Society of Thoracic Surgeons
Adult Cardiac Surgery Database

Monthly Webinar

October 4, 2023

STS National Database™
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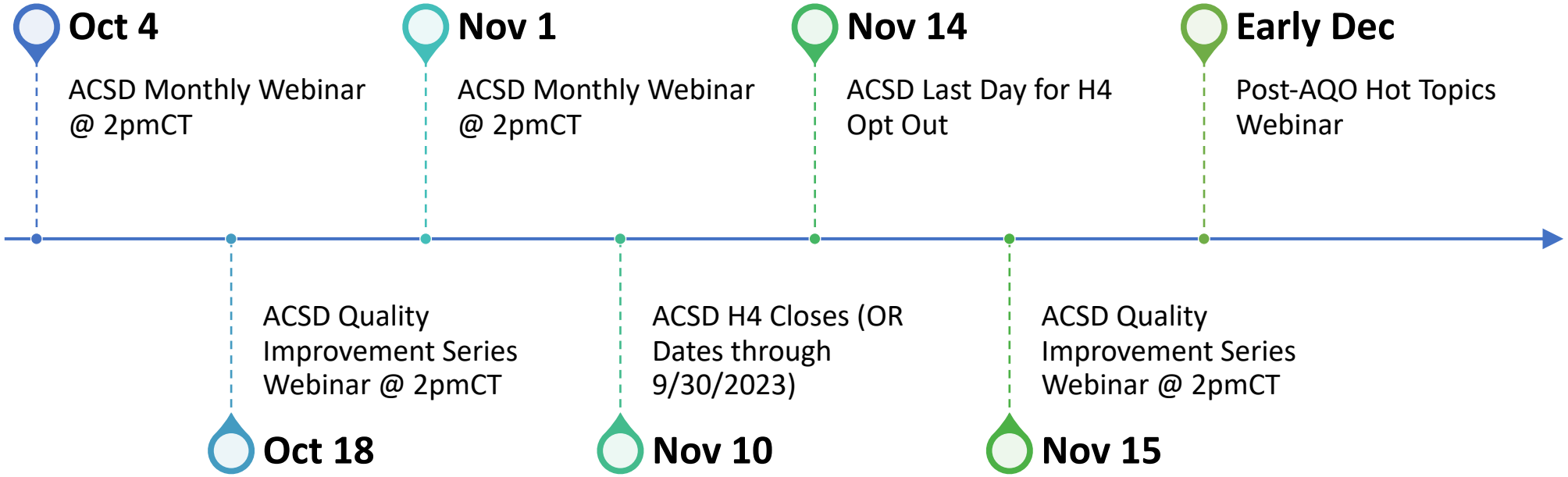
Agenda

- 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



Harvest 2023 Dates

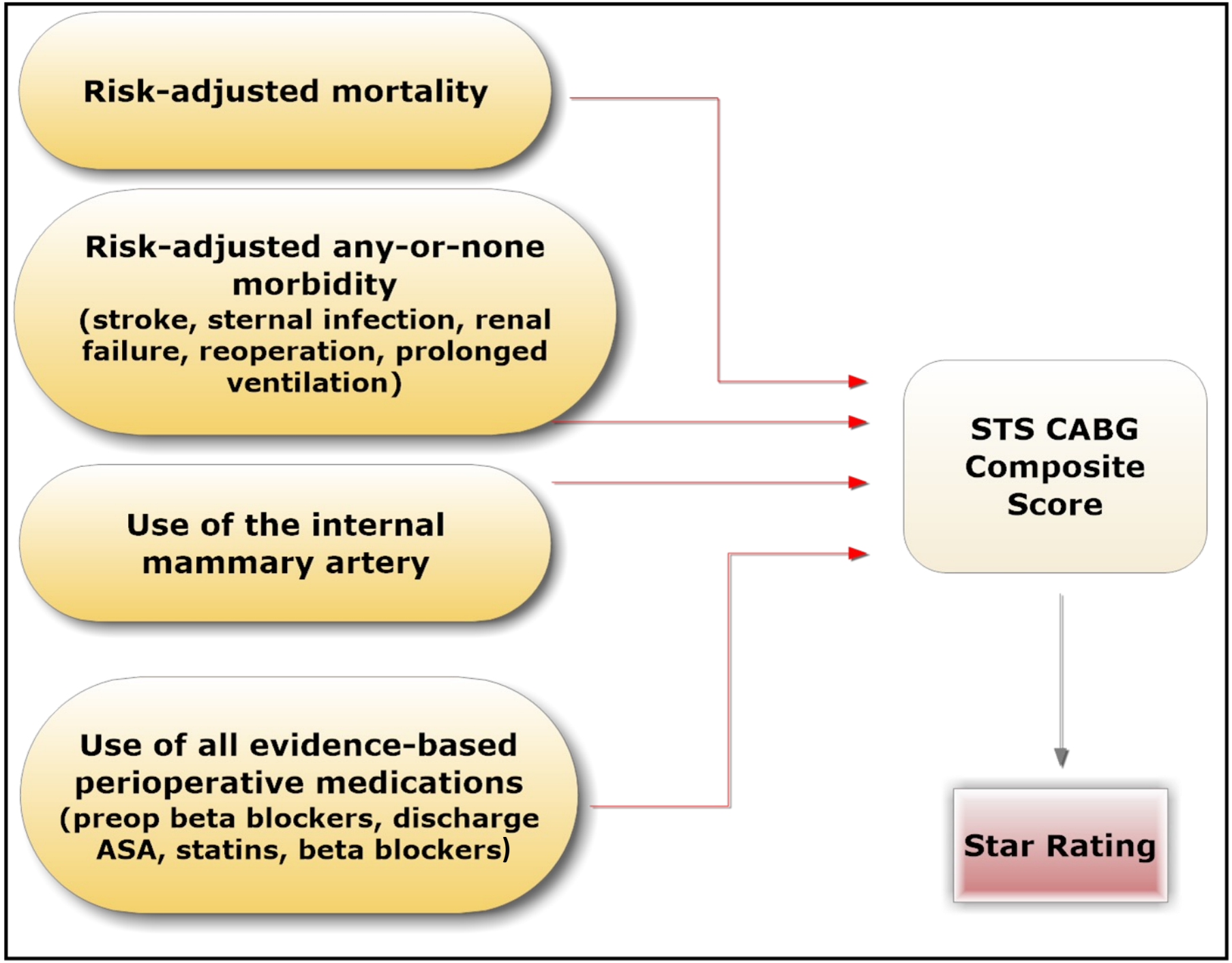
Adult Cardiac Surgery Database - 2023

	Harvest Submission Window Close	Opt-Out Date	Includes Procedures Performed Through:	Report Posting	Comments
Harvest 1	2/10/2023	02/14/2023	12/31/2022	Spring 2023	Star Rating
Harvest 2	5/19/2023	05/23/2023	3/31/2023	Summer 2023	
Harvest 3	8/18/2023	8/22/2023	6/30/2023	Fall 2023	Star Rating
Harvest 4	11/10/2023	11/14/2023	9/30/2023	Winter 2023	

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

2011 and 2021 ACC/AHA Guidelines

4.5. Perioperative Beta Blockers: Recommendations

Class I

1. Beta blockers should be administered for at least 24 hours before CABG to all patients without contraindications to reduce the incidence or clinical sequelae of postoperative AF.[604–608,608a–608c] *(Level of Evidence: B)*
2. Beta blockers should be reinstituted as soon as possible after CABG in all patients without contraindications to reduce the incidence or clinical sequelae of AF.[604–608,608a–608c] *(Level of Evidence: B)*
3. Beta blockers should be prescribed to all CABG patients without contraindications at the time of hospital discharge. *(Level of Evidence: C)*

Class IIa

1. Preoperative use of beta blockers in patients without contraindications, particularly in those with an LVEF greater than 30%, can be effective in reducing the risk of in-hospital mortality.[609–611] *(Level of Evidence: B)*
2. Beta blockers can be effective in reducing the incidence of perioperative myocardial ischemia.[612–615] *(Level of Evidence: B)*
3. Intravenous administration of beta blockers in clinically stable patients unable to take oral medications is reasonable in the early postoperative period.[616] *(Level of Evidence: B)*

Class IIb

1. The effectiveness of preoperative beta blockers in reducing inhospital mortality rate in patients with LVEF less than 30% is uncertain.[609,617] *(Level of Evidence: B)*

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 43.

COR	LOE	Recommendations
2a	B-R	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.[1-8]
2a	B-R	2. In patients undergoing CABG, preoperative amiodarone is reasonable to reduce the incidence of postoperative atrial fibrillation.[9-11]
2b	B-NR	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.[12-18]
2b	B-NR	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.[12-14,18]

Quality ID #44 (NQF 0236): Coronary Artery Bypass Graft (CABG): Preoperative Beta-Blocker in Patients with Isolated CABG Surgery – National Quality Strategy Domain: Effective Clinical Care

2018 OPTIONS FOR INDIVIDUAL MEASURES:
REGISTRY ONLY

MEASURE TYPE:
Process

DESCRIPTION:
Percentage of isolated Coronary Artery Bypass Graft (CABG) surgeries for patients aged 18 years and older who received a beta-blocker within 24 hours prior to surgical incision

INSTRUCTIONS:
This measure is to be submitted **each time** an isolated CABG procedure is performed during the performance period. It is anticipated that eligible clinicians who provide services for isolated CABG will submit this measure. The timeframe for this measure includes the entire 24 hour period prior to the surgical incision time.

Measure Submission:
The listed denominator criteria is used to identify the intended patient population. The numerator options included in this specification are used to submit the quality actions allowed by the measure. The quality-data codes listed do not need to be submitted for registry submissions; however, these codes may be submitted for those registries that utilize claims data.

DENOMINATOR:
Isolated CABG surgeries for patients aged 18 years and older

Definition:
Isolated CABG – Refers to CABG using arterial and/or venous grafts only

DENOMINATOR NOTE: *In order to ensure the only surgeries allowed into the denominator for the measure are isolated CABG surgeries, the anesthesiologist CPT code (00562) (which is not specific to isolated CABG), would need to be in conjunction with the CPT indicated for the CABG surgery (33530) and one of the other CABG codes (33510, 33511, 33512, 33513, 33514, 33516, 33517, 33518, 33519, 33521, 33522, 33523, 33533, 33534, 33535, 33536).*

Denominator Criteria (Eligible Cases):
Patients aged ≥ 18 years on date of encounter
AND
Patient procedure during the performance period (CPT): 00566, 00567, 33510, 33511, 33512, 33513, 33514, 33516, 33517, 33518, 33519, 33521, 33522, 33523, 33533, 33534, 33535, 33536

OR

Patient procedure during the performance period (CPT): 33510, 33511, 33512, 33513, 33514, 33516, 33517, 33518, 33519, 33521, 33522, 33523, 33533, 33534, 33535, 33536
AND
Patient procedure during the performance period (CPT): 00562, 33530

NUMERATOR:
Patients who received a beta-blocker within 24 hours prior to surgical incision of isolated CABG surgeries

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, CABG 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 (Crystal, 2004, Burgess, 2006). POAF has been associated with increased rates of post-operative morbidity such as cerebrovascular accidents (CVA), infections (e.g. septicemia, pneumonia, and mediastinitis, renal failure and mortality and consequently, increased costs (Mariscalco, 2008, Crystal, 2004, Bramer, 2010).

"Postoperative AF after cardiac operations is associated with postoperative morbidities such as cerebrovascular accidents (CVA), infections (e.g., septicemia, pneumonia and mediastinitis), and renal failure. Previous studies have suggested that POAF after CABG is related to early and late mortality" (Bramer et al., 2010, p.443). "Development of AF immediately after coronary artery bypass surgery (CABG) 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, Mariscalco, 2008, Ferguson, 2002). Khan's meta-analysis of RCTs (2013) found that "Preoperative BB prophylaxis initiation resulted in 51% 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.3).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 CABG surgery who have not had a recent myocardial infarction was not associated with improved perioperative outcomes" (p.1320).

EXPERT OPINION ON DRUG SAFETY
2018, VOL. 17, NO. 8, 805–813
https://doi.org/10.1080/14740338.2018.1504019

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REVIEW

Rationale for administering beta-blocker therapy to patients undergoing coronary artery bypass surgery: a systematic review

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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.

ARTICLE HISTORY
Received 20 March 2018
Accepted 20 July 2018

KEYWORDS
Coronary artery disease; myocardial infarction; coronary artery bypass graft surgery; beta-blockers; efficacy; safety

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 very early history of beta-blockers dates back to over a century ago when Ehrlich and Langley described the concept of drug receptors for the first time [5,6]. Thereafter, a large leap in the field occurred in 1948 when Ahlquist 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 and development

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 sympatho-mimetic activity, alpha-adrenergic receptor blockade, or vasodilatory effects [9]. Metoprolol, for example, selectively inhibits cardiac beta-1 receptors, but not beta-2 receptors. Carvedilol, on the other hand, inhibits postsynaptic 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,

European Journal of Cardio-Thoracic Surgery 00 (2017) 1–29
doi:10.1093/ejcts/ezx314

2017 EACTS Guidelines on perioperative medication in adult cardiac surgery

EACTS GUIDELINES

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Keywords: EACTS Guidelines • Cardiac surgery • Perioperative medication • Risk reduction • Second
bypass grafting • CABG • Valve replacement • Transcatheter aortic valve implantation • Antiplatelet
Statins • Glucose management • Pain • Steroids • Antibiotics • Atrial fibrillation

TABLE OF CONTENTS

6. BETA-BLOCKERS

6.1 Preoperative beta-blockers

Current evidence recommends that patients should continue beta-blockers before elective and non-elective cardiac surgery [162–164], because doing so results in a consistent survival benefit plus a reduction in arrhythmic events in the early postoperative period [165]. However, the effectiveness of catecholamine in the early postoperative period may be limited by concurrent treatment with beta-blockers until the day of the operation [166]. Therefore, it may be cumbersome to control patients with preoperative long-acting agents. Therefore, one should consider switching to short-acting agents to limit adverse events.

Whether one should initiate a beta-blocker in the preoperative or postoperative period is less clear [167], and such a decision should be individualized, which involves weighing the risks and benefits. As discussed in the section on AF, initiating beta-blockers preoperatively may be considered for the prevention of POAF. Whether beta-blockers prevent perioperative MI and death is controversial. Studies have shown that beta-blockers are particularly beneficial in patients with a recent MI [168]. Indeed, it is suggested that the benefit of beta-blockers before CABG to prevent MI and death is limited only to patients with a recent MI [169]. There is conflicting evidence on whether preoperative beta-blockers are beneficial in patients with reduced LVEF but without a recent MI [126]. However, if beta
preoperatively, careful up-titration of short
ing to blood pressure and heart rate, starti
surgery, is recommended.

Management of treatment with beta-blockers in perioperative settings

Recommendations	Class[a]	Level[b]	Ref[c]
Preoperative period			
It should be considered to continue beta-blocker therapy prior to cardiac surgery.	IIa	B	[125, 126, 176]
Postoperative period			
Postoperative long-term beta-blocker therapy is recommended in patients with a recent MI or reduced LVEF (<35%).	I	A	[171, 173–175]

They emphasize preop BB use in patients with recent MI

RICHARD E. CLARK AWARD

Preoperative Beta-Blocker Usage: Is Worthy of Being a Quality Indicator

William T. Brinkman, MD, Morley A. Herbert, PhD, Syma L.
Mitchell J. Magee, MD, Todd M. Dewey, MD, Robert L. Smit
James R. Edgerton, MD, Stuart J. Head, BS, William H. Ryan
Michael J. Mack, MD

Cardiopulmonary Research Science Technology Institute and Medical City Dallas Hospital
Cardiothoracic Surgery, Erasmus University Medical Center, Rotterdam, The Netherlands

Background. Since 2007, the use of preoperative β-blockers has been used as a quality standard for patients undergoing coronary artery bypass graft surgery. Recent studies have called into question of the benefit of empiric preoperative β-blocker use.

Methods. Data were extracted from our Society of Thoracic Surgeons certified database for patients undergoing isolated coronary artery bypass graft surgery from 2000 to 20
received
who did
Results
7,967 (62
ers. Usin
groups o
and 4,474
matched
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versus 2.

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ers; $p < 0.001$) reach
In the matched grou
adverse event rates
and those who were
ing intraoperative b
higher among β-bl
Calculating the adju

Original Investigation

Preoperative β-Blocker Use in Coronary A Grafting Surgery
National Database Analysis

William Brinkman, MD; Morley A. Herbert, PhD; Sean O'Brien, PhD; Giovanni Filardo, PhD; Syma Princ
Todd Dewey, MD; Mitchell Magee, MD; William Ryan, MD; Michael Mack, MD

IMPORTANCE Use of preoperative β-blockers has been associated with a reduction in perioperative mortality for patients undergoing coronary artery bypass grafting (CABG surgery in observational research studies, which led to the adoption of preoperative β-blocker therapy as a national quality standard.

OBJECTIVE To determine whether preoperative β-blocker use within 24 hours of CABG surgery is associated with reduced perioperative mortality in a contemporary sample o patients.

DESIGN, SETTING, AND PARTICIPANTS Retrospective analysis of the Society of Thoracic Surgeons National Adult Cardiac database for 1107 hospitals performing cardiac surger United States from January 1, 2008, through December 31, 2012. Participants included onemergent CABG surgery who had days or any other high-risk presenti

Preoperative β-Blockers as a Coronary Surgery Quality Metric: The Lack of Evidence of Efficacy

Check for updates

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

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Background. Two quality measures used in public reporting and value-based payment programs require β-blockers 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 sea
β-blockers versus amiodarone, two found no significant difference in atrial fibrillation; the third showed significantly lower incidence with amiodarone. One RCT compared β-blocker plus amiodarone versus each of those drugs separately; the combination reduced atrial

Circulation: Cardiovascular Quality and Outcomes

RESEARCH LETTER

Preoperative β-Blockers for Isolated Coronary Artery Bypass Graft
Does the Evidence Cited by the Current Quality Measu Support Them?

Briget da
Giovanni
MPH
Danielle
CPH
James R.

β-Blocker administration ≤24 hours before isolated coronary artery bypass graft (CABG) surgery has been a National Quality Forum (NQF)–endorsed quality measure since 2007. The American College of Cardiology Foundation/American Heart Association CABG guidelines list this as a class I recommendation, whereas the European Society of Cardiology/European Association for Cardio-Thoracic Surgery guidelines recommend β-blockers to prevent postoperative atrial fibrillation (AF) without specifying a time frame.

The primary rationale for pre-CABG β-blocker administration expressed in the NQF measures and guidelines is preventing postoperative AF; the NQF measures also broach reduced mortality. Postoperative AF is associated with increased morbidity, length of stay and hospital costs, and significantly poorer survival[1]; the expectation is that preventing AF prevents or mitigates these outcomes.

Two NQF-endorsed versions of the 24-hours-prior-to-incision quality measure exist: Measure 0127 draws on the Society of Thoracic Surgeons Adult Cardiac Surgery Database, forming part of the Receipt of Required Perioperative Medications in publicly reported Society of Thoracic Surgeons CABG composite scores for cardiac surgery groups and hospitals; Measure 0236 draws on Medicare claims data and is used in the Merit-Based Incentive Payment System, which, by 2022, places 9% of participating physicians' Medicare reimbursement at risk, depending on performance. It is critical that process measures in such programs be firmly grounded in evidence. Recent studies question the benefits of preoperative β-blockers in CABG.[2–4] We reviewed the evidence cited by the quality measures and guidelines.

Full text for the studies cited in the rationales underlying NQF measures 0127

RICHARD E. CLARK AWARD FOR ADULT CARDIAC SURG

Preoperative Beta-Blocker Use Should Not Be a Quality Metric for Coronary Artery Bypass Grafting

Damien J. LaPar, MD, MSc, Ivan K. Crosby, MD, Irving L. Kron, MD, John A. Kern, Edwin Fonner, Jr, DrPH, Jeffrey B. Rich, MD, Alan M. Speir, MD, and Gorav Ailawadi, MD

University of Virginia, Charlottesville; Inova Heart and Vascular Institute, Falls Church; Mid Atlantic Cardiothoracic Surgeons and Virginia Cardiac Surgery Quality Initiative, Richmond, Virginia

Background. Preoperative beta-blockade for coronary artery bypass grafting (CABG) has become an accepted hospital quality metric. However, single-institution reports regarding the benefits of beta-blocker (ß-blocker) use are conflicting. The purpose of this study was to evaluate the associations between preoperative beta-blocker use and outcomes within a large, regional cohort.

Methods. Patient records from a statewide, multi-institutional Society of Thoracic Surgeons (STS) certified database for isolated CABG operations (2001 to 2011) were extracted and stratified by preoperative ß-blocker use. The influence of preoperative ß-blockers on risk-adjusted outcomes was assessed by hierarchical regression modeling with adjustment for preoperative risk using calculated STS predictive risk indices.

Results. A total of 43,747 (age, 63 years; ß-blocker 80% versus non ß-blocker 20%) patients were included. Median STS predicted risk of mortality scores for ß-blocker patients were incrementally lower (1.2% vs 1.4%, $p < 0.001$). Non ß-blocker patients more fr
developed pneumonia (3.5% vs 2.8%, $p = 0.00$
ß-blocker patients surprisingly had greater intrac
blood usage (16% vs 11%, $p < 0.001$). There
difference in unadjusted mortality (ß-blocker:
non ß-blocker: 2.2%, $p = 0.15$). After risk adj
preoperative ß-blocker use was not associat
mortality ($p = 0.63$), morbidity, length of stay (p
or hospital readmission ($p = 0.97$).

Conclusions. Preoperative ß-blocker use is n
ciated with risk-adjusted mortality, several n
of morbidity, or hospital resource utilizati
CABG operations. Thus, these data suggest
routine use of preoperative ß-blockers for
operations should not be used as a measure of
quality.

(Ann Thorac Surg 2013;96:

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

CrossMark

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

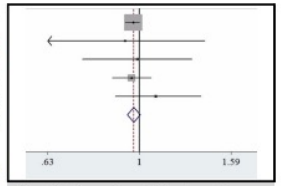
ABSTRACT

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 use before CABG remain controversial. 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-blockers therapy or non-beta-blockers therapy were considered eligible for the current study.

Results: Six observational studies with 1,231,850 patients were included. The pooled analyses of unadjusted outcome (odds ratio [OR], 0.82; 95% confidence interval [CI], 0.71-0.95; $P = .007$) or risk-adjusted outcome (OR, 0.95; 95% CI, 0.92-0.97; $P = .000$) showed slight reduction in operative mortality, whereas an insignificant difference in mortality rate was observed in pooling postoperative data from propensity score analysis (OR, 0.97; 95% CI, 0.94-1.00; $P = .088$). Removing one study that used propensity-score covariate adjustment, subgroup analysis of propensity-matched patients (313,417 in each group) still generated a statistically nonsignificant benefit for preoperative beta-blocker use (OR, 0.97; 95% CI, 0.94-1.00; $P = .093$). Furthermore, the preoperative use of beta-blockers did not reduce the incidence of major postoperative complications, such as postoperative myocardial infarction, stroke, atrial fibrillation, reoperation, renal failure, prolonged ventilation, and sternal wound infection.

Conclusions: Our study suggests that the use of preoperative beta-blockers did not reduce either operative mortality or the incidence of postoperative complications in patients undergoing CABG. (J Thorac Cardiovasc Surg 2018;155:620-9)



Forest plot of operative mortality outcome from propensity score analysis.

Central Message
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.

Perspective
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 use before CABG remain controversial. This study suggests that the use of preoperative beta-blockers does not have short-term benefits for patients undergoing CABG.

See Editorial Commentary page 630.

EDITORIAL COMMENTARY

β-Blockers: Beyond binary

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

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Disclosures: Authors have nothing to disclose with regard to commercial support.
Received for publication Aug 31, 2017; accepted for publication Sept 1, 2017; available ahead of print Sept 28, 2017.
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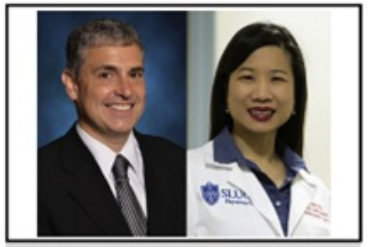
J Thorac Cardiovasc Surg 2018;155:630-1
0022-5223/$36.00

https://doi.org/10.1016/j.jtcvs.2017.09.003



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

Central Message

This meta-analysis suggests that preoperative β-blocker use is a limited quality indicator but does not definitively show lack of benefit. Future studies should include dosing initiation and adequacy.

See Article page 620.

Wang and colleagues[1] present the first meta-analysis of short-term clinical outcomes of preoperative 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: preoperative administration, postoperative/discharge 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.[2] 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[3] and 2 single-institution observational studies.[4,5] These latter 2 analyzed combinations of perioperative medications, which was an exclusion criteria in the present meta-analysis.

Comparatively, the meta-analysis by Wang and colleagues[1] 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 colleagues'

Invited Commentary

Preoperative β-Blockade in Coronary Artery Bypass Grafting Surgery

David M. Shahian, MD

Related article

In the current issue, Brinkman and colleagues[1] 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 preoperative β-blockade, controversies regarding its use in noncardiac surgery, the value of β-blockade in CABG, and reasonable clinical recommendations based on the preponderance of current evidence.

β-Blockade and Cardiovascular Disease

β-Blockers have diverse, beneficial effects for cardiovascular patients, including diminished sympathetic nervous system activity, antiarrhythmic properties, and decreased heart rate, systolic blood pressure, and myocardial contractility. They reduce myocardial oxygen consumption, myocardial ischemia, infarction, and death. β-Blockers may blunt the perioperative inflammatory response, and they increase the threshold for ischemia-induced ventricular arrhythmias. The American College of Cardiology/American Heart Association (ACC/AHA) classifies β-blockade as "recommended" (class I) or "reasonable" (class II) treatment for many cardiovascular conditions, including stable ischemic heart disease, unstable angina, ST elevation myocardial infarction (STEMI) in hemodynamically stable patients without other contraindications to β-blockade, graphic Cardiac Risk Evaluation Applying Stress Echocardiography (DECREASE) studies, which provided much of the original evidence base for prophylactic β-blockade in noncardiac surgery.

β-Blockade 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 30 randomized studies demonstrate the value of perioperative β-blockade in reducing the incidence of AF after cardiac surgery.[5-7] For example, the meta-analysis by Wiesbauer and colleagues[6] found that postoperative 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 would seem 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 (eg, 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

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- 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

Contact Information

- Carole Krohn, Director, STS National Database
  - CKrohn@sts.org
  - 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!