



# WHY *TREAT* AFIB SURGICALLY?

Even as the medical risks of atrial fibrillation (Afib) become more widely known and treatments are proven effective ...

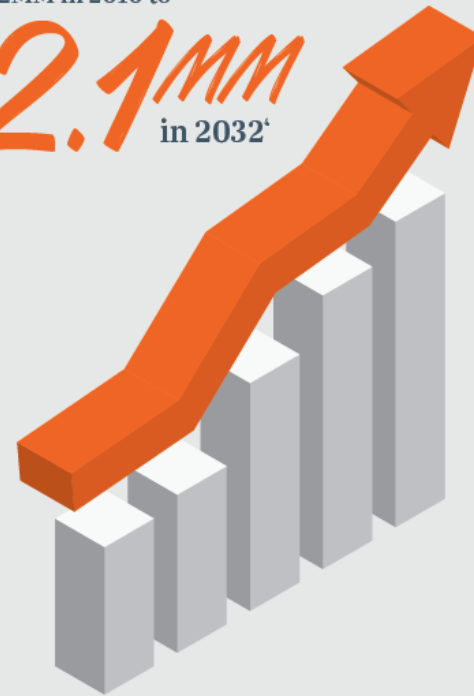
# Why Treat Afib Surgically?

only about  
**1/3**  
of Afib is treated  
during heart surgery.<sup>12</sup>

more than  
**33**  
**MILLION**  
people currently suffer  
from Afib worldwide.<sup>3</sup>

In the U.S. alone, the prevalence  
of Afib is projected to increase  
from 5.2MM in 2010 to

**12.1MM**  
in 2032<sup>4</sup>



**ACT**  
against Afib  
Assess. Collaborate. Treat.

# Afib is a Real Burden



## Clinical Burden

Patients with Afib have:

**5x** increase in stroke risk<sup>4</sup>

**5x** increase in heart failure (HF) development<sup>5</sup>

**46%** greater risk of death<sup>5,7</sup>

More cardiac complications<sup>8</sup>

# Afib is a Real Burden

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## Patient Burden

Patients with Afib have:

- **Decrease** in general and mental health<sup>8</sup>
- **Decreased** cognitive function<sup>9,10,11</sup>
- Approximately 10 outpatient **hospital visits** and > 50 **physician encounters** per year on average<sup>12</sup>
- Heightened **anxiety** about medications<sup>13</sup>
- **Burnout** from frequent follow-up appointments<sup>14</sup>
- Up to a 47% **reduction** in quality of life<sup>15-19</sup>

## Economic Burden



Afib patients cost **\$8,700** more per year to treat<sup>20</sup>



**564,000** ED visits per year<sup>21</sup>



**470,000**, or **~65%** of Afib patients presenting to the ED, are admitted each year<sup>22</sup>



Afib costs the U.S. health system **\$26 billion** per year<sup>23</sup>

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# Afib Burden is Real

**Patients Understand Cancer is Serious. So is the Burden of Afib.**

Although patients with Afib have a 5-year lower survival rate than patients with many types of cancer, the Afib often goes untreated during heart surgeries — especially for AVR and CABG patients.



\*Sources:

Adapted from: Piccini, J.P. et al. (2014). Clinical course of atrial fibrillation in older adults: the importance of cardiovascular events beyond stroke. *Eur Heart J*, 35(4):250-6.

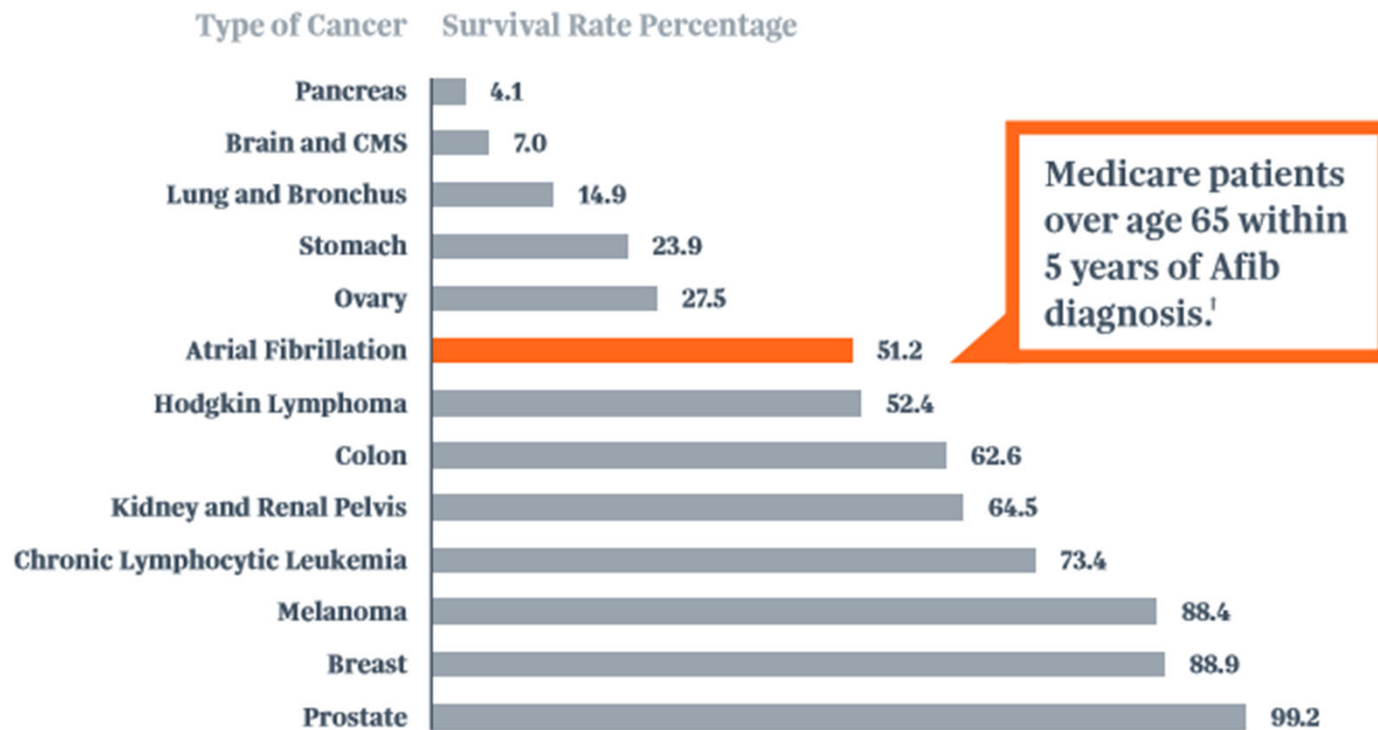
Adapted from: Howlader, N. et al. SEER Cancer Statistics Review, 1975-2010. National Cancer Institute. Bethesda, MD, [https://seer.cancer.gov/archive/csr/1975\\_2010/](https://seer.cancer.gov/archive/csr/1975_2010/), based on November 2012 SEER data submission, posted to the SEER website, April 2013.

**AVR:** aortic valve repair/replacement

**CABG:** coronary artery bypass graft

# Severity of Afib is Often Misunderstood

## “Most Feared” Cancer Survival Rates



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Sources: †Piccini, J.P. et al. (2014). Clinical course of atrial fibrillation in older adults: the importance of cardiovascular events beyond stroke. Eur Heart J, 35(4):250-6. \*Adapted from: Howlader, N. et al. SEER Cancer Statistics Review, 1975-2010. National Cancer Institute. Bethesda, MD, [https://seer.cancer.gov/archive/csr/1975\\_2010/](https://seer.cancer.gov/archive/csr/1975_2010/), based on November 2012 SEER data submission, posted to the SEER website, April 2013.

# Help Patients Live Better. Longer.

**Increasingly more data show that surgical ablation during heart surgery reduces mortality, risk of stroke, and other post-surgical complications. Concomitant surgical ablation to treat Afib isn't as risky as you might think.**

Patients who undergo concomitant treatment may actually have reduced hospital LOS.<sup>24</sup> One year after CABG surgery with surgical ablation for Afib, survival improves by 42%.<sup>25</sup> Ten years after CABG surgery, Afib patients who receive concomitant treatment show a 20% improvement in life expectancy.<sup>26</sup> What's more, concomitant surgical ablation gives patients with non-paroxysmal Afib the highest chance at restoring NSR.<sup>27-31</sup> Patients with a surgically restored NSR show improvement in quality of life.<sup>8</sup>



# Help Patient Live Better. Longer.

**42% Higher  
Survival at 1 Year**

European Journal of Cardio-Thoracic Surgery (2017) 41:4  
doi:10.1093/ejcts/ezw148 ORIGINAL ARTICLE

See the article by Levine et al. on page 85. Read Volume 41, Issue 10. This year monthly online access is available with legal rights for your institution. For more information on our publishing services, visit [www.oxfordjournals.org](http://www.oxfordjournals.org).

**One-year mortality and costs associated with surgical ablation for atrial fibrillation concomitant to coronary artery bypass grafting\***

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**Abstract**

**OBJECTIVE:** While surgical ablation (SA) for persistent atrial fibrillation (AF) can reduce recurrence of AF, its impact on long-term survival and health care costs remains controversial. This study defines the clinical outcomes and costs associated with SA in patients with prior AF undergoing coronary artery bypass grafting (CABG).

**METHODS:** A total of 1395 Medicare beneficiaries with prior AF who underwent CABG in 2013 were divided into 2 groups: those with and those without concurrent SA. Risk-adjusted early (0–90 days) and late (91–365 days) postoperative mortality and hospital costs were compared.

**RESULTS:** SA was performed in 17% of CABG patients with prior AF. Postoperative characteristics favored patients with SA: emergent re-operation (12% vs. 24%,  $P < 0.001$ ), hospital charges in the preceding 90 days (CABG \$41 500 vs. \$60 300), chronic lung disease (27% vs. 20%) and renal failure (6% vs. 7%) ( $P < 0.001$ ). Risk-adjusted operative mortality was similar in the 2 groups. Risk-adjusted survival was similar through 90 days, but significantly better with SA after 90 days (hazard ratio 0.60; 95% CI 0.42–0.87) ( $P < 0.001$ ). One-year risk-adjusted incidence of cardiovascular implantable electronic device implantation was greater with SA (9% vs. 13%;  $P = 0.02$ ). Risk-adjusted costs for the CABG admission ( $P = 1.11$ ;  $P = 0.87$ ) and hospital care through 1 year ( $P = 1.05$ ;  $P = 0.02$ ) were also greater with SA.

**CONCLUSIONS:** In the Medicare population, SA was performed in 17% of CABG patients in 2013. Operative risks for mortality and stroke did not increase with SA but costs did. Patients receiving SA, however, had significantly better risk-adjusted late survival.

**Keywords:** Atrial fibrillation • Atrial fibrillation • Coronary artery bypass grafting • Mortality • Healthcare

**INTRODUCTION** **METHODS**

Surgical ablation (SA) for atrial fibrillation (AF) has been shown to reduce AF recurrence in randomized controlled trials [1–6] and operative success [6–8]. Most trials use preoperative catheter ablation procedures. While

**Database and study population**

N = 3,745  
Risk-Adjusted Patients

**“One-year mortality and costs associated with surgical ablation for atrial fibrillation concomitant to coronary artery bypass grafting”**

**31% Higher  
Survival at 5 Years**

**J. Maxwell Chamberlain Memorial Paper for Adult Cardiac Surgery  
Does Surgical Atrial Fibrillation Ablation Improve Long-Term Survival? A Multicenter Analysis**

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**COMMERCIAL RELATIONSHIPS:** B. Quinonez: Consultant/Advisory Board, CryoLife, LivaNova; M. P. Rohloff: Speaker Bureau/Honoraria, LivaNova

**Discussed at:** A. Marc Gillinov, Cleveland, OH

**COMMERCIAL RELATIONSHIPS:** A. M. Gillinov: Ownership Incentive, Clear Cardiac Systems, Research Grant, Abbott; Consultant/Advisory Board, Abbott, AmCor, Clear Cardiac Systems, CryoLife, Edwards Lifesciences, Medtronic; Speaker Bureau/Honoraria, AmCor

**Purpose:** STS recently issued new guidelines on surgical atrial fibrillation ablation (SAFA), given the effectiveness of this technique in achieving freedom from atrial fibrillation (AF). The goal of this analysis was to assess the influence of SAFA on long-term survival.

**Methods:** A multicenter, retrospective analysis of 20,407 consecutive coronary artery bypass grafting (CABG) or valve procedures from 2008 to 2015 in seven medical centers reporting to a prospectively maintained clinical registry was conducted. Patients undergoing first-time surgery with documented preoperative AF were included in the final analysis (n=2795). Patients with preoperative AF undergoing CABG or valve surgery with concomitant SAFA were then compared to those undergoing surgery without SAFA. The primary endpoint was all-cause mortality. Secondary endpoints included in-hospital morbidity and mortality. A propensity model and inverse probability weighting were used to estimate adjusted short- and long-term outcomes for the two groups.

**Results:** The overall frequency of SAFA in the study cohort was 28.3% (n=790), and there was no difference in overall survival between the two groups (hazard ratio 0.60; 95% CI 0.42–0.87).

N = 20,407  
Risk-Adjusted Patients

**“Does Surgical Atrial Fibrillation Ablation Improve Long-Term Survival? A Multicenter Analysis”**

**20% Higher  
Survival at 10 Years**

ACQUIRED: ARRHYTHMIA

**Performance of the Cox-maze IV procedure is associated with improved long-term survival in patients with atrial fibrillation undergoing cardiac surgery**

Farah N. Moshfegh, Matthew K. Schill, MD, Laurie A. Shin, RN, DSN, Richard B. Schuessler, PhD, Herb S. Manis, MD, Marc R. Moon, MD, Spencer J. Mealy, MD, and Harsh J. Dhanraj, Jr, MD

**ABSTRACT**

**Objective:** Atrial fibrillation (AF) is associated with an increased mortality risk. The Cox-maze IV procedure (CMI) performed concomitantly with other cardiac procedures has been shown to be effective for achieving sinus rhythm. However, few data have been published on the late survival of patients undergoing a concomitant CMI.

**Methods:** Patients undergoing cardiac surgery were retrospectively reviewed from 2001 to 2006 (n = 18,538). Patients were stratified into 3 groups: patients with a history of AF receiving a concomitant CMI (CMI; n = 426), patients with a history of AF undergoing surgery (Unintended AF; n = 1506), and patients without AF history (No AF; n = 8011). Propensity score matching was conducted between the CMI and Unintended AF groups, and between the CMI and No AF groups.

**Results:** Thirty-day mortality was similar between the matched groups. Kaplan-Meier analysis showed greater survival for CMI compared to Unintended AF (P = .004). Ten-year survival was 62% for CMI and 42% for Unintended AF. Adjusted hazard ratio was 0.67 (95% confidence interval, 0.26–0.86, P = .004). No difference in survival was found between CMI and No AF groups with the Kaplan-Meier analysis (P = .807). Two-year survival was 80% for CMI and 57% for No AF. Adjusted hazard ratio was 1.03 (95% confidence interval, 0.53–2.01, P = .028).

**Conclusions:** For selected patients with a history of AF undergoing cardiac surgery, concomitant CMI did not add significantly to postoperative morbidity or mortality and was associated with improved late survival compared with patients with unintended AF and a similar survival to patients without a history of AF (J Thorac Cardiovasc Surg 2016;151:158–70).

**See Editorial page 871.**  
**See Editorial page 157.**

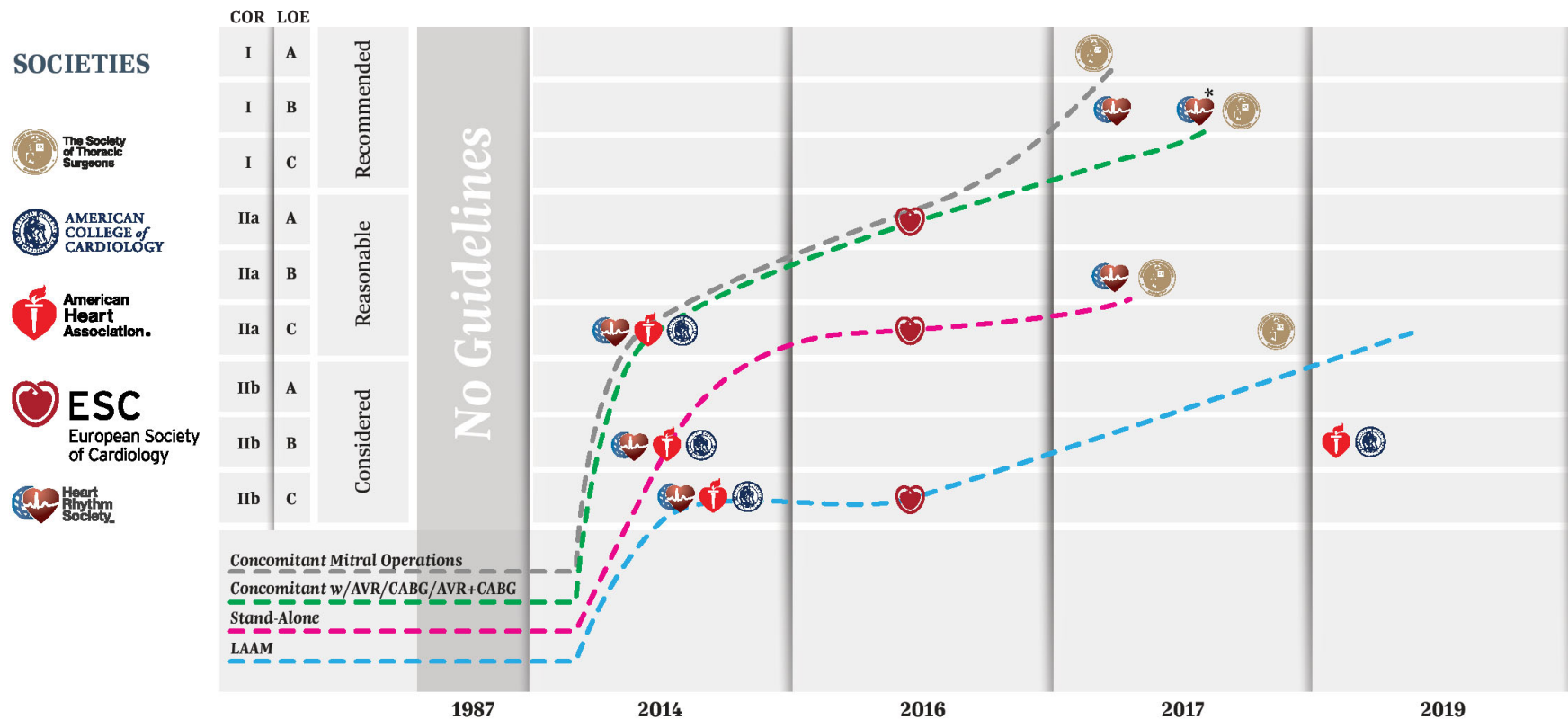
N = 10,859  
Risk-Adjusted Patients

**“Performance of the Cox-maze IV procedure is associated with improved long-term survival in patients with atrial fibrillation undergoing cardiac surgery”**

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# Do Something

Concomitant Surgical Ablation has a **Class I** Recommendation



A wealth of data led the Surgical Thoracic and Heart Rhythm Societies to make a Class I recommendation that patients with Afib undergoing valve or coronary surgeries receive surgical Afib treatment.<sup>32-37</sup>

\*AVR/CABG concomitant ablation Class I LDR for symptomatic persistent and long-standing persistent "refractory or intolerant to at least one Class I or III antiarrhythmic medication."

# Do Something

**Cox Maze IV yields the highest efficacy for Afib treatment, but literature shows progressive efficacy for each additive lesion set of the Cox Maze IV.**

**Lesion Set Options** Reported Experiences: 1–5 year retro and prospective peer-reviewed publications both on and off AADs

Approach	Reported Experiences w/ Surgical Ablation	Ablation Duration	Endocardial PVI Outcomes (Lone Afib)
Pulmonary Vein Isolation (PVI)	PAF ~50–90% <sup>1,2,3</sup>	Note: + = Time	PAF ~70% – meta-analysis <sup>29</sup>
	nPAF ~60% <sup>1,4</sup>	+	nPAF ~50% – meta-analysis <sup>29</sup>
Box Set Lesion (Box)	nPAF ~55–70% <sup>5,6</sup>	++	Reported Experiences: 1–5 year retro and prospective peer-reviewed publications both on and off AADs
Left Atrial Lesion Set (LAL)	nPAF ~73–86% <sup>7-9</sup>	+++	
Bi-Atrial Lesion Set (Maze)	nPAF ~80–90% <sup>10-12</sup>	++++	
<b>Left Atrial Appendage Management (LAAM)</b>			
<b>Effectiveness of LAAM Modalities</b>			
LAAM is often part of surgical ablation procedures	Epicardial Clip Exclusion: 97% (93-100%) <sup>13-23</sup> Excision: 74% (45-100%) successful closure <sup>24,25,27</sup> Staple Ligation: 56% (0-71%) successful closure <sup>24-26</sup> Suture Ligation: 36% (23-49%) successful closure <sup>24-27</sup>		

**LAA exclusion has always been a part of the Maze procedure.**

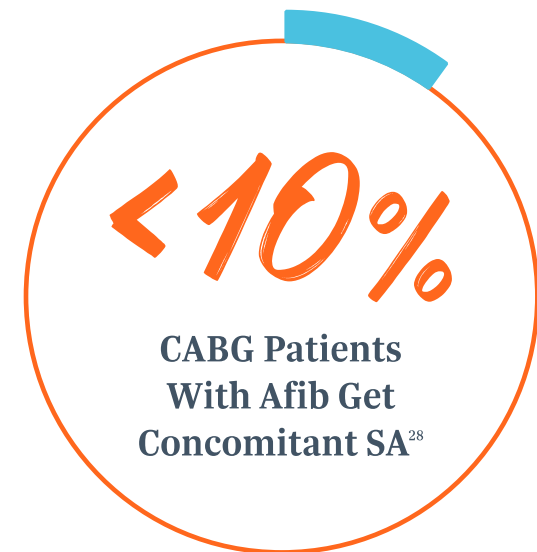
The success of various procedures may be influenced by several factors, which may predict the outcome, such as duration of pre-procedural Afib, type of Afib, lesion set performed, left atrial size, patient’s age, atrial fibrillation wave <1.0mm, experience of the operator, left atrial reduction, and device used.

See Appendix A for References.

# Afib is Surgically Undertreated and Underdiagnosed.

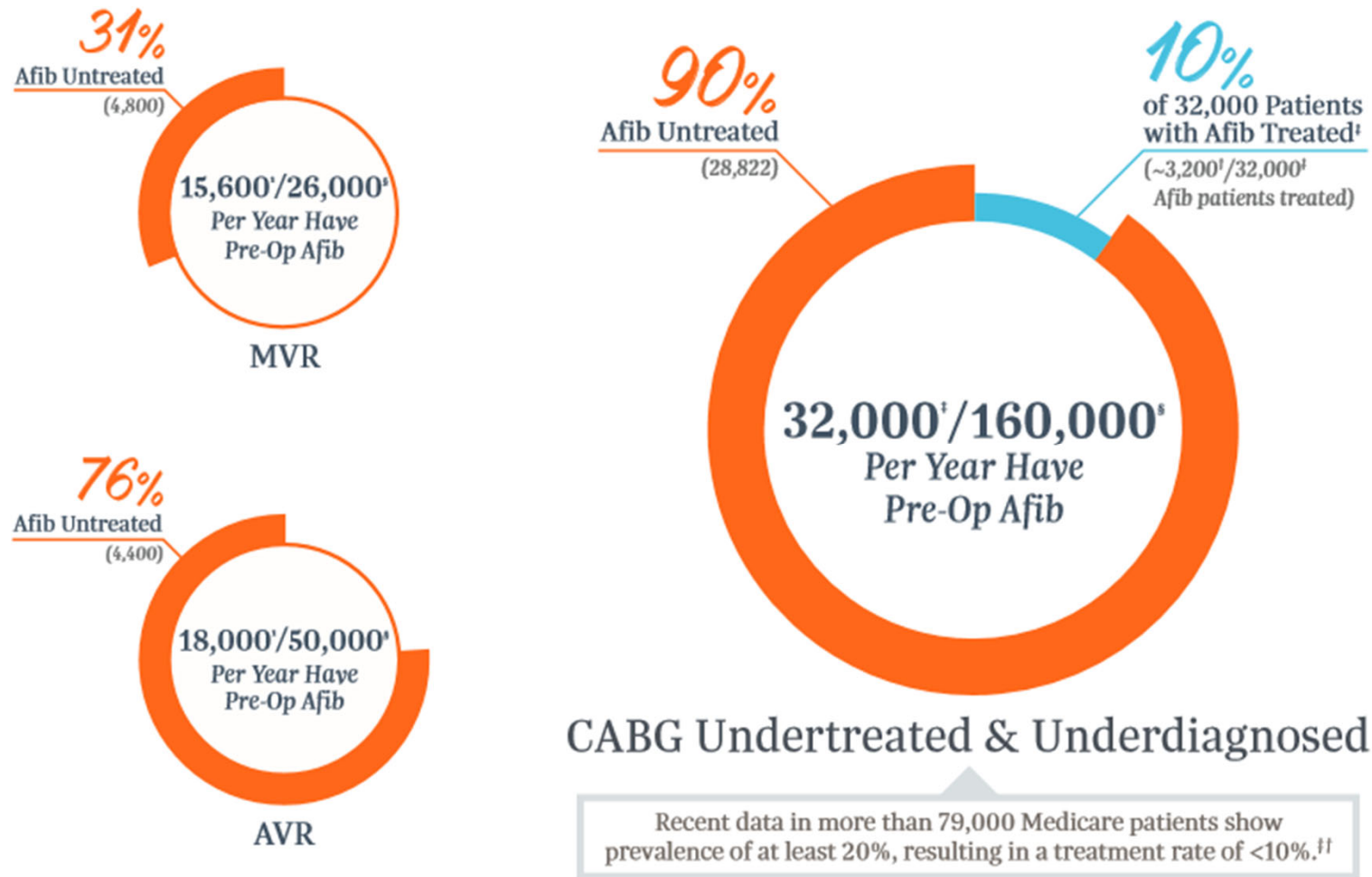
Based on STS data, almost half of patients with pre-operative Afib get surgical ablation (SA), with MVR patients getting the highest rate of concomitant SA and CABG patients the lowest.<sup>1</sup> However, more recent data show that patients are not screened for Afib when referred to CABG, resulting in notable underdiagnosis of Afib, and thus, undertreatment.<sup>28</sup>

Of the patients referred for CABG, **less than 10% with Afib get concomitant surgical ablation (SA)**<sup>2,28</sup> to restore NSR that could help them live longer and better.





# Afib is Surgically Undertreated



Sources:

<sup>1</sup> Badhwar, V. et al. (2017). Surgical ablation of atrial fibrillation in the United States: trends and propensity matched outcomes. *Ann of Thorac Surg*, 104(2):493-500 Afib incidence pre-op by type of surgery. Reports incidence of Afib in MVR as 60% and AVR as 36%.  
<sup>§</sup> McCarthy, P.M. et al. (2019). Prevalence of atrial fibrillation before cardiac surgery and factors associated with concomitant ablation. *J Thorac Cardiovasc Surg*, PII: S0022-5223(19) 31361-3, DOI: 10.1016/J.JTCVS.2019.06.062. Showed 20% prevalence of Afib in CABG based on CMS data showing admission for Afib 3 years prior to CABG.  
<sup>†</sup> Braid-Forbes Health Research analysis of 2014 CMS SAF data: Annual Counts and Proportions of Atrial Fibrillation and Concomitant Surgical Atrial Ablation in US Cardiac Surgeries. Presented to AtriCure August 22, 2016. Showed 3,121 SA treatments during isolated CABG surgeries. Internal data on file.  
<sup>‡</sup> Society of Thoracic Surgery Database.

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# Be Part of the Heart Failure Solution

*"HF BEGETS AF,  
AF BEGETS HF"<sup>52</sup>*

# Be Part of the Heart Failure Solution

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Recent research also points to a **relationship between Afib and heart failure**, in which Afib may be both a causal factor and a consequence of HF.<sup>52,53</sup> Studies show that the prevalence of Afib increases with the severity of heart failure,<sup>54</sup> and the development of Afib in HF patients is one of the leading causes of clinical deterioration.<sup>55</sup>

**Restoration of NSR improved ejection fraction 8% – 18%**<sup>56,57</sup>

**Restoration of NSR resulted in decreased mortality, improvement of LVEF, reduced left atrium dimensions, and might improve NYHA HF Class.**<sup>56,57</sup>

# Screen for Afib in CABG Patients

In a population of more than 79,000 patients, 20% of CABG patients had an admission for Afib within 3 years before the CABG, but the Afib diagnosis was often unknown during referral.<sup>50</sup>

Collaborate with the primary physician to discuss SA as part of the surgical plan.

## **Identify Patients with Afib:**

- Include screening questions at referral in the surgical intake process, such as:
  - *Have you ever been told you have an irregular heart beat?*
  - *Have you ever had heart palpitations?*
  - *Have you ever taken blood thinners?*
  - *Have you ever taken medicines to manage your heart rate?*
- Review chart history for a past Afib diagnosis, Holter monitoring, cardioversion, or catheter ablation.



# Screen for Afib in CABG Patients

## Did you Know?

Patients who are managed by a Nurse Navigator have:<sup>58</sup>

- Higher satisfaction
- Fewer readmissions and ED visits
- Improved outcomes
- Higher retention in the same system for other care needs
- Reduced length of stay in the ICU

- Contact primary physician, such as the General Cardiologist or Heart Failure Specialist, to ask about any history of Afib.
- Implement screening and a follow-up process for patients who present to the ED with Afib.
- Discuss concomitant surgical Afib treatment during the referral process.
- Consider active navigation of Afib patients with a Nurse Navigator to guide the patient through the referral, treatment, and follow-up management.



**ACT**  
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# Ready to ACT against Afib?

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**Ready to  
ACT against Afib?**



**How are you treating the  
left atrial appendage?**

To find out more, visit [ACTagainstAfib.com](http://ACTagainstAfib.com)  
or contact your AtriCure representative.

This material is intended to provide general information, including opinions and recommendations, contained herein for educational purposes only. Such information is not intended to be a substitute for professional medical advice, diagnosis or treatment. The material is not intended to direct clinical care in any specific circumstance. The judgment regarding a particular clinical procedure or treatment plan must be made by a qualified physician in light of the clinical data presented by the patient, the diagnostic and treatment options available.

**ACT**  
**against Afib**  
Assess. Collaborate. Treat.

# ACT



*Individual results may vary. Please consult with your physician regarding your condition and appropriate medical treatment.*

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