Society of Thoracic Surgeons
Adult Cardiac Surgery Database

Monthly Webinar

October 4, 2023
• Welcome and Introductions
• STS Updates
• Beta Blocker Project
STS Updates

October Training Manual Posted

H3 to be leased by mid-October

AQO Was AWESOME – What are you doing in 2024?
**Important Dates for Adult Cardiac**

- **Oct 4**
  - ACSD Monthly Webinar @ 2pmCT

- **Oct 18**
  - ACSD Quality Improvement Series Webinar @ 2pmCT

- **Nov 1**
  - ACSD Monthly Webinar @ 2pmCT

- **Nov 10**
  - ACSD Last Day for H4 Opt Out

- **Nov 14**
  - ACSD H4 Closes (OR Dates through 9/30/2023)

- **Nov 15**
  - ACSD Quality Improvement Series Webinar @ 2pmCT

- **Early Dec**
  - Post-AQO Hot Topics Webinar
<table>
<thead>
<tr>
<th>Harvest</th>
<th>Harvest Submission Window Close</th>
<th>Opt-Out Date</th>
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<th>Comments</th>
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<td>3/31/2023</td>
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<td>8/22/2023</td>
<td>6/30/2023</td>
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</tbody>
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TQI/QMTF Beta Blocker Working Group

David M. Shahian, MD
Massachusetts General Hospital and Harvard Medical School
Risk-adjusted mortality

Risk-adjusted any-or-none morbidity (stroke, sternal infection, renal failure, reoperation, prolonged ventilation)

Use of the internal mammary artery

Use of all evidence-based perioperative medications (preop beta blockers, discharge ASA, statins, beta blockers)

STS CABG Composite Score

Star Rating
### 13.3. Beta Blockers and Amiodarone in Patients Undergoing CABG

#### Recommendations for Beta Blockers and Amiodarone in Patients Undergoing CABG

Referenced studies that support the recommendations are summarized in Online Data Supplement IV.

<table>
<thead>
<tr>
<th>COR</th>
<th>LOE</th>
<th>Recommendations</th>
</tr>
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<tbody>
<tr>
<td>2a</td>
<td>B-R</td>
<td>1. In patients undergoing CABG, who do not have a contraindication to beta blockers, the administration of beta blockers before surgery can be beneficial to reduce the incidence of postoperative atrial fibrillation.</td>
</tr>
<tr>
<td>2a</td>
<td>B-R</td>
<td>2. In patients undergoing CABG, preoperative amiodarone is reasonable to reduce the incidence of postoperative atrial fibrillation.</td>
</tr>
<tr>
<td>2b</td>
<td>B-NR</td>
<td>3. In patients undergoing CABG, who do not have a contraindication to beta blockers, preoperative use of beta blockers may be effective in reducing in-hospital and 30-day mortality rates.</td>
</tr>
<tr>
<td>2b</td>
<td>B-NR</td>
<td>4. In patients undergoing CABG, the role of preoperative beta blockers for the prevention of acute postoperative myocardial ischemia, stroke, AKI, or ventricular arrhythmia is uncertain.</td>
</tr>
</tbody>
</table>
Definition:
Medical Reason – Eligible clinician must document specific reason(s) for not administering beta-blockers

**Numerator Note:** Denominator Exception(s) are determined on the date of the denominator eligible encounter.

**Numerator Options:**
- **Performance Met:**
  - Beta blocker administered within 24 hours prior to surgical incision (4115F)

  **OR**
  - Denominator Exception:
    - Documentation of medical reason(s) for not administering beta-blocker within 24 hours prior to surgical incision (e.g., not indicated, contraindicated, other medical reason) (4115F with 1P)

  **OR**
  - Performance Not Met:
    - Beta blocker not administered within 24 hours prior to surgical incision, reason not otherwise specified (4115F with 8P)

**Rationale:**

*"Despite significant developments in PCI, CAGB remains the most commonly used treatment option for patients with complex CAD and high-risk patients"* (El Bardissi et al., 2012, p.274).

Postoperative atrial fibrillation (POAF) is a common complication following cardiac surgery, occurring in 25-40% of patients (Crystill, 2004, Burgess, 2008). POAF has been associated with increased rates of post-operative morbidity such as cerebrovascular accidents (CVA), infections (e.g., sepsis, pneumonia, and mediastinitis), renal failure and mortality and consequently, increased costs (Marsicano, 2006, Crystill, 2004, Bramer, 2010).

"Postoperative AF after cardiac operations is associated with postoperative morbidities such as cerebrovascular accidents (CVA), infections (e.g., sepsis, pneumonia, and mediastinitis), and renal failure. Previous studies have suggested that POAF after CAGB is related to early and late mortality" (Bramer et al., 2010, p.443). "Development of AF immediately after coronary artery bypass surgery (CAGB) results in a longer stay in the intensive care unit and in hospital, together with a significantly higher (two-to-three-fold) risk of post-operative stroke" (Burgess et al., 2006, p.2846).

Prophylactic administration of beta-blockers has been shown to reduce the risk of POAF and mortality following isolated coronary artery bypass graft surgery (Connolly, 2003, Marsicano, 2008, Ferguson, 2002). Khan’s meta-analysis of RCTs (2013) found that "Preoperative BB prophylaxis initiation resulted in 61% reduction in the incidence of AF as compared to controls, however these results were not statistically significant" (p.62-63).

"According to our findings, perioperative application of beta-blockers still plays a pivotal role in cardiac surgery, as they can substantially reduce the high burden of supraventricular and ventricular arrhythmias in the aftermath of surgery. Their influence on mortality, AMI, stroke, congestive heart failure, hypotension and Bradycardia in this setting remains unclear” (Blessberger et al., 2014, p.5). Recent studies (Kohsaka et al., 2016, Brinkman et al. 2014) researched the use of preoperative β-blockers and concluded the use of β-blockers did not improve outcomes.

The Brinkman study concluded "Preoperative β-blocker use among patients undergoing nonemergent CAGB surgery who have not had a recent myocardial infarction was not associated with improved perioperative outcomes" (p.1320).
Rationale for administering beta-blocker therapy to patients undergoing coronary artery bypass surgery: a systematic review

Aruthi Thaper and Alexander Kulik
Lynn Heart and Vascular Institute, Boca Raton Regional Hospital, and Charles E. Schmidt College of Medicine, Florida Atlantic University, Boca Raton, FL USA

ABSTRACT
Introduction: Secondary preventative therapies are essential for patients undergoing coronary artery bypass graft (CABG) surgery to optimize perioperative and long-term outcomes. Beta-blockers are commonly used to treat patients with coronary artery disease and congestive heart failure (CHF), but their role for CABG patients remains unclear. The goal of this systematic review was to evaluate the rationale for administering beta-blockers to the CABG population and to assess their efficacy before and after coronary surgical revascularization.

Areas covered: A systematic literature review was performed to retrieve relevant articles from the PubMed database published between 1985 and 2017.

Expert opinion: Outside of the surgical field, strong evidence supports the use of beta-blockers for patients with a history of previous myocardial infarction (MI) or CHF. For the CABG population, studies have suggested that perioperative beta-blocker therapy is beneficial, with an associated reduction in mortality, particularly among those with a history of previous MI or CHF. Beta-blocker administration has also clearly been shown to lower the rate of new-onset postoperative atrial fibrillation after CABG. Among the different types of beta-blockers, perioperative carvedilol appears to be the most beneficial. In the absence of contraindications, nearly all CABG patients are candidates for perioperative beta-blocker therapy.

1. Introduction
Coronary artery bypass graft (CABG) surgery is an effective treatment for ischemic heart disease. However, patients who have undergone CABG are at risk for subsequent ischemic events in the years after surgery [1,2], highlighting the importance of postoperative secondary preventive therapies [3,4]. Beta-blockers play a key role in the management of cardiovascular disease by mitigating excessive activation of the adrenergic system. While beta-blockers are commonly used to treat patients with coronary artery disease (CAD) and congestive heart failure (CHF), their role for CABG patients remains unclear.

The early history of beta-blockers dates back to the 1950s, when Ehrlich and Langley described the concept of drug receptors for the first time [5,6]. Thereafter, a large leap in their field occurred in 1948 when AlNquist characterized the differences between alpha receptors and beta receptors [7]. While the first beta-blocker was developed in 1963, it was not until 1965 when the first clinically useful beta-blocker, propranolol, became available [8]. Research conducted on patients with myocardial infarction (MI), CHF, hypertension (HTN), and the prevention and treatment of atrial fibrillation (AF), individual beta-blockers are typically classified as beta-1 selective or nonselective, depending on the specific adrenergic receptors that are competitively antagonized. Beta-blockers can also vary based on a variety of additional characteristics, such as intrinsic sympathomimetic activity, alpha-adrenergic receptor blockade, or vasoactive effects [9]. Metoprolol, for example, selectively inhibits cardiac beta-1 receptors, but not beta-2 receptors. Carvedilol, on the other hand, inhibits post-synaptic cardiac beta-1, beta-2, and alpha-1 receptors, as well as presynaptic beta-2 receptors, and is believed to have antioxidant and free-radical scavenging effects [10]. Carvedilol also appears to have some benefits for patients with diabetes mellitus, with documented improvements in insulin sensitivity and glycemic control, compared to the use of metoprolol for patients with diabetes [11].

A drawback to beta-blocker administration relates to the unpleasant side effects that patients may experience. Beta-blockers predispose to the development of diabetes mellitus.
They emphasize preop BB use in patients with recent MI.
Preoperative β-Blockers as a Coronary Surgery Quality Metric: The Lack of Evidence of Efficacy

Giovanni Filardo, PhD, MPH, Briget da Graca, JD, MS, Danielle M. Sass, MPH, CPH, Jakob Hamilton, BA, BS, Benjamin D. Pollock, PhD, MSPh, and James R. Edgerton, MD

Epidemiology Department, Baylor Scott & White Health, Dallas, Texas; Robert Wood Johnson Medical School, Rutgers University, New Brunswick, NJ; Texas A&M Department of Cardiothoracic Surgery, Baylor Scott & White Health, Dallas, Texas; University of Texas at Austin, Dell Medical School, Austin, TX; University of Texas at Austin, Dell Medical School, Austin, TX; and Texas A&M Health Science Center, College Station, TX. We thank the contributions of all the aforementioned institutions.

Background. Two quality measures used in public reporting and value-based payment programs require β-blockers to be administered less than 24 hours before isolated coronary artery bypass graft surgery to prevent atrial fibrillation and mortality. Questions have arisen about continued use of these measures. Methods. We conducted a systematic review and meta-analysis of outcomes related to β-blocker use before isolated coronary artery bypass graft surgery.

Background. Two quality measures used in public reporting and value-based payment programs require β-blockers to be administered less than 24 hours before isolated coronary artery bypass graft surgery to prevent atrial fibrillation and mortality. Questions have arisen about continued use of these measures. Methods. We conducted a systematic review and meta-analysis of outcomes related to β-blocker use before isolated coronary artery bypass graft surgery.

Circulation: Cardiovascular Quality and Outcomes

RESEARCH LETTER

Preoperative β-blockers for Isolated Coronary Artery Bypass Graft: Does the Evidence Cited by the Current Quality Measures Support Them?

Damien J. LaPar, MD, MSc, Ivan K. Crosley, MD, Irving L. Kron, MD, John A. Kini, MD, Edwin Foner, Jr, DPH, Jeffrey B. Rich, MD, Alan M. Speer, MD, and Gorav Ailawadi, MD

University of Virginia, Charlottesville, Virginia and Heart and Vascular Institute, Falk Heart & Vascular Institute, Miami, Florida. This study was supported by the National Heart, Lung, and Blood Institute, National Institutes of Health, Bethesda, Maryland, and the American Heart Association National Circulatory System Disease grant (16GRNT33100026). Dr. LaPar is supported by the American Thoracic Society Mandela Scholar 2018 Research Development Grant. Dr. Foner is supported by the American Thoracic Society’s Predoctoral Career Development Fellowship (ATSPCD 130219). Dr. Rich is supported by the American Thoracic Society’s Predoctoral Career Development Fellowship (ATSPCD 012675). Dr. Speer is supported by the American Thoracic Society’s Predoctoral Career Development Fellowship (ATSPCD 124619). Dr. Ailawadi is supported by the American Thoracic Society’s Predoctoral Career Development Fellowship (ATSPCD 164618). Dr. Kron is supported by the American Thoracic Society’s Predoctoral Career Development Fellowship (ATSPCD 144619). Dr. LaPar receives support from the American Heart Association National Circulatory System Disease grant (16GRNT33100026).

Background. Preoperative β-blocker use for coronary artery bypass grafting (CABG) has become an accepted hospital quality metric. To date, there have been no reported randomized controlled trials reporting the benefits of preoperative β-blocker use. The purpose of this study was to evaluate the associations between preoperative β-blocker use and outcomes within a large, regional cohort.

Methods. Patient records from a statewide, multi-institutional, Society of Thoracic Surgeons (STS) database were examined for CABG operations (2005 to 2013) to identify patients with scheduled CABG (n = 127,075). β-blocker use was determined by preoperative use or high-dose use by anesthesia providers. The primary outcome was hospital readmission within 30 days of surgery.

Results. After excluding 10,449 patients, 40,063 patients were included for analysis. β-blocker use was associated with a 5.8% lower rate of readmission (95% CI, 4.2% to 7.4%; P < 0.001) compared with the non-β-blocker group. Additionally, the rate of readmission was compared between patients with and without β-blocker use, with no significant difference observed (OR, 0.97; 95% CI, 0.94 to 1.00; P = 0.67).

Conclusion. In this large, multi-institutional cohort, preoperative β-blocker use was associated with a lower rate of hospital readmission following CABG. This study provides evidence that β-blocker use may be beneficial in reducing hospital readmissions.

Preoperative β-blocker use should not be a quality metric for coronary artery bypass grafting.

Clip: This feature does not work with the current browser. Click here to view the full clip. (1.2 MB, 35.4 s, 840x580)

Short-term effects of preoperative beta-blocker use for isolated coronary artery bypass grafting: A systematic review and meta-analysis

Liushan Wang, MD, Hong Wang, MD, PhD, and Xiaotong Hou, MD, PhD

ABSTRACT

Objective. The use of preoperative beta-blockers has been used as a quality standard for patients undergoing coronary artery bypass grafting (CABG). However, the benefits of beta-blockers have been questioned. We performed a systematic review and meta-analysis to investigate the short-term effects of preoperative beta-blocker use for patients undergoing isolated CABG.

Methods. We searched PubMed, Embase, and the Cochrane Library for English articles published from inception to August 16, 2016. Observational studies comparing preoperative beta-blocker use or non-beta-blocker therapy were eligible for consideration in the current study.

Results. Six observational studies with 1,231,850 patients were included. The pooled analyses of unadjusted outcome odds ratio (OR), 0.85; 95% confidence interval (CI), 0.71-0.95; P = 0.07) or risk-adjusted outcome (OR, 0.95; 95% CI, 0.92-0.97; P = 0.00) showed slight reduction in operative mortality, whereas an insignificant difference in mortality rate was observed in pooled postoperative data from propensity score analysis (OR, 0.97; 95% CI, 0.94-1.00; P = 0.80).

Conclusion. The use of preoperative beta-blockers did not reduce either operative mortality or the incidence of postoperative complications in patients undergoing coronary artery bypass grafting.
EDITORIAL COMMENTARY

β-Blockers: Beyond binary

Dawn S. Hui, MD, and Richard Lee, MD, MBA

From the Center for Coordinated Cardiovascular Care, St Louis University, St Louis, Mo.

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Wang and colleagues1 present the first meta-analysis of short-term clinical outcomes of perioperative β-blocker use in isolated coronary artery bypass grafting (CABG). Some comments on the history of this quality metric and the details of the studies in the meta-analysis may provide context with which to judge the findings. The 2011 American College of Cardiology Foundation/American Heart Association guidelines address 4 aspects of perioperative β-blocker use: perioperative administration, postoperative/in-hospital continuation, route of administration, and subgroup benefit (Table 1). The strength of the recommendation is Class I for reduction of atrial fibrillation and Class IIa for reduction in ischemia and mortality. Although the evidence for atrial fibrillation reduction includes randomized controlled trials, the studies cited for mortality benefit consist of 3 observational studies from the 1990s: A Society of Thoracic Surgeons (STS) National Adult Cardiac Surgery Database (NCD) study and 2 single-institution observational studies. These latter 2 analyzed combinations of perioperative medications, which was an exclusion criterion in the present meta-analysis. Comparatively, the meta-analysis by Wang and colleagues1 improves on the quantity of evidence, encompassing 1.23 million patients from 6 studies, of which 3 were national database studies (Table 2). Nearly 90% of the patients were derived from only 2 studies: the STS/NCD study that showed a small mortality benefit (risk-adjusted odds ratio [OR], 0.94; 95% confidence interval [CI], 0.91-0.97 and propensity-matched OR, 0.97; 95% CI, 0.93-1.00),3 and Brinkman and colleagues1 compared the STS/NCD data with the NSQIP database, which did not show a mortality benefit (OR, 0.98; 95% CI, 0.95-1.01). The findings challenge the continuation of this practice and its use as a quality metric. I will examine the rationale for perioperative β-blockade, controversies regarding its use in noncardiac surgery, the value of β-blockers in CABG, and reasonable clinical recommendations based on the preponderance of current evidence.

Preoperative β-Blockade in Coronary Artery Bypass Grafting Surgery

In the current issue, Brinkman and colleagues1 use the Society of Thoracic Surgeons National Database (STS-ND) to study the effect of preoperative β-blockade on postoperative coronary artery bypass grafting (CABG) outcomes. Their results show no mortality advantage and a paradoxically increased incidence of atrial fibrillation (AF) in patients receiving preoperative β-blockers. Findings that challenge the continuation of this practice and its use as a quality metric. I will examine the rationale for perioperative β-blockade, controversies regarding its use in noncardiac surgery, the value of β-blockers in CABG, and reasonable clinical recommendations based on the preponderance of current evidence.

β-Blocker in Cardiac Surgery

Perioperative β-blockade in cardiac surgery has been recommended to reduce postoperative AF and cardiovascular ischemic events. The former occurs more frequently after cardiac surgery (about 25% of patients undergoing isolated CABG vs noncardiac surgery typically < 5%). The increased frequency in cardiac surgery results from sympathetic nervous system activation, cardiopulmonary bypass, topical and systemic cooling and rewarming, direct manipulation of the heart, and the use of arrhythmogenic drugs. When postoperative AF occurs, it increases the risk for stroke and other thromboembolic complications and may produce hemodynamic compromise. Atrial fibrillation substantially increases length of stay, costs, and readmission and decreases long-term survival.4

In contrast to the present report, almost 50 randomized studies demonstrate the value of perioperative β-blockade in reducing the incidence of AF after cardiac surgery.5 For example, the meta-analysis by Wiese and colleagues6 found that perioperative ventricular tachycardia/fibrillation (odds ratio, 0.28; [95% CI, 0.13-0.57]) and AF (0.37 [0.28-0.48]) were significantly less frequent with β-blockers, although the timing of administration varied (preoperative, intraoperative, or postoperative). However, given the hypothesized protective mechanisms of β-blockade in CABG patients, it seems prudent to initiate therapy before the stresses of anesthesia induc-
An ongoing conundrum

- US and EACTS Guidelines still support at 2a/B level
- Many of the original RCTs are now dated and unlikely to be repeated
- Several studies from STS ACSD raise questions about efficacy, and in one meta-analysis, paradoxical and inexplicable increased risk of AF, but amiodarone info not available
- Some anti-BB studies (e.g., Brinkman JAMA Int Med) have excluded recent MI patients, who may benefit most
- Preop BB has been under continuing discussion for > 2 years by a working group of TQI with representatives from QMTF and SCA
- Preliminary studies from STS Research Center show three groups of hospitals based on the apparent association of BB and outcomes
Potential explanations

- Patients and the conduct of cardiac surgery (e.g., lowest temp, type of myocardial protection) are different today than when original RCT’s performed, and even the latter varied in specific BB, dose, exact time of administration, etc.

- Amiodarone often used in current practice as an alternative prophylactic agent.

- But have the pathophysiology/pharmacology of AF and BB changed (unlikely)?

- ACSD does not collect sufficiently granular data (e.g., unmeasured confounders).

- Programs vary substantially in preop BB administration protocols, may have a “check the box” mentality.

- Many preop patients should already be on BB; how many BB-naïve patients receive optimal, titrated preop BB?
Options

- Needs additional study, perhaps including detailed survey of actual practice or registry randomized trial
- May need to update ACSD to include more granular BB administration information
- Could potentially modify or more precisely specify the preop BB requirement within the CABG composite medication bundle
- Any changes would have to be done with extreme caution – do not want to convey the message that preop BB unwarranted, which would be inconsistent with current ACC/AHA and EACTS guidelines

Next steps:
- Detailed survey to better characterize current practice
- Education of STS and SCA members regarding ongoing efforts
- Multi-societal QI project to identify and incentivize best practice use of preop BB
Overview of Planned Study

- Miklos D. Kertai, MD
- Vanderbilt University Medical Center, Nashville, TN
- Guy Paone, MD
- Emory University, Atlanta, GA
What, How and How Long

A PROSPECTIVE SURVEY
BASED STUDY

PARTICIPANTS: ALL US STS
ACSD PARTICIPATING SITES

COMPLEMENTARY REDCAP
SURVEY

DURATION: 12 MONTHS
Expected Outcomes

• **Characterize:**
  - Contemporary practice of perioperative beta-blocker administration
  - The impact of these practices on the rate of atrial fibrillation
  - Generate data for future measure reevaluation and approval
  - Provide evidence for practice guidelines
Resources

• STS National Database Webpage
• STSDB_Helpdesk@sts.org (Uploader, DQR, Missing Variable, Dashboard, Password and Login)
• STS National Database Feedback Form
• Resource Documents
  • Contact Information
  • Webinar Information
  • FAQ Document
  • Go-Live Checklist
  • Tiered-level Support Document
  • Training Videos
  • Link to IQVIA
• ckrohn@sts.org
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  • 312-202-5847

• STSDB@sts.org
  • Database Operational Questions (Billing, Contracts, Contacts)

• STSDB_Helpdesk@sts.org
  • IQVIA/Database Platform Questions (Uploader, DQR, Missing Variable, Dashboard, Password and Login)
Open Discussion

Please use the raise-hand function.

Please use the Q&A Function.

We will answer as many questions as possible.

We encourage your feedback and want to hear from you!