Background/

The Cardiac Surgery Database (CSD) is a national data registry of isolated CABG and isolated valve procedures. The CSD captures data from all Medicare hospitals and is voluntary. The registry is operated by the Society of Thoracic Surgeons (STS) and has a large number of participating hospitals. The registry is designed to collect comprehensive data on all isolated cardiac procedures and to provide feedback to participating institutions. The data collected by the CSD is used to improve the quality of care and to identify areas for improvement.

Objective

The purpose of this study was to improve preoperative beta blocker documentation for isolated CABG procedures. The study was conducted at a single-center institution, and the study population included all patients undergoing isolated CABG procedures during the study period. The study was approved by the institutional review board, and all patients provided informed consent.

Methodology

The study was conducted at a single-center institution, and the study population included all patients undergoing isolated CABG procedures during the study period. The study was approved by the institutional review board, and all patients provided informed consent. The study was designed as a before-and-after intervention study. A preoperative beta blocker documentation checklist was developed and implemented. The checklist included specific parameters for documenting preoperative beta blocker administration. The checklist was reviewed and approved by the surgical and medical staff. The checklist was implemented during the intervention period, and the data was collected during the control period.

Results

The results of the study showed a significant improvement in preoperative beta blocker documentation. The intervention group had a higher percentage of patients who received preoperative beta blockers compared to the control group. The intervention group also had a higher percentage of patients who had preoperative beta blocker documentation in their electronic medical record.

Conclusion

The results of this study demonstrate the effectiveness of preoperative beta blocker documentation in improving patient outcomes. The implementation of a documentation checklist can help improve patient safety and quality of care. The findings of this study can be used to develop and implement similar interventions at other institutions.
The STS Adult Cardiac Risk Calculator: A Comparison of Clinician and Data Manager Risk Scoring

Joseph Squire, RN-BC, BSN; Andrew Bilderback, MS
Wolff Center, University of Pittsburgh Medical Center (UPMC)

Objectives

- 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).

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 for major adverse outcomes and the average differences of predicted outcome percentages between the groups.

Results

- Clinicians generally underestimated 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).
- Deciding risk factor 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 differences has not been determined and investigation into the variances is warranted.

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

<table>
<thead>
<tr>
<th>Predicted Outcome*</th>
<th>STS ACSD Data Manager Overall Average Risk Score</th>
<th>Clinician Overall Average Risk Score</th>
<th>Absolute % Difference (Clinician - Manager %)</th>
<th>Relative % Difference (Clinician vs. Manager)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality</td>
<td>2.08%</td>
<td>1.82%</td>
<td>-0.26%</td>
<td>-12.57%</td>
</tr>
<tr>
<td>Stroke</td>
<td>0.20%</td>
<td>0.20%</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Reoperation</td>
<td>2.77%</td>
<td>2.60%</td>
<td>-0.17%</td>
<td>-6.15%</td>
</tr>
<tr>
<td>Permanent Stroke</td>
<td>1.38%</td>
<td>1.17%</td>
<td>-0.21%</td>
<td>-15.09%</td>
</tr>
<tr>
<td>Prolonged Ventilation</td>
<td>8.06%</td>
<td>7.43%</td>
<td>-0.62%</td>
<td>-7.75%</td>
</tr>
<tr>
<td>Renal Failure</td>
<td>1.99%</td>
<td>2.12%</td>
<td>0.13%</td>
<td>6.56%</td>
</tr>
<tr>
<td>Morbidity and Mortality</td>
<td>12.21%</td>
<td>9.62%</td>
<td>-2.59%</td>
<td>-4.69%</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Variable</th>
<th>Agreement</th>
<th>Variable</th>
<th>Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medications</td>
<td></td>
<td>Patient History/Current State</td>
<td></td>
</tr>
<tr>
<td>Atrial Fibrillation</td>
<td>96.67%</td>
<td>Atrial Fibrillation</td>
<td>96.67%</td>
</tr>
<tr>
<td>Syncope</td>
<td>96.67%</td>
<td>Syncope</td>
<td>96.67%</td>
</tr>
<tr>
<td>Atrial Tachycardia</td>
<td>96.67%</td>
<td>Atrial Tachycardia</td>
<td>96.67%</td>
</tr>
<tr>
<td>Hypertension</td>
<td>96.67%</td>
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<tr>
<td>Diabetes</td>
<td>96.67%</td>
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<tr>
<td>CHF</td>
<td>96.67%</td>
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<tr>
<td>COPD</td>
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<td>Stroke</td>
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<td>Cardiovascular Disease</td>
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Author Information

Joseph Squire | 4601 Baum Blvd, Suite 228, Pittsburgh, PA 15213 | squirej@upmc.edu | (412) 647-4940
Andrew Bilderback | 4601 Baum Blvd, Suite 228, Pittsburgh, PA 15213 | bilderbacka@upmc.edu | (412) 864-0796

DISCLOSURES: THE AUTHORS HAVE NO DISCLOSURE OR CONFLICTS OF INTEREST
The Aortic Worksheet:
Enhancing Data Manager Efficiency and Surgeon Compliance

Joseph Squire, RN-BC, BSN
Wolff Center, University of Pittsburgh Medical Center (UPMC)

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.

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.

Aortic Worksheet, Clinician Entry View

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.

Worksheet Design

Aortic Worksheet, Completed View with Immediate Post-Operative Section

Results

- Compliance rates for completing the Aortic 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 manager 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

<table>
<thead>
<tr>
<th>Pre-electronic Worksheet</th>
<th>Post-electronic Worksheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>75%</td>
<td>95%</td>
</tr>
<tr>
<td>54%</td>
<td>88%</td>
</tr>
<tr>
<td>52%</td>
<td>92%</td>
</tr>
<tr>
<td>31%</td>
<td>85%</td>
</tr>
<tr>
<td>41%</td>
<td>49%</td>
</tr>
</tbody>
</table>

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.

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.

Author Information

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DISCLOSURES: THE AUTHOR HAS NO DISCLOSURE OR CONFLICTS OF INTEREST
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

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

Table 2: Predicted Risk of Morbidity/Mortality

<table>
<thead>
<tr>
<th>Group</th>
<th>No M/M N (%)</th>
<th>M/M N(%)</th>
<th>No M/M N (%)</th>
<th>M/M N (%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>5,860 (91.39%)</td>
<td>552 (8.61%)</td>
<td>2,741 (93.45%)</td>
<td>252 (6.54%)</td>
<td>0.002</td>
</tr>
<tr>
<td>(4)</td>
<td>942 (94.39%)</td>
<td>56 (5.61%)</td>
<td>942 (94.39%)</td>
<td>56 (5.61%)</td>
<td></td>
</tr>
</tbody>
</table>

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

Mary Elise Hollenbeck, BSN, RN, Jeanne Koss, BSN, RN
Munson Medical Center, Traverse City, Michigan

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.

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. 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.

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.

<table>
<thead>
<tr>
<th>Indicators</th>
<th>2018 Q1</th>
<th>2018 Q2</th>
<th>2018 Q3</th>
<th>2018 Q4</th>
<th>Rolling YTD</th>
<th>Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Extubation &lt;6hrs</td>
<td>51.3%</td>
<td>54.3%</td>
<td>52.2%</td>
<td>48.3%</td>
<td>52.0%</td>
<td>55.0%</td>
</tr>
</tbody>
</table>
Improving Pump Thrombosis Identification, Communication, and Reporting
Geralyn Lerg MS, RN, AGCNS, CPTPC

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.
- Subaim: 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.

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

Charina Ballesteros, MSN, RN, CCRN-K
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, intraoperative, 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
- Creation of standardized templates for the clinical team to evaluate medication compliance

**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**

**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.

**References**


**Acknowledgement:**

CSICU Providers; CSICU, 4W & Same Day Admission Unit RNs; CCL Quality Data Nurses, Tammy Russo, Diane Cruz

**No Disclosure or COI to Declare**
Improving Performance on the STS Isolated CABG Quality Metric for Pre-operative Beta Blockade Across Multiple Campuses

Irene Prudente RN, BSN; Denise McLaughlin, RN; Mary Montalvo RN, MSN; Lisa Gengo ND, PA; Kate Halahan RN, MBA; Melissa Gardon RN, BSN, CCRN; Angela Batista MBA, RN, CPHQ

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.
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 to 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 1, 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.
Creating an Interactive Cardiothoracic Dashboard to Improve Outcomes

Jay Thompson, MHA, Lisa Wilbert, RN, Joanna Chikwe, MD, Henry J. Tannous, MD, Lisa Wells, RN, BS, Janet Kaminsky, RN, BS, Alene Agtarap, RN, BSN, Paul Ventiquattro, MS
Stony Brook Medicine, Stony Brook New York

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
- 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

Lead Author Jay Thompson has no Disclosures
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.)

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.

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.
The Value and Impact of A Statewide Quality Collaborative

Diane Alejo1,2, Clifford E Fonner2, Jennifer Bobbitt3, Cheryl Lunnen4, Chrissy Ruhl5, Jeanne Ruff6, James M. Brown7, Michael Fiocco4, Mark Nelson8, Bradley S. Taylor9, Niv Ad3,5, Stefano Schena1, Thomas L. Matthew5, Glenn Whitman1, John Conte10, Kurt Wehberg11, Paul Massimiano3, Rawn Salenger4,12, and the Maryland Cardiac Surgery Quality Initiative Collaborative.

1Johns Hopkins University School of Medicine; 2Maryland Cardiac Surgery Quality Initiative, Inc.; 3Washington Adventist Hospital; 4MedStar Heart & Vascular Institute; 5Western Maryland Health System; 6Peninsula Regional Medical Center; 7University of Maryland Prince George’s Hospital Center; 8University of Maryland School of Medicine; 9Suburban Hospital, Johns Hopkins Medicine; 10Penn State Heart and Vascular Institute; 11Beebe Healthcare; 12University 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
- Statewide STS Registry data quality monitoring & auditing
- Engagement among Surgeons, Hospital Leadership, Data Managers and State Regulatory Organizations
- Quality Improvement Initiatives: Early Estimation, Prolonged Ventilation, Blood Utilization, and Readmissions

Quality Metrics: Isolated CABG, 2013 – 2018

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Early Estimation

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| Variance | 10%  
| Impact | 10%  |

Any Blood Transfusion (2013 vs. 2018, p<0.01)

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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.

Figure 1

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

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.

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.

Results:
• 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.

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.
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.

\[
Rate = \frac{\text{# of patients with infection}}{\text{# of patients}}
\]

Equation 1- Infection rate calculation

Results

<table>
<thead>
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<th>Log-Rank Comparison</th>
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<tbody>
<tr>
<td>HGB A1C 1</td>
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<td>&lt;5.7</td>
</tr>
<tr>
<td>0.25</td>
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</table>

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.

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 a 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

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. Amalakun (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 and may consult additional physicians or specialists as needed.

Methods

Primary cardiologist or CV surgeon identifies a patient who is likely in need of cardiovascular surgical interventions and notifies CV coordinator.

The Heart Team Consult is set up and STS score is calculated by CV coordinator based on the Pre-Operative testing and CV Coordinator’s patient assessment.

Heart Team physician reviews the case and may consult additional physicians or specialists as needed.

Heart Team consult physician will discuss findings with primary physician or surgeon. If needed, Heart Team physician will notify CV coordinator to set-up teleconference with cardiologist, CV surgeon and additional specialists who are involved in the process, as appropriate, and with the同意 of staff to further discuss the case.

Results

Percent of Mortalities

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<thead>
<tr>
<th>Month</th>
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<th>2019</th>
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<td>June</td>
<td>0%</td>
<td>7%</td>
</tr>
<tr>
<td>July</td>
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<td>0%</td>
</tr>
<tr>
<td>August</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>September</td>
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<td></td>
</tr>
<tr>
<td>October</td>
<td>8%</td>
<td></td>
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<td>November</td>
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</tr>
<tr>
<td>December</td>
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</tr>
</tbody>
</table>

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.
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 multicenter 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

<table>
<thead>
<tr>
<th># Pills Used on Day Before Discharge</th>
<th>Prescribe (# Pills):</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0 – 4</td>
</tr>
<tr>
<td>1 – 3</td>
<td>15</td>
</tr>
<tr>
<td>≥ 4</td>
<td>25</td>
</tr>
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</table>

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

Recommend clinic visit for assessment prior to opioid refills.

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

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.

**CONCLUSIONS**

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.

**RESULTS**

Postoperative Outcomes

<table>
<thead>
<tr>
<th></th>
<th>Group 1</th>
<th>Group 2</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>STS Predicted risk of Mortality</td>
<td>0.0125</td>
<td>0.0118</td>
<td>0.054</td>
</tr>
<tr>
<td>Total OR (mins)</td>
<td>329.4 ± 89.0</td>
<td>285.1 ± 77.6</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Composite Morbidity</td>
<td>1143 (8.8%)</td>
<td>146 (8.3%)</td>
<td>0.68</td>
</tr>
<tr>
<td>(includes 6 Complications)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prolonged Ventilation</td>
<td>695 (5.3%)</td>
<td>75 (4.3%)</td>
<td>0.34</td>
</tr>
<tr>
<td>Reoperation of Bleeding</td>
<td>200 (1.5%)</td>
<td>22 (1.3%)</td>
<td>0.51</td>
</tr>
<tr>
<td>Initial Ventilation &lt; 6 hrs</td>
<td>7176 (55.6%)</td>
<td>828 (47.6%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Initial ICU (hrs)</td>
<td>63.7 ± 80.9</td>
<td>54.3 ± 103.6</td>
<td>0.79</td>
</tr>
<tr>
<td>Total Blood Products</td>
<td>0.39 ± 1.24</td>
<td>0.36 ± 1.09</td>
<td>0.78</td>
</tr>
<tr>
<td>Post-Operative LOS (hrs)</td>
<td>163.3 ± 140.2</td>
<td>157.3 ± 101.6</td>
<td>0.45</td>
</tr>
<tr>
<td>In-hospital Mortality</td>
<td>148 (1.1%)</td>
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</tr>
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<td>1222 (9.4%)</td>
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OR= Operating Room; ICU = Intensive Care Unit; LOS = Post-Operative Length of Stay

**METHODS**

83,880 cardiac surgical procedures were performed in Michigan between July 2011 and December 2018. 14,837 were isolated elective CABs. 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.

**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.

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