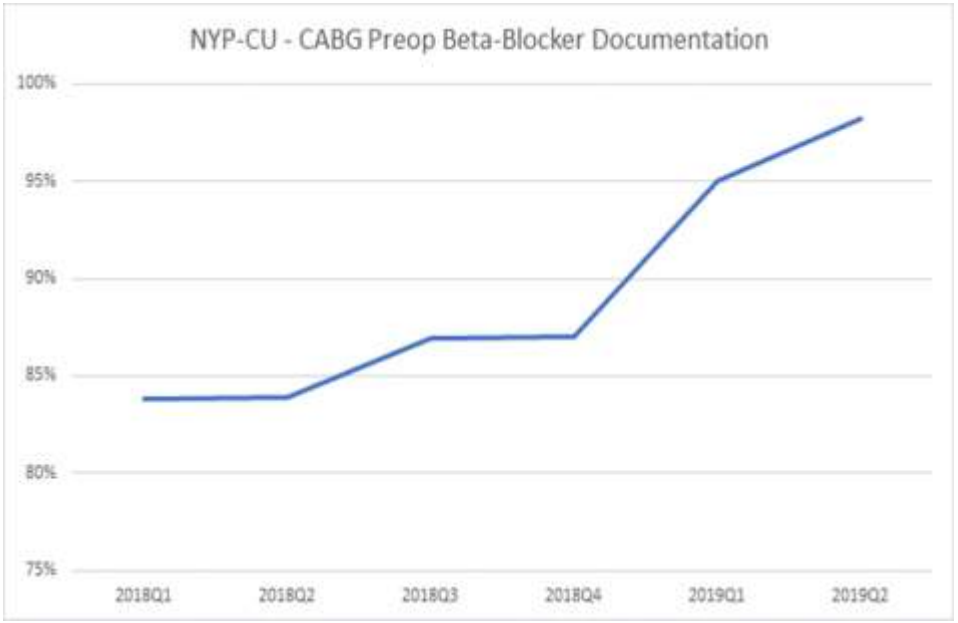
Methods

Our campuses currently utilize different electronic medical record systems, rendering standardization difficult. With standardization limits at multiple campuses, we had to refrain from silo-abstraction.

- Beginning in April 2019, NewYork-Presbyterian/Columbia University Irving Medical Center was used as the pilot campus
- Claims data was used to capture isolated CABGs weekly while patients are still in-house
- Reviewed lists of BB failures, alerting providers to lapses in documentation and ruling out contraindications
- Continued retrospective reviews as necessary

Results

These efforts have resulted in pre-operative BB improvements for the pilot campus. NewYork-Presbyterian/Columbia University Irving Medical Center went from a 5% failure rate in Q1 2019 (n= 92) from retrospective review alone to a 1.7% failure rate (n=116) by reviewing current in-house CABG patients in Q2 2019.



Conclusion/Next Steps

While we expect our STS Star Ratings to improve with these changes, our ultimate goal is to achieve 100% compliance in an effort to improve patient outcomes. These interventions are tracked weekly to ensure long-term compliance and cultural change. NewYork-Presbyterian/Weill Cornell Medical Center and newly joined sites, NewYork-Presbyterian Brooklyn Methodist Hospital and NewYork-Presbyterian Queens, began implementing these efforts with July 2019 procedures and expect to achieve similar improvements.

Weill Cornell Medicine NewYork-Presbyterian ColumbiaDoctors

Has v2.9 Solved the Mystery of 'Other' Readmissions?

Melissa Clark RN MSN, Jaelene Williams RN MS, David Grix CCP-Emeritus, Chris Bond MBChB, Richard L. Prager MD

For the MSTCVS Quality Collaborative

BACKGROUND

We previously reported that 31.3% (338/1,081) of isolated coronary artery bypass graft (CABG) readmission reasons in the state of Michigan were coded as Other in the STS v2.81 Adult Cardiac Surgery Database (ACSD). **We hypothesized the addition of more specific readmission reasons in v2.9 would decrease this rate, revealing opportunities for targeted quality improvement initiatives.**

METHODS

The Michigan Society of Thoracic and Cardiovascular Surgeons Quality Collaborative (MSTCVS-QC) database was queried and CABG records from January 1, 2015 - December 31, 2016 (v2.81) were compared to records from July 1, 2017 – December 31, 2018 (v2.9). In patients readmitted within 30 days of discharge, coding of primary reason was reviewed.

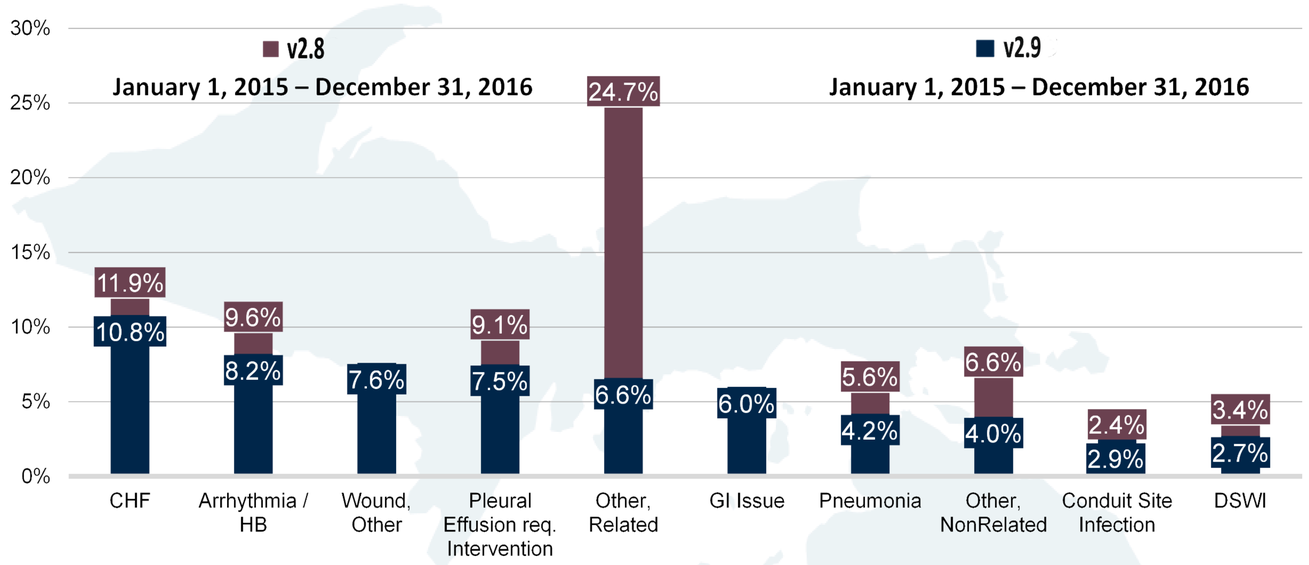
RESULTS

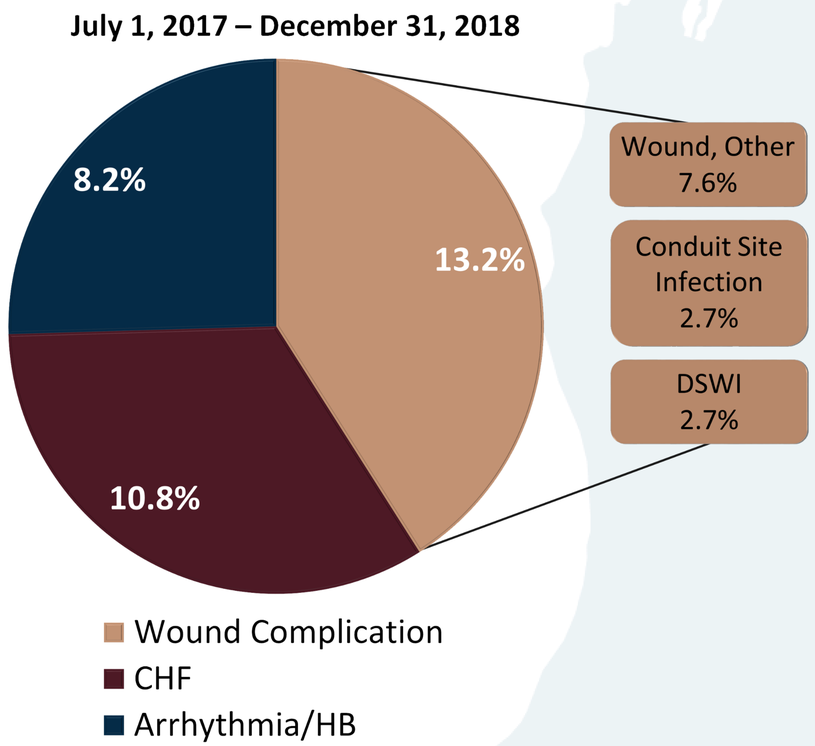
- During the study period, 1,909/18,634 (10.2%) CABG patients were readmitted.
- Following upgrade to STS v2.9 on July 1st 2017, the proportion coded as Other decreased from 31.3% (n=338) to 10.6% (n=88).
- 19.9% (n=165) of readmissions fell into new v2.9 categories of wound, GI issue, sepsis and non-cardiac chest pain
- **Analysis of the categories demonstrated wound complications are the leading cause of CABG readmission in our state.**

CONCLUSION

The addition of more specific reasons for readmission in the STS v2.9 ACSD has decreased the number of records coded with a readmission reason of Other in the MSTCVS-QC database from 31.3% to 10.6% ($p<0.001$). The addition of these new categories allows for a more focused review of reasons for readmission and can help identify areas for quality improvement.

REASONS FOR READMISSION IN MICHIGAN





Support for the Michigan Society of Thoracic and Cardiovascular Surgeons Quality Collaborative is provided by Blue Cross and Blue Shield of Michigan and Blue Care Network as part of the BCBSM Value Partnerships program. Although Blue Cross Blue Shield of Michigan and MSTCSV Quality Collaborative work collaboratively, the opinions, beliefs and viewpoints expressed by the author do not necessarily reflect the opinions, beliefs and viewpoints of BCBSM or any of its employees.

For more information about the MSTCVS Quality Collaborative and its quality initiatives, please contact the MSTCVS Coordinating Center 734-998-5918

Creating an Interactive Cardiothoracic Dashboard to Improve Outcomes

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Lisa Wells, RN, BS, Janet Kaminsky, RN, BS, Ailene Agtarap, RN, BSN, Paul Ventiquattro, MS

Stony Brook Medicine, Stony Brook New York

ADVANCES IN QUALITY & OUTCOMES: A Data Managers Meeting
October 23-25, 2019 ✣ New Orleans Marriott

Background:

- Stony Brook University Hospital is a 603 bed Level One Trauma Center, the only Academic Medical Center in Suffolk County, Long Island New York and home to the Stony Brook University Heart Institute
- SBM joined the STS Adult CT Surgery registry in 2012, but never publically reported data
- The Chair of CT Surgery and Hospital Leadership set a goal to publically report outcomes with the STS for Adult CT Surgery Isolated CABG procedures
- With this intention, there was a need for an interactive dashboard that provided a comprehensive snapshot of the program, drove Performance Improvement and tracked clinical outcomes
- There also was a need for real-time data with the ability to drill down to patient/physician specific level details

Objectives:

- Minimizing the window between abstraction and data depiction, coupled with data driven process improvement to result in enhanced patient outcomes
- Utilizing data from both the STS Registry and the NYS Cardiac Surgery registry, dashboards would be created in Tableau that incorporated Volume and Outcome data from each registry. This data would be depicted in monthly and year-to-date visualizations and include benchmarks and previous years results
- Early dashboard analysis highlighted 3 areas of opportunity
  - Prolonged intubation
  - Discharge medication documentation
  - Patient comorbidity and case complexity documentation (Registry inclusions, exclusions and predicted risk metrics)

Methods:

- Metrics were chosen that were important to both physician and hospital. Publicly reported "star rating" outcomes were highlighted
- Connect directly to abstraction system (Apollo Advance by Lumedx)
- Daily extract refreshing
- Provide data to monthly Abstraction Meetings with clinical team members to discuss case details and ensure proper chart documentation
- Provide monthly CT Surgery Program Of Distinction meetings to discuss department level aggregated data. (A monthly program level Performance Improvement meeting)
- Provide Surgeons patient level and comprehensive access to their performance data
- Provide the Chief of CT Surgery surgeon/program level data
- Provide as real time as possible non-risk adjusted data to predict published data
  - Achieve ≤ 1 month delay between discharge, chart abstraction and visualization in dashboard
- Provide data to drive policy, practice optimization, and identify potential areas of improvement
- Provide access to patient case lists with Post-Op Ventilation hours prominently displayed

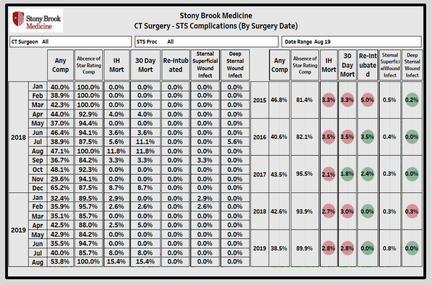
Results:

- The SBUH CT Surgery team now has the ability to look at data by procedure, physician and date range, which was a critical component of the build
- Results are colorized in green or red based on achievement of targets. Run charts appear for each metric as it is reviewed
- Stony Brook University Hospital and the CT Surgery team achieved Three Stars in 2017 for isolated CABG patients
- Prior to dashboard creation the hospital failed to meet data completeness thresholds for inclusion
- With the dashboard and the dedication of the team SBUH has maintained three stars for three consecutive reporting periods
- In addition there has been a statistically significant decrease in the rate of prolonged intubation and compliance with discharge medications while sustaining low mortality rates
- Dashboards are updated automatically as chart abstraction is completed and are presented monthly at multidisciplinary quality meetings
- Early detection of areas of opportunities through a comprehensive dashboard ensures SBUH CT Surgery patients receive the high level of quality they expect and deserve

Conclusions:

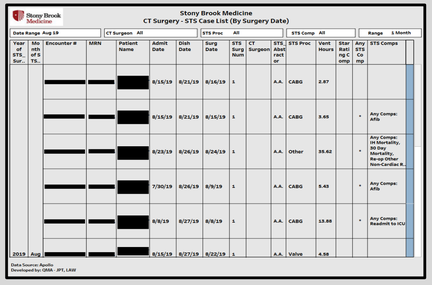
- Data driven performance improvement through an interactive Cardiothoracic dashboard has improved Stony Brook University Hospital's results in patient care after surgery
- Real-time access to dashboard statistics allows the CT Surgery team to continue to evolve and address expanding objectives all while ensuring the best possible outcomes

Dashboard : STS Complications


Stony Brook Medicine
CT Surgery - STS Complications (By Surgery Date)

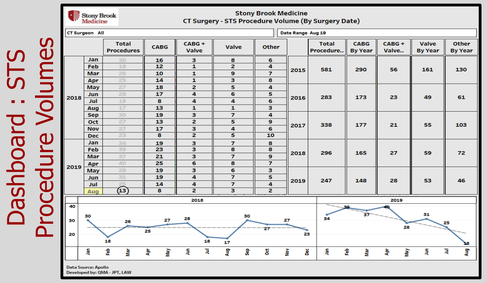
		Any Comp	Absence of Star Rating Comp	IH Mort	30 Day Mort	Re-Intubated	Sternal Superficial Wound Infect	Deep Sternal Wound Infect
2018	Jan	40.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Feb	38.9%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Mar	42.3%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Apr	44.0%	92.9%	4.0%	4.0%	0.0%	0.0%	0.0%
	May	37.0%	94.4%	0.0%	0.0%	0.0%	0.0%	0.0%
	Jun	46.4%	94.1%	3.6%	3.6%	0.0%	0.0%	0.0%
	Jul	38.9%	87.5%	5.6%	11.1%	0.0%	0.0%	5.6%
	Aug	47.1%	100.0%	11.8%	11.8%	0.0%	0.0%	
	Sep	36.7%	84.2%	3.3%	3.3%	0.0%	3.3%	0.0%
	Oct	48.1%	92.3%	0.0%	0.0%	0.0%	0.0%	0.0%
	Nov	29.6%	94.1%	0.0%	0.0%	0.0%	0.0%	0.0%
	Dec	65.2%	87.5%	8.7%	8.7%	0.0%	0.0%	0.0%
2019	Jan	32.4%	89.5%	2.9%	0.0%	0.0%	2.9%	0.0%
	Feb	35.9%	95.7%	2.6%	2.6%	0.0%	2.6%	0.0%
	Mar	35.1%	85.7%	0.0%	0.0%	0.0%	0.0%	0.0%
	Apr	42.5%	88.0%	2.5%	5.0%	0.0%	0.0%	0.0%
	May	42.9%	84.2%	0.0%	0.0%	0.0%	0.0%	0.0%
	Jun	35.5%	94.7%	0.0%	0.0%	0.0%	0.0%	0.0%
	Jul	40.0%	85.7%	8.0%	8.0%	0.0%	0.0%	0.0%
	Aug	53.8%	100.0%	15.4%	15.4%	0.0%	0.0%	0.0%
2015		46.8%	81.4%	8.3%	8.3%	6.0%	0.5%	0.2%
2016		40.6%	82.1%	8.6%	8.9%	2.5%	0.4%	0.0%
2017		43.5%	95.5%	2.1%	1.8%	2.4%	0.3%	0.0%
2018		42.6%	93.9%	2.7%	3.0%	0.0%	0.3%	0.3%
2019		38.5%	89.9%	2.8%	2.8%	0.0%	0.8%	0.0%

Dashboard : Case List Complications


Stony Brook Medicine
CT Surgery - STS Case List (By Surgery Date)

Year of STS..	Mo nth of S TS..	Encounter #	MRN	Patient Name	Admit Date	Disch Date	Surg Date	STS Surg Num	CT Surgeon	STS Proc	Vent Hours	Star Rating Comp	Any STS Comp	STS Comps
2019	Aug	[redacted]	[redacted]	[redacted]	8/15/19	8/21/19	8/16/19	1	A.A.	CABG	2.87			
		[redacted]	[redacted]	[redacted]	8/15/19	8/21/19	8/16/19	1	A.A.	CABG	3.45		*	Any Comps: Afib
		[redacted]	[redacted]	[redacted]	8/23/19	8/26/19	8/24/19	1	A.A.	Other	38.62		*	Any Comps: In Mortality, 30 Day Mortality, Re-op Other Non-Cardiac R..
		[redacted]	[redacted]	[redacted]	7/30/19	8/26/19	8/9/19	1	A.A.	CABG	8.43		*	Any Comps: Afib
		[redacted]	[redacted]	[redacted]	8/8/19	8/27/19	8/9/19	1	A.A.	CABG	13.88		*	Any Comps: Readmit to ICU
		[redacted]	[redacted]	[redacted]	8/15/19	8/27/19	8/22/19	1	A.A.	Valve	4.58			

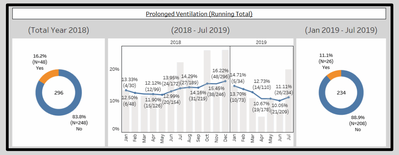
Dashboard : STS Procedure Volumes


Stony Brook Medicine
CT Surgery - STS Procedure Volume (By Surgery Date)

		Total Procedures	CABG	CABG + Valve	Valve	Other
2018	Jan	26	16	3	8	6
	Feb	27	12	1	2	9
	Mar	26	10	1	9	7
	Apr	25	14	1	3	8
	May	27	18	2	5	4
	Jun	28	17	4	6	5
	Jul	18	8	4	4	6
	Aug	17	13	1	1	3
	Sep	30	19	3	7	4
	Oct	27	13	2	5	9
	Nov	23	17	3	4	6
	Dec	25	8	2	5	10
2019	Jan	34	19	3	7	8
	Feb	37	23	3	9	6
	Mar	30	21	3	6	9
	Apr	28	16	6	8	7
	May	31	19	3	6	3
	Jun	29	14	4	7	4
	Jul	30	18	4	7	4
	Aug	(13)	9	2	3	2

	Total Procedure..	CABG By Year	CABG + Valve..	Valve By Year	Other By Year
2015	581	290	56	161	130
2016	283	173	23	49	61
2017	338	177	21	55	103
2018	296	165	27	59	72
2019	247	148	28	53	46

Prolonged Ventilation



Dashboard : Patient Detail


Stony Brook Medicine
CT Surgery - STS Case List Details

Encounter #	MRN	Patient Name	Admit Date	Surg Date	STS Surg Num	Disch Date
[redacted]	[redacted]	[redacted]	8/8/19	8/8/19	1	8/27/19

CT Surgeon	STS Proc	Vent Hours	Discharge / Mortality Status	30 Day Status	Discharge Location
	CABG	13.88	Discharged alive, last known status is alive	Null	Home

All STS Comps	If Other Comp	All STS Star Comps
Readmit to ICU	Double Read: Abx discontinuation: post-op abx given longer than 48h, documentation in CT note 8/10 to continue Abx over the	Null

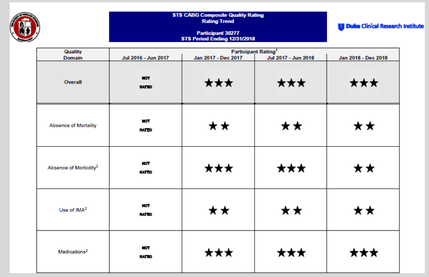
Double Read Comments

Predicted Risk Model Coefficients Version 2017.1.2

Predicted Risk Mortality	Predicted Renal Failure
0.027480	Null
Predicted Deep Sternal Wound Infection	**Predicted Morbidity or Mortality**
0.003408	0.217403
Predicted Reoperation	**Predicted Short LOS**
0.025471	0.200072
Predicted Permanent Stroke	**Predicted Long LOS**
0.012018	0.100427
Predicted Prolonged Ventilation	
0.158028	

Data Source: Apollo
Developed by: QIAA - JPT, LAW

STS Three Star Rating


STS CABG Composite Quality Rating
Rating Trend
Participant 30077
STS Posted Feb 12th/2018
Duke Clinical Research Institute

Quality Domain	Participant Rating: Jul 2016 - Jun 2017	Jan 2017 - Dec 2017	Jul 2017 - Jun 2018	Jan 2018 - Dec 2018
Overall	NOT RATED	★★★	★★★	★★★
Absence of Mortality	NOT RATED	★★	★★	★★
Absence of Morbidity[1]	NOT RATED	★★★	★★★	★★
Use of IMA[2]	NOT RATED	★★	★★	★★
Medications[3]	NOT RATED	★★★	★★★	★★★

Data Driven Care = Smart Medicine

Lead Author Jay Thompson has no Disclosures

Society of Thoracic Surgeons (STS) Adult Registry Data with Financial Data – A First Pass

Diane Alejo[1,2], Clifford E. Fonner[2], Terri Haber[2], Niv Ad[3,5], Stefano Schena[1], Glenn Whitman[1], Paul Massimiano[3], Rawn Salenger[4,5], Maryland Cardiac Surgery Quality Initiative (MCSQI) Collaborative.

[1]Johns Hopkins University School of Medicine, [2]Maryland Cardiac Surgery Quality Initiative, Inc., [3]Washington Adventist Hospital, [4]University of Maryland Saint Joseph Medical Center, [5]University of Maryland School of Medicine.

Background

- Matching STS data with financial data offers insight into charge variation among programs.
- Identifying sources of variability may help control healthcare costs, improve quality and access to care.

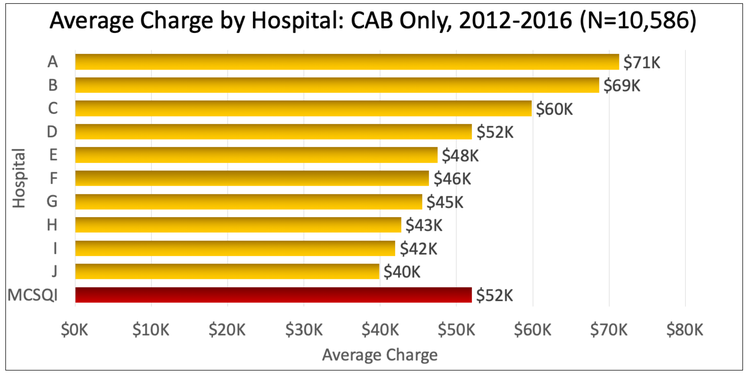
Methods

- A database was created by matching STS adult cardiac surgery data from a statewide quality collaborative and charge data from a statewide hospital discharge dataset (Health Services Cost Review Commission (HSCRC).
- Among all patients (n= 22,835) discharged between 2012-2016 achieved a 97.0% (22,140/22,835) match rate.
- Isolated coronary artery bypass (CAB) cases (n=10,991) achieved a 96.3% (10,586/10,991) match rate with greater than 93% in 9/10 centers.

Linking STS Data Fields to HSCRC Data Fields
Hospital Code / Hospital Name
Medical Record Number (MRNUM)
Date of Birth (DOB)
Date of Admission (ADMDATE)
Date of Discharge (DISCDATE)

⟺

Searched for HSCRC cases with matching tuples in the identified hospital
MRNUM DISCDATE DOB
MRNUM ADMTDATE DOB
MRNUM ADMTDATE DISCDATE
ADMTDATE DOB DISCDATE



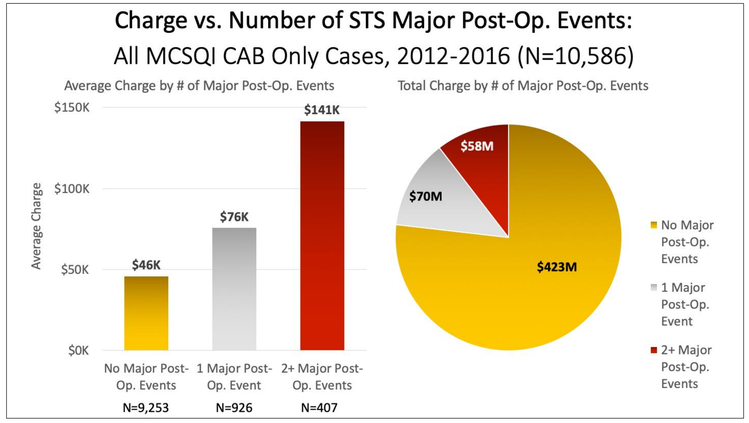
Results

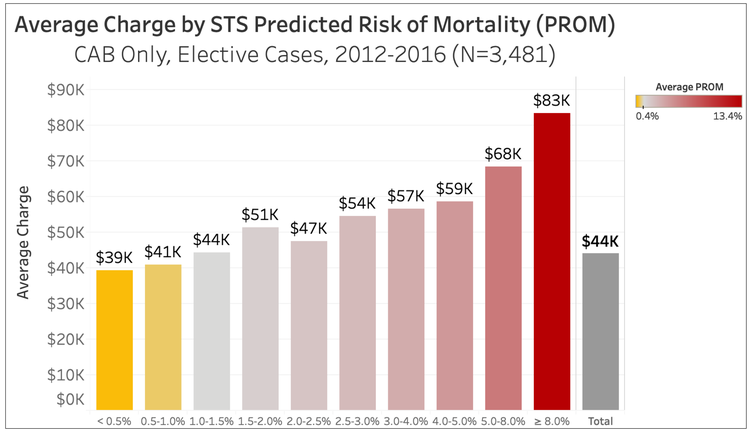
Elective Isolated CAB:

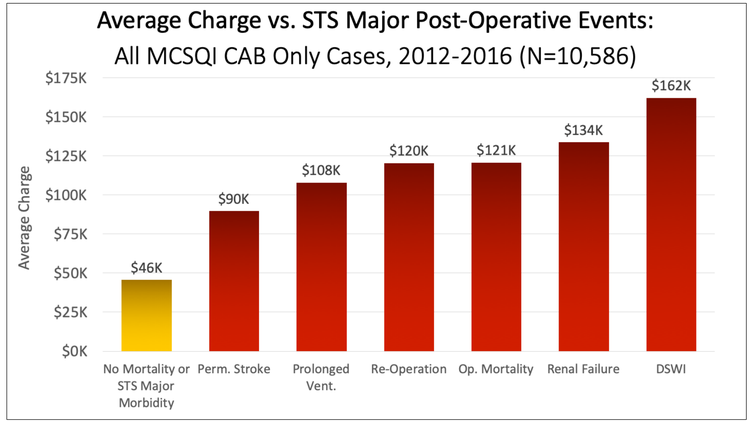
- **Gender:** Females incurred higher charges $47,655 vs $42,953 (p<0.001) within all age categories;
- **Race:** Caucasian $42,727; African-American patients: $49,844
- **Age:** Patients > 80 years of age had the highest charges.
- **Academic centers** had 42% higher charges.

Charges versus STS Major Morbidities and Mortality:

- Average charge with zero postoperative events was $43,339 (56.3% 5,967/10,586) compared to $63,163 (43.6% 4,618/10,586) with any minor or major events.
- Patients with 2+ major post-operative events saw a 209% increase in charges.
- Patients with deep sternal wound infection had the highest mean charge ($162,333).







Conclusions

Analyzing the financial impact of clinical outcomes creates opportunities for quality improvement and identification of strategies to reduce healthcare expenditures.

Disclosures: Niv Ad, MD (Speakers Bureau / Honoraria: Medtronic Inc.; Consultant / Advisory Board: Atricure Inc.; Consultant / Advisory Board: Liva Nova), Clifford E. Fonner (Shareholder Relationship: Sentinel Healthcare Corp.)

The Value and Impact of A Statewide Quality Collaborative

Diane Alejo[1,2], Clifford E Fonner[2], Jennifer Bobbitt[3], Cheryl Lunnen[4], Chrissy Ruhl[5], Jeanne Ruff[6] , Terri Haber[2], Amy Dukovcic[3], James M. Brown[7], Michael Fiocco[4], Mark Nelson,[5] Bradley S. Taylor[8], Niv Ad[3,8], Stefano Schena[1], Thomas L Matthew[9], Glenn Whitman[1], John Conte[10], Kurt Wehberg[11], Paul Massimiano[3], Rawn Salenger[8,12], and the Maryland Cardiac Surgery Quality Initiative Collaborative.

[1]Johns Hopkins University School of Medicine; [2]Maryland Cardiac Surgery Quality Initiative, Inc.; [3]Washington Adventist Hospital; [4]MedStar Heart & Vascular Institute; [5]Western Maryland Health System; [6]Peninsula Regional Medical Center; [7]University of Maryland Prince George's Hospital Center; [8]University of Maryland School of Medicine; [9]Suburban Hospital, Johns Hopkins Medicine; [10]Penn State Heart and Vascular Institute; [11]Beebe Healthcare; [12]University of Maryland Saint Joseph Medical Center.

Background

The Maryland Cardiac Surgery Quality Initiative (MCSQI) was established to:

share best practices,
improve outcomes, and
enhance healthcare policy in the state.

Engagement of surgeons, multi-disciplinary providers, hospital leadership, state policy officials, and data managers has been the key to success.

Methods

Focused collaboration led to significant improvements in care. We embarked on:

a. policy, quality and research initiatives to impact and improve cardiac outcomes (Figure 1).
b. identification of performance variances resulting in best practice guidelines and improved individual hospital outcomes.
c. a statewide quality assessment tool evaluating 27 tenets of quality with a re-assessment one year later.

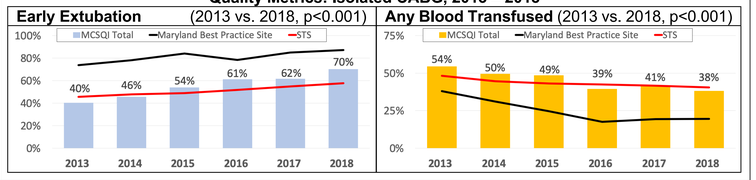
Results

Our Collaborative's Statewide Quality, Policy and Research Impact

Impact on Quality:

- Statewide STS Adult Cardiac Surgery Registry Warehouse is the foundation for quality improvement metrics
- Statewide STS Registry data quality monitoring & auditing
- Engagement among Surgeons, Hospital Leadership, Data Managers and State Regulatory Organizations
- Quality Improvement Initiatives: Early Extubation, Prolonged Ventilation, Blood Utilization, and Readmissions

Quality Metrics: Isolated CABG, 2013 – 2018



Quality Assessment Tool – Tenets of Quality in Cardiac Surgery

Statewide Cardiac Surgery Quality Assessment Tool

Evidence of Preoperative Quality Protocols and Processes	
Protocols	
	Protocol for preoperative Beta Blockade (non-emergency CABG only)
	Protocol for Staphylococcus decolinization (mupirkin)
Process	
	Use of STS score discussed with patient & family & documented >50% cases)
	Preoperative planning with a Multidisciplinary Team
Evidence of Intraoperative Quality Protocols and Processes	
Protocols	
	Protocols for antibiotic prophylaxis
	Protocols for DVT prophylaxis
	Protocols for glucose control
	Protocols for blood conservation
	Protocols for decubitus prophylaxis
Process	
	Core Management by TEE-certified Cardiac Anesthesiology (>75% cases)
	Use of LIMA during CABG (>90% cases)

Evidence of and do you Review the following Post-operative Quality Outcome Metrics and Processes	
Outcome Measures	
	STS Risk-adjusted 30-day Mortality rate
	STS Risk-adjusted Stroke Rate
	STS Risk-adjusted Renal Failure Rate
	STS Risk-adjusted Prolonged Ventilation Rate
	STS Risk-adjusted Deep Sternal Wound Infection Rate
	STS 30 Day Readmission Rates
	Patient-Reported Outcome Measures(PROM): HCAHPS
	Review CABG Cost per case Metrics
Process	
	Core Management by Certified Cardiac Surgery ICU Nurses (CCRN or CSC), >50% nurses
	Core Management by Certified Intensivists in Cardiac Surgery ICU, >50% intensivists
Evidence of the following Safety, Process Improvement, & Ongoing Education	
Process	
	Board Certified/Eligible in Thoracic Surgery, >50% of surgeons
	Participation in Ongoing Education (>30 CME/year), per ABTS, >75% of surgeons
	Participation in Thoracic Surgery MMs (at least quarterly), >75% of surgeons
	Participation in Internal Process Improvement Meetings (at least Bi-Annual), >75% surgeons
	Participation in MCSQI, at least 1 surgeon & 1 data manager participate >= 50% biannual meeting
Adult Cardiac Surgery (age >=18) case volume threshold	
Process	
	Minimum number of annual cardiac surgery cases > 100

MCSQI developed an assessment tool to evaluate cardiac surgery quality, with 100% participation of sites in the state.

40% of programs showed improvement in the one-year follow-up survey.

Hospitals adopting 100% of the 27 tenets of quality increased from 67% (18/27) to 82% (22/27).

After one year, 10/10 programs:
- implemented blood conservation protocols;
- reviewed Patient-Reported Outcome Measures;
- had ">50% ICU Intensivist coverage";
- had ">75% of Surgeons participating in Morbidity & Mortality Conferences."

Impact: programs joined together to ensure high-quality care for cardiac surgery patients in Maryland!

Impact on Policy:

State Health Care Commission

- Revisions to "State Health Plan Chapter for Cardiac Surgery and Percutaneous Coronary Intervention Services" to ensure meaningful, accurate and fair **"Certificate of Ongoing Performance"** metrics and quality assessment components
- Regulation criteria determination of ICD-9 /10 procedure codes for defining cardiac surgery in the state
- Successful linking of STS data with charge data for correlation of charges/costs to outcomes and quality performance

State Hospital Association

Consensus statement yielded the exclusion of five* specific Potentially Preventable Complications (PPC) for cardiac surgery APR-DRGs under the statewide Hospital Acquired Conditions Program.

PPC	Note: Recommendations apply to Cardiac Surgery Procedures Only
3*	Acute Pulmonary Edema and Respiratory Failure without Ventilation
8*	Other Pulmonary Complications
9*	Shock
12*	Cardiac Arrhythmias & Conduction Disturbances
14	Ventricular Fibrillation / Cardiac Arrest
40*	Post-op Hemorrhage & Hematoma without Hemorrhage Control Proc or I&D Proc.
41	Post-op Hemorrhage & Hematoma with Hemorrhage Control Proc or I&D Proc.

Impact on Research

Quality Improvement Research: partnership with STS Regional Collaboratives to further process improvement

24 Abstracts / **9** Posters / **8** National Presentations / **5** Publications
Regional Collaborations: VCSQI & The IMPROVE Network

Figure 1

Conclusions

- The value and impact of a statewide consortium is important for demonstrating a return on stakeholders' investments.
- MCSQI has been successful in sharing best practices, improving STS outcomes across the state and collaborating with policy officials as regulations are formulated.
- Success is demonstrated in achievements in metrics, regulatory collaboration and quality outcomes research, with the ultimate goal of delivering high quality care to our patients.

Disclosures: Niv Ad, MD (Speakers Bureau / Honoraria: Medtronic Inc.; Consultant / Advisory Board: Atricure Inc.; Consultant / Advisory Board: Liva Nova), Clifford E. Fonner (Shareholder Relationship: Sentinel Healthcare Corp.)

Addressing the Challenges of Longitudinal Follow-Up in The Society of Thoracic Surgery (STS) Registries: Novel use of an EMR Query Tool to Ascertain Post-Discharge Patient Vital Status

Diane Alejo, Joseph DiNatale, Joseph Canner, Marvin Borja, Kimberly Behrens, Mayuri Machado Alvarez, Kathryn Maloney, Stephen Broderick, Glenn Whitman, Marshall Jacobs
Johns Hopkins University School of Medicine, Division of Cardiac Surgery

Background

STS mandates threshold levels for confirmation of vital status for inclusion in report analyses.

We hypothesized that a structured query language (SQL) search of an EMR (Electronic Medical Record) can identify vital status of many STS Registry patients.

Methods

Using medical record numbers of STS registry patients discharged between July 2016-March 2019 (n=3,836), we ran a SQL search against our EPIC Clarity database for death status and last confirmed "Alive" dates by screening selective EPIC encounter types that indicate patient status.

EPIC Encounter type, lab specimen collection dates, completed orders (radiology, diagnostic procedures) and medication events were extracted.

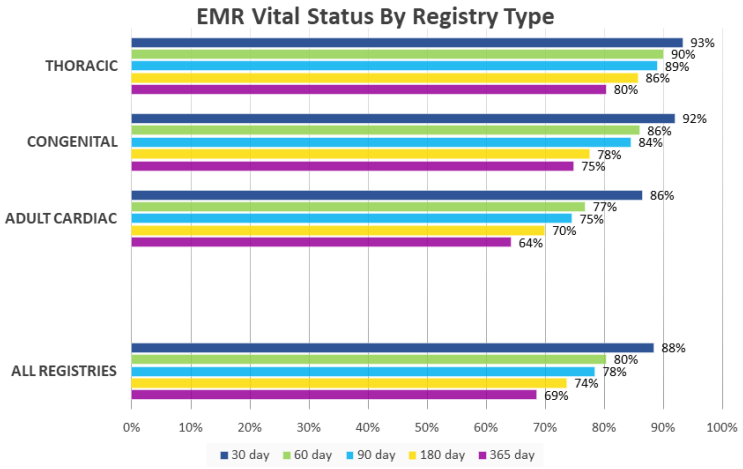
Readmission and outpatient visits were included.

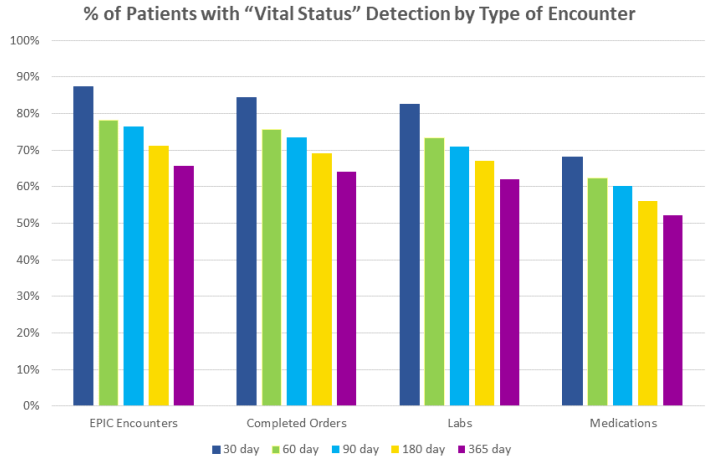
EPIC Encounter types deemed non-confirmatory for survival were excluded.

Results

Searching EPIC encounters/visits within the Health System EMR

- Overall postop vital status ascertainment at 30, 60, 90, 180 and 365 days was **88%, 80%, 78%, 74% and 69%.**
- Ascertainment rates were highest for the Thoracic Database for all intervals (93%, 90%, 89%, 86%, 80%).
- At one year, females had higher rates of follow-up (74% vs 66% (p<0.001)).
- At one year, in-state resident patients, rates were 91%, 83%, 81%, 77% and 72%.
- Status at one year was documented for 80% of patients <18 years versus 67% >=18 years, (p<0.001).





Searching EPIC encounters/visits inside and outside of the Health System (EPIC's Care Everywhere Events)

- Expanded searching of encounters yield additional (marginal) vital status at one year

  from: 67% to 70% in patients (>=18 years) of age
  80% to 81% in patients (< 18 years) of age

All Encounters	30 Day	1 Year
Adult Cardiac	89%	67%
Congenital	93%	77%
Thoracic	94%	82%
All 3 STS Registries	90%	71%

Conclusions

An automated EMR Query Tool can:

- Successfully ascertain vital status for clinical registries.
- Assist clinical registries in achieving thresholds for confirmation of vital status, a critical prerequisite for receiving STS Star Rating Metrics and STS Analyses Reports.
- Substantially reduce the time and effort associated with manual EMR reviews to confirm vital status but telephone or electronic follow-up may also be needed.
- Provide a mechanism to derive 1-year actuarial survival rates of patients in the STS Adult, Congenital and Thoracic registries.

Precise, definitive and consistent labeling of EMR document note types reflecting vital status may increase the scope of eligible note types, thus increasing the detection rate.

Future integration of national death registries within an EMR would improve detection of mortality.

Disclosures: Stephen Broderick,MD (Consultant/Advisory Board: Bristol Meyers Squibb)

Our Journey to Three Stars

Ailene V. Agtarap RN, BS , Lisa A. Wilbert, RN, Janet Kaminsky, RN, BS, Lisa C. Wells, RN, BS, Jay Thompson, MHA, Erika Sexton, RN, Laurie O'Sullivan, RN, Susan Cunneen, RN, Karen Sanders, RN, Joanna Chikwe, MD, Henry Tannous, MD,

Stony Brook Medicine, Stony Brook New York

ADVANCES IN QUALITY & OUTCOMES: A Data Managers Meeting
October 23-25, 2019 ✣ New Orleans Marriott

Background:

Public reporting has been linked to improved patient outcomes. Transparency in healthcare provides patients with the tools they need to make informed decisions when choosing a surgeon and hospital. To this end our institution, Stony Brook University Hospital, an academic medical center with 603 beds decided to publicly report CABG outcomes to the STS.

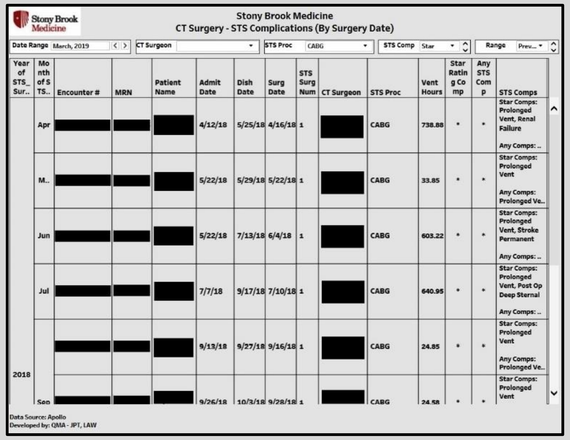
JOURNEY

Data Driven Care = Smart Medicine

Methods:

- Monthly interdisciplinary staff meetings are held to discuss outlier cases and missed Star metrics.
- Tableau dashboards have been created for these meetings that automatically update as chart abstraction is completed.
- In addition to our standard double-read process, Star metrics and all cases with complications are independently reviewed by a second Cardiac Surgery Data Manager to validate data accuracy.
- Star metrics including LIMA use, preoperative and discharge medications, and adverse events are analyzed for opportunities to improve patient care.
- Prolonged ventilation hours have been added to the dashboard so that providers can readily review any missed occasion for early extubations.

Tableau Dashboard



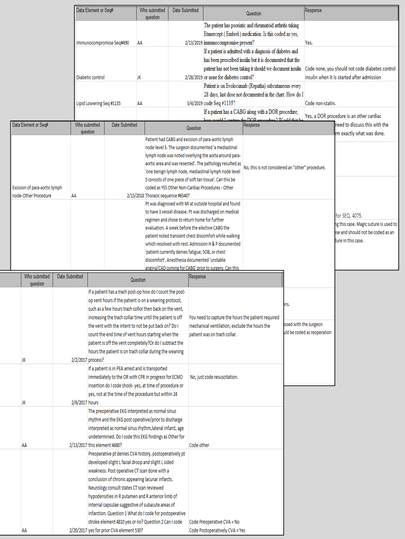
Stony Brook Medicine
Stony Brook Medicine
CT Surgery - STS Complications (By Surgery Date)

Date Range: March, 2019 | CT Surgeon | STS Proc: CABG | STS Comp: Star | Range: Previ...

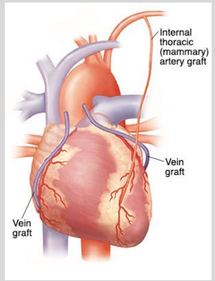
Year of STS_ Sur..	Month of STS..	Encounter #	MRN	Patient Name	Admit Date	Dish Date	Surg Date	STS Surg Num	CT Surgeon	STS Proc	Vent Hours	Star Rating Comp	Any STS Comp	STS Comps
2018	Apr	[redacted]	[redacted]	[redacted]	4/12/18	5/25/18	4/16/18	1	[redacted]	CABG	738.88	*	*	Star Comps: Prolonged Vent, Renal Failure Any Comps: ...
	M..	[redacted]	[redacted]	[redacted]	5/22/18	5/29/18	5/22/18	1	[redacted]	CABG	33.85	*	*	Star Comps: Prolonged Vent Any Comps: Prolonged Ve..
	Jun	[redacted]	[redacted]	[redacted]	5/22/18	7/13/18	6/4/18	1	[redacted]	CABG	603.22	*	*	Star Comps: Prolonged Vent, Stroke Permanent Any Comps: ...
	Jul	[redacted]	[redacted]	[redacted]	7/7/18	9/17/18	7/10/18	1	[redacted]	CABG	640.95	*	*	Star Comps: Prolonged Vent, Post Op Deep Sternal Any Comps: ...
	Sep	[redacted]	[redacted]	[redacted]	9/13/18	9/27/18	9/16/18	1	[redacted]	CABG	24.85	*	*	Star Comps: Prolonged Vent Any Comps: Prolonged Ve..
	Sep	[redacted]	[redacted]	[redacted]	9/26/18	10/3/18	9/28/18	1	[redacted]	CABG	24.58	*	*	Star Comps: Prolonged Vent

Data Source: Apollo
Developed by: QMA - JPT, LAW

Examples of Q&A Grid with STS Questions/Answers



Data Element or Set#	Who submitted question	Date Submitted	Question	Response
Immunocompromise Seq#690	AA	2/13/2019	The patient has psoriatic and rheumatoid arthritis taking Etanercept (Enbrel) medication. Is this coded as yes, immunocompromise present?	Yes.
Diabetic control	JK	2/26/2019	If a patient is admitted with a diagnosis of diabetes and has been prescribed insulin but it is documented that the patient has not been taking it should we document insulin or none for diabetes control?	Code none, you should not code diabetes control insulin when it is started after admission
Lipid Lowering Seq #1135	AA	3/4/2019	Patient is on Evolocumab (Repatha) subcutaneous every 28 days, last dose not documented in the chart. How do I code non-statin.	Code non-statin.
		2/13/2018	If a patient has a CABG along with a DOR procedure,	Yes, a DOR procedure is an other cardiac
Excision of para-aortic lymph node-Other Procedure	AA	2/13/2018	Patient had CABG and excision of para-aortic lymph node level 5. The surgeon documented 'a mediastinal lymph node was noted overlying the aorta around para-aortic area and was resected'. The pathology resulted as 'one benign lymph node, mediastinal lymph node level 5 consists of one piece of soft tan tissue'. Can this be coded as YES Other Non-Cardiac Procedures - Other	No, this is not considered an "other" procedure.
		2/13/2018	Pt was diagnosed with MI at outside hospital and found to have 3 vessel disease. Pt was discharged on medical regimen and chose to return home for further evaluation. A week before the elective CABG the patient noted transient chest discomfort while walking which resolved with rest. Admission # 8 documented 'patient currently denies fatigue, SOB, or chest discomfort'. Anesthesia documented 'unstable angina/CAD coming for CABG' prior to surgery. Can this	for SEQ. 4075.
Additional vent hours	JK	2/2/2017	If a patient has a trach post-op how do I count the post-op vent hours if the patient is on a weaning protocol, such as a few hours trach collar then back on the vent, increasing the trach collar time until the patient is off the vent with the intent to not be put back on? Do I count the end time of vent hours starting when the patient is off the vent completely? Or do I subtract the hours the patient is on trach collar during the weaning process?	No need to capture the hours the patient required mechanical ventilation, exclude the hours the patient was on trach collar.
Shock	JK	2/6/2017	If a patient is in HCA arrest and is transported immediately to the OR with CPR in progress for ECMO insertion do I code shock- yes, at time of procedure or yes, not at the time of the procedure but within 24 hours	No, just code resuscitation.
EKG	AA	2/13/2017	The preoperative EKG interpreted as normal sinus rhythm and the EKG post operative/prior to discharge interpreted as normal sinus rhythm /lateral infarct, age undetermined. Do I code this EKG findings as Other for this element 4680?	Code other
CVA	AA	2/20/2017	Preoperative pt denies CVA history, postoperatively pt developed slight L facial droop and slight L sided weakness. Post operative CT scan done with a conclusion of chronic appearing lacunar infarcts. Neurology consult states CT scan reviewed hypodensities in R putamen and R anterior limb of internal capsular suggestive of subacute areas of infarction. Question 1 What do I code for postoperative stroke element 4010 yes or no? Question 2 Can I code yes for prior CVA element 5397	Code Preoperative CVA = No Code Postoperatively CVA = Yes



30 Day Follow-up phone calls

MD	MRN	OR Date	Procedure	Type of Case	Mode of Validation	ALIVE
M	[redacted]	7/1	Excision of arterial Mass	C	8/20 phone call	YES
JB		7/1	CABG X3 LIMA	C	In Hospital 8/3	YES
T		7/1	CABG X3 LIMA	C	8/1 IN HOSP	YES
C		7/2	CABG X3 LIMA	C	8/13 Phone call	YES
M		7/2	CABC X3 MVR (replacement)	C	in hospital	DECEASED 7/4
JB		7/3	CABG X2 LIMA	C	Office Visit 8/13	YES
M		7/3	Sternal Excision of atrial Myxoma	C	8/29 Phone call	YES
M		7/3	LVAD pump exchange	C	In Hospital	YES
T		7/5	CABG X 4 LIMA	C	Phone call 8/13	YES
JB		7/5	AVR (replacement)	C	8/13 Office visit	YES
JB		7/8	CABG x 3 MVR (replac) tissue	C	8/28 office visit	YES
JB		7/9	CABG X4	C	8/13 phone call	YES
JB		7/10	CABG X1 AVR (replacement) AVR (replacement, MVR (replacement)	C	8/23 phone call	YES
M		7/10	Aortic Root	C	8/21 office visit	YES
T		7/10	CABG X 3 mediastinal mass	C	8/29 phone call	YES
JB		7/11	CABG X3	C	8/20 office visit	YES
M		7/12	CABG X - MVR (replacement)	C	8/20in hospital	YES
T		7/12	MVR (replacement0	C	8/15 office visit	YES
M		7/13	CABC X2 LIMA	C	8/29* phone call	YES
JB		7/15	CABG x4 SVG and RAG	C	8/29 phone call	YES
JB		7/17	CABG X 4	C	8/29 phone call	YES
M		7/22	CABG X 4	C	pt was in hosp.	DECEASED 7/27
T		7/29	CABGX3 LIMA	C	8/29 Left message	UNKNOWN
M		7/30	CABG X 4	C	8/29 phone call	Yes
M		7/26	CABG X3	C	will call	UNKNOWN

Methods:

- Ongoing education is provided to the team to improve clinical documentation.
- Reinforcement is provided regarding prescription or documentation of contraindication to Star metric medications including Beta blockers, Statins, and Aspirin.
- When questions from the team arise, STS is queried. These questions and answers are saved on a spreadsheet and used as an internal resource.
- Follow-up phone calls are performed by the Clinical Care Coordinator to accurately confirm 30-day mortality status on all cardiac surgery patients.
- In addition to the phone calls, the electronic medical record (EMR) is also reviewed to verify 30-day postoperative status and hospital readmission.

Results:

Stony Brook University Hospital received it's first Three Star rating in 2017 for isolated CABG patients. This Three Star performance has been sustained now for three consecutive reporting periods and is available to the public to provide healthcare transparency. Our consistent top performance reflects that our cardiac surgery population is receiving the highest level of quality care.

Conclusion:

A systemic approach to public reporting ensuring quality and accuracy of outcomes has provided our patients with data they can use to make informed decisions about where to receive their cardiac care. Stony Brook University Hospital is proud to have received the Three Star rating for isolated CABG patients and will continue to expand the level of cutting edge patient care delivered while focusing on patient satisfaction and outstanding results.

STS Three Star Rating

STS CABG Composite Quality Rating
Rating Trend
Participant 30277
STS Period Ending 12312018
Duke Clinical Research Institute

Quality Domain	Participant Rating[1] Jul 2016 - Jun 2017	Jan 2017 - Dec 2017	Jul 2017 - Jun 2018	Jan 2018 - Dec 2018
Overall	NOT RATED	★★★	★★★	★★★
Absence of Mortality	NOT RATED	★★	★★	★★
Absence of Morbidity[2]	NOT RATED	★★★	★★★	★★
Use of IMA[3]	NOT RATED	★★	★★	★★
Medications[4]	NOT RATED	★★★	★★★	★★★

https://publicreporting.sts.org/hospital/1972523348

STS Public Reporting Online
The Society of Thoracic Surgeons
Adult Cardiac | Congenital Heart | General Thoracic | Resources | Contact
Stony Brook University Hospital
Stony Brook, New York
CABG Results

Year	Overall Composite Score*	Absence of Operative Mortality	Absence of Major Morbidity	Use of Internal Mammary Artery	Receipt of Required Perioperative Medications
January 2017 - December 2017	★★★	★★	★★★	★★	★★★
January 2018 - December 2018	★★★	★★	★★	★★	★★★

References:

- [Werner and Bradlow, Public Reporting On Hospital Process Improvements Is Linked To Better Patient Outcomes, Health Affairs, Vol. 29, No.7 (2010)] [Campanella, Vukovic, Parente, Sulejmani, Ricciardi, Specchia, The impact of Public Reporting on clinical outcomes: a systematic review and meta-analysis, BMC Health Serv Res. 2016; 16: 296].

Lead Author Ailene V. Agtarap has no Disclosures

Association of Device-Related Infections with Body Mass Index and Hemoglobin A1C in Durable LVAD Patients

Kevin Bryant, BS, Laura Theiler, BSN, RN

Background

Left Ventricular Assist Devices (LVADs) have emerged as a common treatment for advanced heart failure. Infections are a significant risk in LVAD patients due to the presence of a percutaneous driveline, with an approximate 1-yr. percutaneous site infection rate of 19% and an estimated cost of $7,000 per re-hospitalization [1].
Increased rates of general infections have been observed both in obese [2] and diabetic [3,4] patients, but this has been less extensively examined in LVAD patients.

Past examinations of LVAD patients have confirmed an association between obesity and risk of a DLES infection [5], while there has not been a demonstrated increased rate of infection associated with diabetic patients [6].

In overweight patients and in pre-diabetic patients, trends in infection rates have been less well examined. However, there may be merit to studying these precursor groups separately from the rest of the healthy populations.

Methods

INTERMACS patients for the University of Utah Hospital were selected starting January 1, 2009 through July 31, 2019. Only patients with at least 90 days on support with a durable ventricular assist device were included (n = 209). Patients were stratified by two pre-implant categories - Hemoglobin A1C (HGB A1C) and BMI. HGB A1C was used to stratify patients into three categories: Healthy (HGB A1C ≤ 5.6) (n = 56), Pre-diabetic (HGB A1C 5.7 – 6.4) (n = 80), and Diabetic (HGB A1C ≥ 6.5) (n = 73). BMI was used to stratify patients into three categories: Low (BMI < 25) (n = 65), Overweight (25 ≤ BMI < 30) (n = 66), and Obese (BMI ≥ 30) (n = 78).

We assessed differences in infection rates via two separate methods. First, each sub-group was compared using a Kaplan-Meier survival curve and quantified with a log-rank comparison. Through this, we were able to observe distinctions in infection rates over a continuous time window. Following this, we assessed infection rates according to Equation 1 to assess overall incidence per subgroup at 1 year and 2 year time points, as well as overall incidence, then compared groupings of interest from the survival analysis with one-sided t-tests.

$$Rate = \frac{\#\ of\ patients\ with\ infection}{\#\ of\ patients}$$

Equation 1- Infection rate calculation

Results

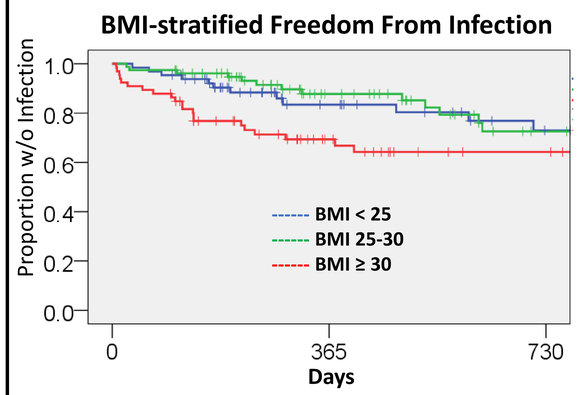


Figure 1 – Kaplan-Meier evaluation shows highly similar infection rates for low BMI and overweight groups, while the obese group experiences an early increase that is maintained. Dashes indicate right-censoring.

Log-Rank Comparison

BMI 1	BMI 2	1-yr.	2-yr.
< 25	25-30	p = 0.42	p = 0.72
< 25	≥ 30	p = 0.04	p = 0.07
25–30	≥ 30	p = 0.004	p = 0.02

Table 1 – Quantification of the results in Figure 1 confirm that only the obese group infection rate significantly differs from other groups, at 1 year for both lower BMI groups and at 2 years compared to the overweight group.

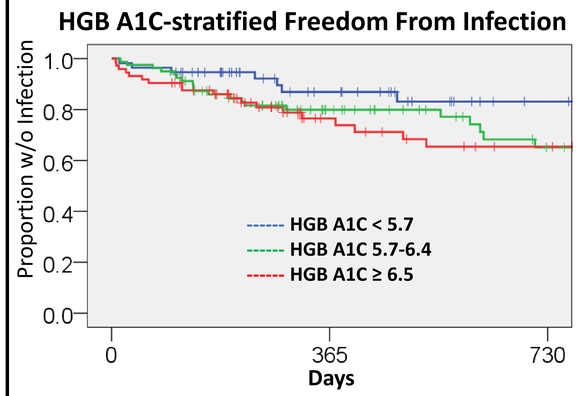


Figure 2 – The low HGB A1C group maintains a freedom from infection rate higher than both pre-diabetic and diabetic patients. However, this is minimal at 1 year, and there is significant clustering of results. Dashes indicate right-censoring.

Log-Rank Comparison

HGB A1C 1	HGB A1C 2	1-yr.	2-yr.
< 5.7	5.7-6.4	p = 0.25	p = 0.12
< 5.7	≥6.5	p = 0.13	p = 0.06
5.7–6.4	≥6.5	p = 0.68	p = 0.72

Table 2 – Log-rank analysis results lead us to conclude that there is not a significant difference in infection development between our observed stratification – There may be a more observable difference if pre-diabetic and diabetic patients are pooled.

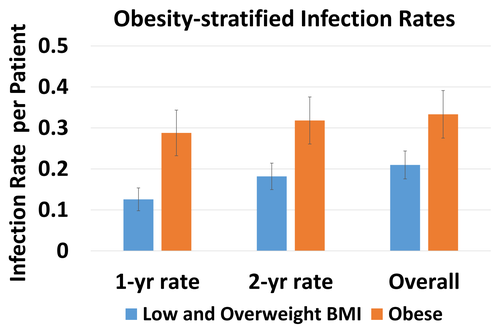


Figure 3 – There is a significantly lower infection rate in 1-yr. (p=0.002), 2-yr. (p=0.01), and overall (p=0.03) endpoints for low and overweight patients pooled versus obese patients.

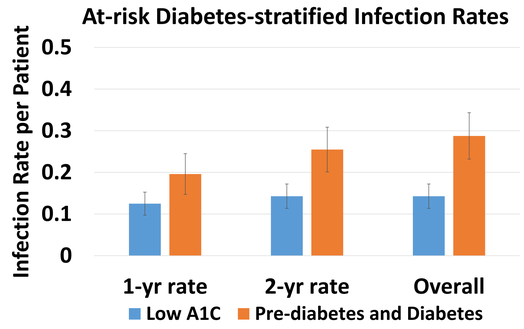


Figure 4 – There is a significantly lower infection rate in 2-yr (p=0.04) and overall endpoints (p=0.02) for low HGB A1C levels versus pre-diabetic and diabetic patients. However the 1-yr. rate, while observably lower, was not statistically significant.

Discussion

There appears to be a visible association between BMI and development of DLES infection based on our results, consistent with past studies. However, this split is not observed in the overweight group, nor is there an apparent gradual difference between the three BMI stratifications. Obese patients exhibited a significantly higher rate of DLES infection, particularly pronounced early in course of care. Notably, this difference in DLES infection rates became less pronounced as the course of care extended, suggesting any association may be more relevant in the short-term. It is unclear if this is related to changes in BMI during the course of care or long-term independence in general.

Any association of HGB A1C on DLES infection rates was inconsistent. Despite observed similarity in the survival curves of pre-diabetic and diabetic patients, there was no significant difference from patients with low levels of HGB A1C. Observing endpoints without censoring, there is statistical significance to suggest that the elevated HGB A1C groups were more prone to DLES infections over time, although this disregards alternate patient outcomes. A major limitation in tying diabetic status with DLES infection rate is medical management, as patients may be in different etiological groups than indicated by their pre-implant lab results recorded in INTERMACS.

References

1. D. Goldstein et al., “Continuous-flow Devices and Percutaneous Site Infections: Clinical Outcomes,” *J Heart Lung Transplant*, vol. 31, pp. 1151-1157, Nov. 2012
2. M. Falagas and M. Kompoti, “Obesity and Infection,” *Lancet Infect Dis,* vol. 6, pp. 436-438, Jul. 2006.
3. J. Casquiro et al., “Infections in Patients with Diabetes Mellitus: A Review of Pathogenesis,” *Indian J Endocrinol Metab,* vol. 16, pp. S27-S36, Mar. 2012.
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5. A. Raymond et al., “Obesity and left ventricular assist device driveline exit site infection,” *ASAIO J*, vol. 56, pp. 57-60, Jan.-Feb. 2010.
6. B. Mohamedali et al., “Is Diabetes Mellitus a Risk Factor for Poor Outcomes after Left Ventricular Assist Device Placement?,” *Tex Heart Inst J.*, vol. 44, pp. 115-119, Apr. 2017.

Reducing CV Surgery Mortalities through the Heart Team Approach

Dr. Suraj Maraj, MD, CMO, Amanda Wood, RN, MSN, CNO and Christine Longtin, CVRN, CVC Methodist Texsan Hospital, San Antonio

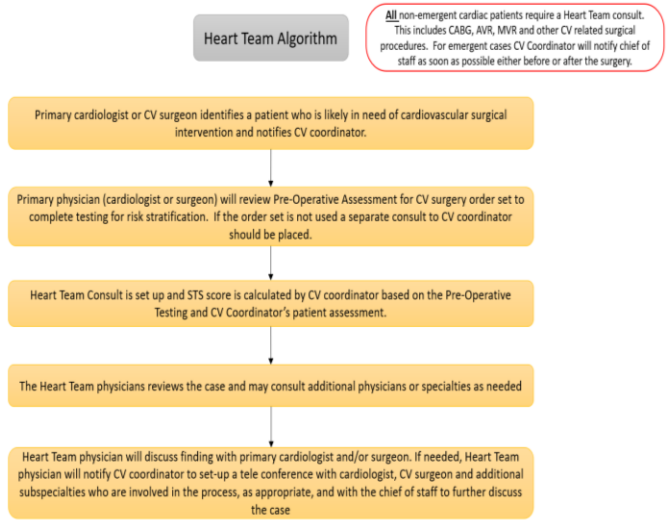
Background and Purpose

Quarter 2 2018 Methodist Texsan Hospital received a 2 Star rating from the Society of Thoracic Surgeons (STS) for our Isolated Coronary Artery Bypass Grafting (CABG) program but unfortunately for our total CV surgeries we showed Operative and In-Hospital Mortalities as greater than 4% above the Like Group and the STS Mean Participant Score. We saw this as an opportunity to improve our outcomes. Our Chief Medical Officer (CMO), along with our Chief Nursing Officer (CNO), Dr.G.Maszak (Chest Pain Champion), Dr.R.Ford (CV surgeon) and Dr.B.Amalakuhan (Critical Care Intensivist) started an initiative to reduce Mortalities and provide the safest treatment with the best outcomes for our CV surgery patients.

Implementation Strategies

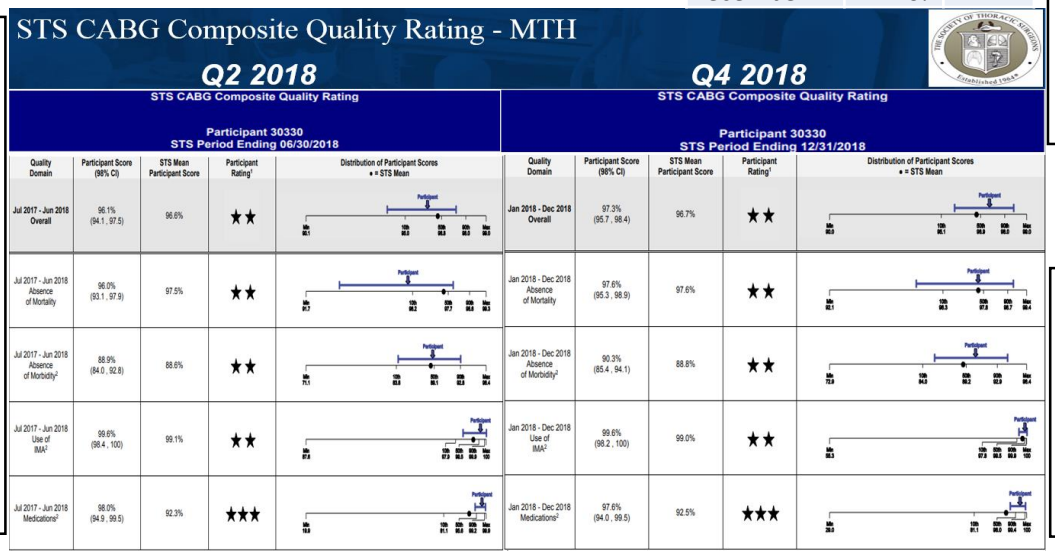
In late 2018 The Heart Team Consult (HTC) was initiated at Methodist Texsan Hospital. The Heart Team consists of Surgeons, Interventional Cardiologists, Primary Cardiologists, CV Coordinator and our Chief of Staff as appropriate.
Pre-op CV testing for complete risk stratification to include Pulmonary Function Testing, Carotid ultrasound, Peripheral artery perfusion evaluation, 5 meter walk, Canadian Frailty Score and patient assessment by the CV Coordinator (CVC). The CVC along with Cardiologists or Surgeon will set up and identify a Heart Team Consult physician. The Heart Team physician reviews the case, Appropriate use criteria, Risk vs Benefit and if needed may request input from other physicians/surgeons involved in the process to discuss patient specific outcome goals.

Methods



Results

Percent of Mortalities	2018	2019
January	15%	0%
February	0%	0%
March	19%	0%
April	0%	0%
May	5%	0%
June	0%	7%
July	5%	0%
August	0%	0%
September	10%	
October	8%	
November	7%	
December	0%	



Conclusions

The Heart Team Consults have resulted in appropriate patient selection and improved outcomes, thus Mortalities have decreased and with that came other expected metric improvements. Methodist Texsan has experienced decreased ventilator times, reduction in inappropriate blood utilization, reduction in overall healthcare costs by reducing length of stay and no major adverse effects including stroke.
We will continue to seek optimal interventions and treatment by using complete Risk Stratification, Heart Team Consults, or consider other treatment options for high risk CV surgery patients to help guide us on our path to best patient care outcomes. Reaching for Stars by becoming a 3 Star STS Rated program in the future!

Acknowledgements

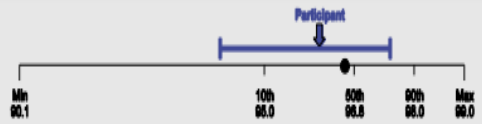
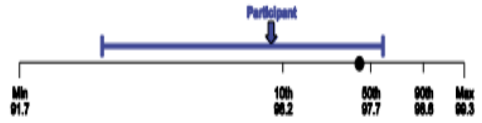
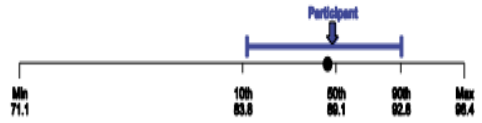
Thank you to the physician who practice at Methodist Texsan and are committed to making sure that our patients get the best care. Thank you to Amy Cameron, CVRN, Cindy Martinez, RN, Janet Mirza, RN VP Quality, Lillian Levesque, RN, Director of Education, and Claudine Sterling, RN for their input and support.

STS CABG Composite Quality Rating - MTH

Q2 2018

STS CABG Composite Quality Rating

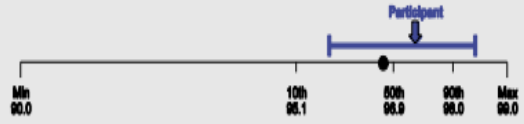
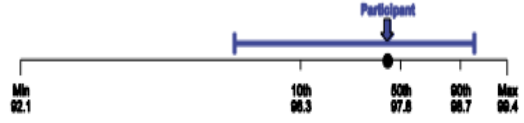
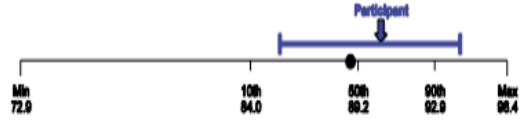
Participant 30330
STS Period Ending 06/30/2018

Quality Domain	Participant Score (98% CI)	STS Mean Participant Score	Participant Rating[1]	Distribution of Participant Scores • = STS Mean
Jul 2017 - Jun 2018 Overall	96.1% (94.1 , 97.5)	96.6%	★★	
Jul 2017 - Jun 2018 Absence of Mortality	96.0% (93.1 , 97.9)	97.5%	★★	
Jul 2017 - Jun 2018 Absence of Morbidity[2]	88.9% (84.0 , 92.8)	88.6%	★★	
Jul 2017 - Jun 2018 Use of IMA[2]	99.6% (98.4 , 100)	99.1%	★★	
Jul 2017 - Jun 2018 Medications[2]	98.0% (94.9 , 99.5)	92.3%	★★★	

Q4 2018

STS CABG Composite Quality Rating

Participant 30330
STS Period Ending 12/31/2018

Quality Domain	Participant Score (98% CI)	STS Mean Participant Score	Participant Rating[1]	Distribution of Participant Scores • = STS Mean
Jan 2018 - Dec 2018 Overall	97.3% (95.7 , 98.4)	96.7%	★★	
Jan 2018 - Dec 2018 Absence of Mortality	97.6% (95.3 , 98.9)	97.6%	★★	
Jan 2018 - Dec 2018 Absence of Morbidity[2]	90.3% (85.4 , 94.1)	88.8%	★★	
Jan 2018 - Dec 2018 Use of IMA[2]	99.6% (98.2 , 100)	99.0%	★★	
Jan 2018 - Dec 2018 Medications[2]	97.6% (94.0 , 99.5)	92.5%	★★★	

Patient-Reported Opioid Use and Outcomes After Cardiac Surgery

Melissa Clark RN MSN, Alexander Brescia MD MSc, Denise Kerr RN MSN, Chris Bond MBChB, Jing Lu BA, Richard L. Prager MD

BACKGROUND

Current opioid prescribing recommendations following cardiac surgery are based on single-center experiences. We utilized our statewide quality collaborative as a platform to create a mechanism to gather multi-center patient-reported opioid use and outcomes data to develop discharge prescribing recommendations following cardiac surgery.

METHODS

A patient questionnaire developed by the Michigan Surgical Quality Collaborative (MSQC) was adapted for use in post-sternotomy patients. A REDCap database was created to collect data including in-hospital opioid use and discharge prescribing, as well as post-discharge patient-reported opioid use, storage, and disposal information. REDCap database entries were matched to STS ACSD records by STS Record ID to obtain patient risk and outcomes data.

RESULTS

Ten centers volunteered to participate in data collection. Centers sampled were geographically diverse within Michigan, with annual case volumes ranging from 120-1600. Data from more than 1200 completed questionnaires have been entered into the REDCap database between February and September 2019. Preliminary analysis showed that the equivalent of 4,045 pills of standard-strength hydrocodone were prescribed to 110 opioid-naïve patients who had not used any opioid pain medication during the day prior to discharge. In addition, only 49% of patients reported receiving instructions for opioid disposal, and analysis of patient-reported disposal practices further indicates an opportunity for improved opioid disposal education.

CONCLUSION

Our statewide quality collaborative has successfully developed a REDCap database for the collection of multi-center patient-reported opioid use and outcomes data. This data has been used independently and with linkage to STS ACSD data to develop postoperative prescribing recommendations and can direct future quality improvement initiatives.

OPIOID PRESCRIBING RECOMMENDATIONS

Opioid Prescribing Recommendations After Cardiac Surgery via Median Sternotomy

Prescribe **around-the-clock acetaminophen (Tylenol):**

Inpatient: 1000mg oral acetaminophen **every 8 hours**

Post-discharge: 1000mg **every 8 hours for 72 hours, then as needed**

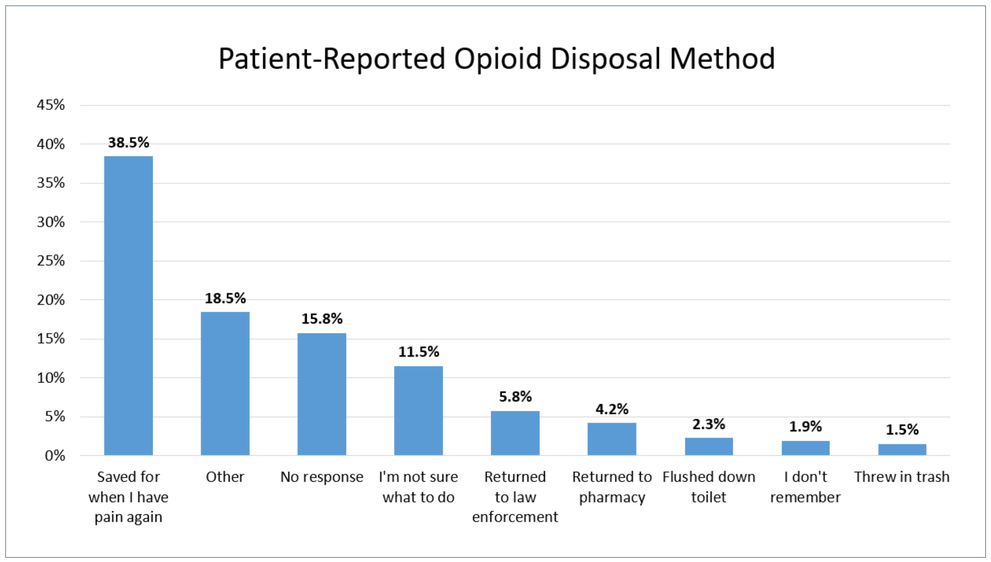
In-hospital opioid use should guide post-discharge prescribing of **5mg oxycodone** to be taken **every 6 hours as needed:**

# Pills Used on Day Before Discharge:	Prescribe (# Pills):
0	**0 – 4**
1 – 3	**15**
≥ 4	**25**

Recommend **clinic visit** for assessment prior to **opioid refills**

OPEN OPIOID PRESCRIBING ENGAGEMENT NETWORK

Distribute **opioid education brochures** at discharge, including instructions for **safe storage and disposal**



Support for the Michigan Society of Thoracic and Cardiovascular Surgeons Quality Collaborative is provided by Blue Cross and Blue Shield of Michigan and Blue Care Network as part of the BCBSM Value Partnerships program. Although Blue Cross Blue Shield of Michigan and MSTCSV Quality Collaborative work collaboratively, the opinions, beliefs and viewpoints expressed by the author do not necessarily reflect the opinions, beliefs and viewpoints of BCBSM or any of its employees.

For more information about the MSTCVS Quality Collaborative and its quality initiatives, please contact the MSTCVS Coordinating Center 734-998-5918

Blue Cross Blue Shield Blue Care Network of Michigan
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Do Multiple Same Day Surgical Procedures By a Single Surgeon Affect Outcomes?

David Grix, Melissa Clark, Jaelene Williams, Chang He, Richard L. Prager

For the MSTCVS Quality Collaborative

Blue Cross Blue Shield Blue Care Network of Michigan

Nonprofit corporations and independent licensees of the Blue Cross and Blue Shield Association

BACKGROUND

Current literature suggests that starting non-emergent cardiac surgery later in the day is associated with worsened outcomes and mortality. We analyzed perioperative outcomes for those patients undergoing elective coronary artery bypass (CAB) grafting as the first case by a surgeon compared to subsequent (two or more) cardiac procedures by the same surgeon.

METHODS

83,880 cardiac surgical procedures were performed in Michigan between July 2011 and December 2018. 14,837 were isolated elective CAB's. 93 surgeons performed subsequent (two or more) elective CAB procedures on the same day.

A retrospective analysis was performed on all elective CAB cases across 33 centers to assess the outcome difference between CAB's performed as 1st case (Group 1) vs. subsequent CAB's performed on the same day (Group 2). To take potential correlation among cases nested within the same surgeon into account, mixed models were used to compare multiple outcomes between early and later elective CAB cases after adjusting baseline predicted scores and hospital total CABG volume tertiles.

Postoperative Outcomes	Group 1 1st elective CABG (n = 13074)	Group 2 Later elective CABG (n = 1763)	P value
STS Predicted risk of Mortality	0.0125	0.0118	0.054
Total OR (mins)	329.4 ± 89.0	285.1 ± 77.6	< 0.0001
Composite Morbidity (includes 6 Complications)	1143 (8.8%)	146 (8.3%)	0.68
Prolonged Ventilation	695 (5.3%)	75 (4.3%)	0.34
Reoperation of Bleeding	200 (1.5%)	22 (1.3%)	0.51
Initial Ventilation < 6 hrs	7176 (55.6%)	828 (47.6%)	<0.0001
Initial ICU (hrs)	63.7 ± 80.9	54.3 ± 103.6	0.79
Total Blood Products	0.39 ± 1.24	0.36 ± 1.09	0.78
Post-Operative LOS (hrs)	163.3 ± 140.2	157.3 ± 101.6	0.45
In-hospital Mortality	148 (1.1%)	21 (1.2%)	0.57
30-day Readmission	1222 (9.4%)	186 (10.6%)	0.06

OR= Operating Room; ICU = Intensive Care Unit; LOS = Post-Operative Length of Stay

RESULTS

Patients in group 1 had a higher STS predicted risk of mortality (PROM) 1.25% vs 1.18% (p=0.054), longer OR total time (p < 0.0001) and more patients with initial ventilation < 6 hours (p<0.0001) than group 2 (table 1). No difference in outcomes were found when later cases were performed at the same or different hospitals.

CONCLUSIONS

Isolated CAB patients have similar perioperative outcomes when a surgeon performs one or more cardiac procedures per day. This may be attributed to procedural scheduling, patient care processes, and/or personnel involved in the care of cardiac patients throughout their postop stay.

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For more information about the MSTCVS Quality Collaborative and its quality initiatives, please contact the MSTCVS Coordinating Center 734-998-5918