

Effect of Sodium Nitroprusside on the Incidence of Post-Operative Atrial Fibrillation after Cardiothoracic Surgery

Timothy Dy Aungst, PharmD Candidate, 2011; Scott Bolesta, PharmD, BCPS

Nesbitt College of Pharmacy and Nursing, Wilkes University, Wilkes-Barre, PA

Introduction

Post-operative atrial fibrillation (POAF) is the most common occurring arrhythmia following cardiothoracic surgery, occurring in 16% to 60% of patients, with 70% of events occurring within four days of the surgical procedure.¹⁻³ Development of POAF may lead to perioperative myocardial infarction (MI), renal insufficiency, increased inotropic drug utilization, prolonged mechanical ventilation, and readmission to the ICU.¹ In addition, patients are three to five times more likely to experience a cerebrovascular accident (CVA).^{4,5} Post-operative atrial fibrillation leads to more time spent recovering in the hospital and additional interventions (e.g. pharmacological therapy, physical and occupational therapy, etc.), increasing costs and time spent on a complication that is difficult to minimize.⁶

Objectives

Primary Objective:

Determine the odds of developing POAF given the utilization of sodium nitroprusside during cardiothoracic surgery.

Secondary Objectives:

Include the incidences of post-operative Cerebral Vascular Accidents (CVA) and Trans-Ischemic Attacks (TIA), and length of stay in the intensive care unite and the hospital overall.

Methods

Study Design:

This is a retrospective cohort study being conducted at Mercy Hospital in Scranton, Pennsylvania, a 256 bed community hospital. It has been reviewed and approved by the Institutional Review Board of the Scranton-Temple Residency Program.

Patient Selection:

All patients admitted to Mercy Hospital between January 1, 2007 and July 31, 2010 who underwent cardiothoracic surgery will be considered for inclusion in the study. Inclusion criteria are patient's ≥ 18 years of age and admittance for cardiothoracic surgery. Exclusion criteria consists of patients with a history of atrial fibrillation or treatment for atrial fibrillation (e.g. return to normal sinus rhythm), those undergoing surgery to treat atrial fibrillation (e.g. MAZE procedure), and prior cardiothoracic surgery or procedure.

Data Collection:

Information for eligible patients will be collected from the hospital's adult cardiac surgery database and pharmacy's medication billing database. Patient data from the cardiac surgery database will be cross listed by date of surgery and medical record number with the pharmacy records billing system to determine if patients had received sodium nitroprusside post-operatively.

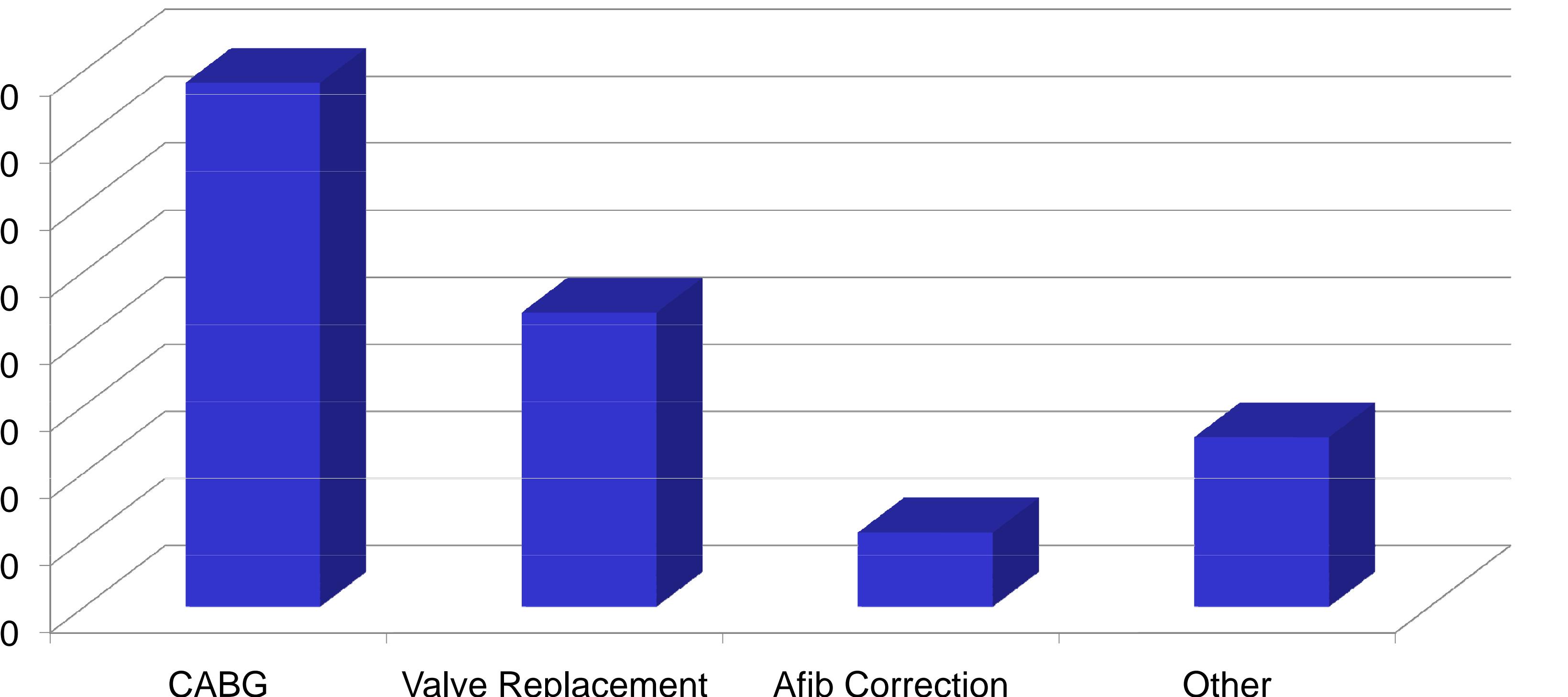
Results and Evaluation

*Table 1: Baseline Demographics of the Cardiac Surgery Database

	All Subjects (N = 1068)
Age, mean (SD)	67 (11.3)
Female Sex, No. (%)	375 (35.1)
Caucasian, No. (%)	1044 (97.8)
Smoker, No. (%)	191 (17.9)
Diabetes, No. (%)	371 (34.7)
Hypertension, No. (%)	905 (84.7)
Congestive Heart Failure, No. (%)	373 (34.9)
Cerebralvascular Disease, No. (%)	153 (14.3)
Arrhythmia, No. (%)	195 (18.3)
AFib/Aflutter, No. (%)	166 (15.5)
Peripheral Vascular Disease, No. (%)	151 (14.1)
Myocardial Infarct, No. (%)	365 (34.2)

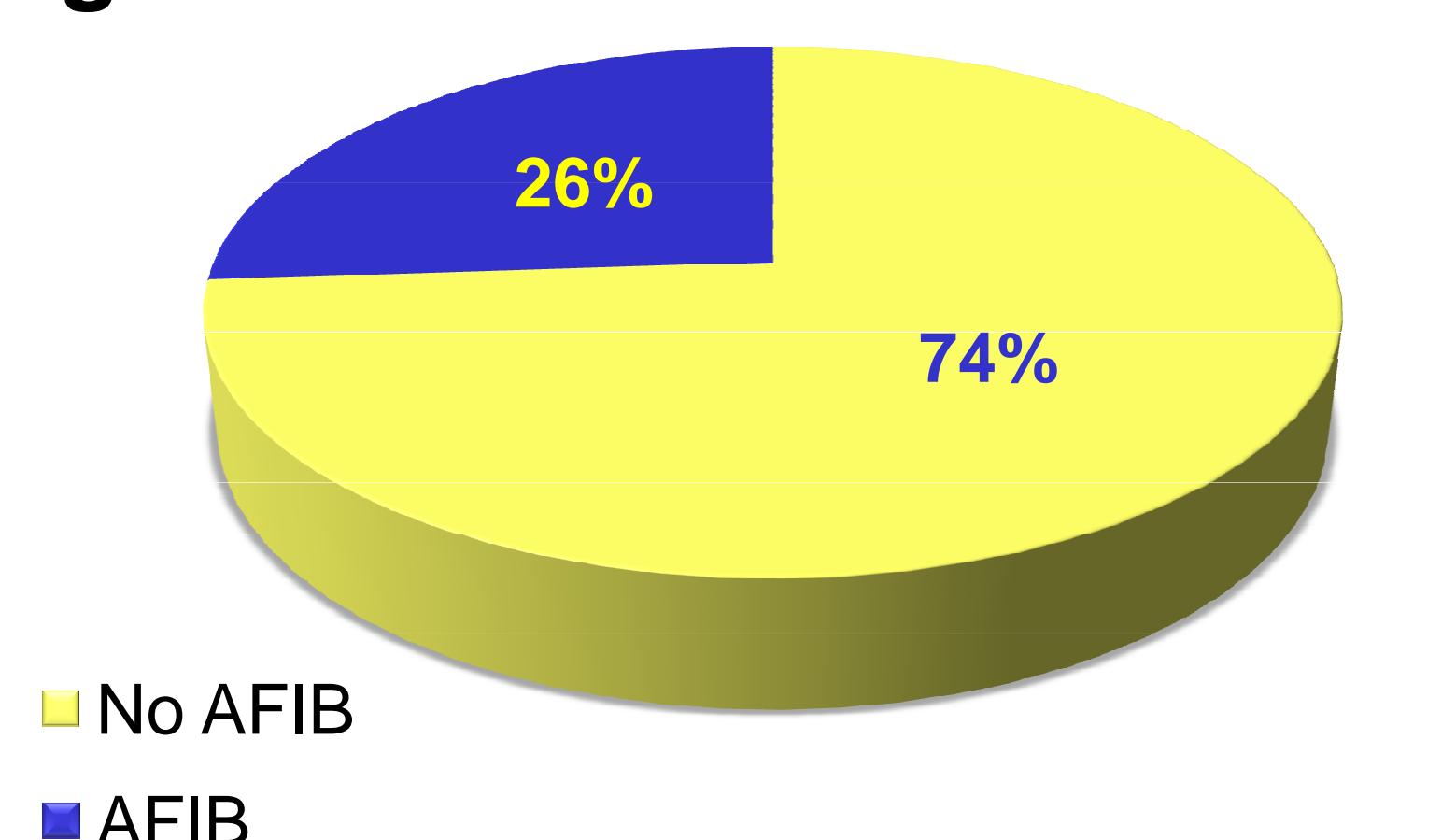
* This data is still being evaluated and all data presented here is preliminary.

Figure 1: Type of Cardiothoracic Surgery



Data Collection took place during the month of September 2010. During this time, 1068 patients were screened for inclusion into our study (Table 1). Of these, 8% (n=88) had undergone prior cardiothoracic surgery. In addition, 10% (n=110) subjects underwent atrial fibrillation corrective surgery. However, excluding these patients from our sample is still ongoing at this time. Overall, there were 1471 procedures conducted, with the majority being coronary artery bypass grafts (CABG) (Figure 1). In addition, there were a total of 277 events of POAF experienced in the population (Figure 2).

Figure 2: Incidence of POAF



Pre-operative medications were also evaluated to determine if they may have influenced the rate of POAF (Figure 3). Post-operative medications were also evaluated to determine if there was a significant change in medications from baseline (Figure 4).

Results and Evaluation (Cont'd)

Figure 3: Pre-Operative Medications

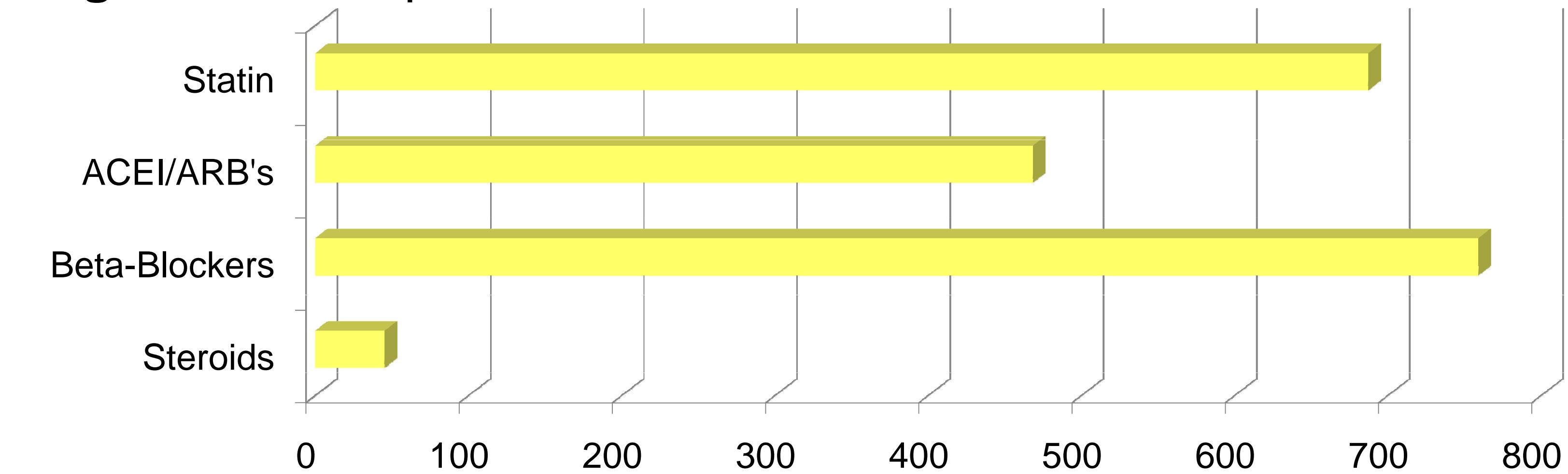
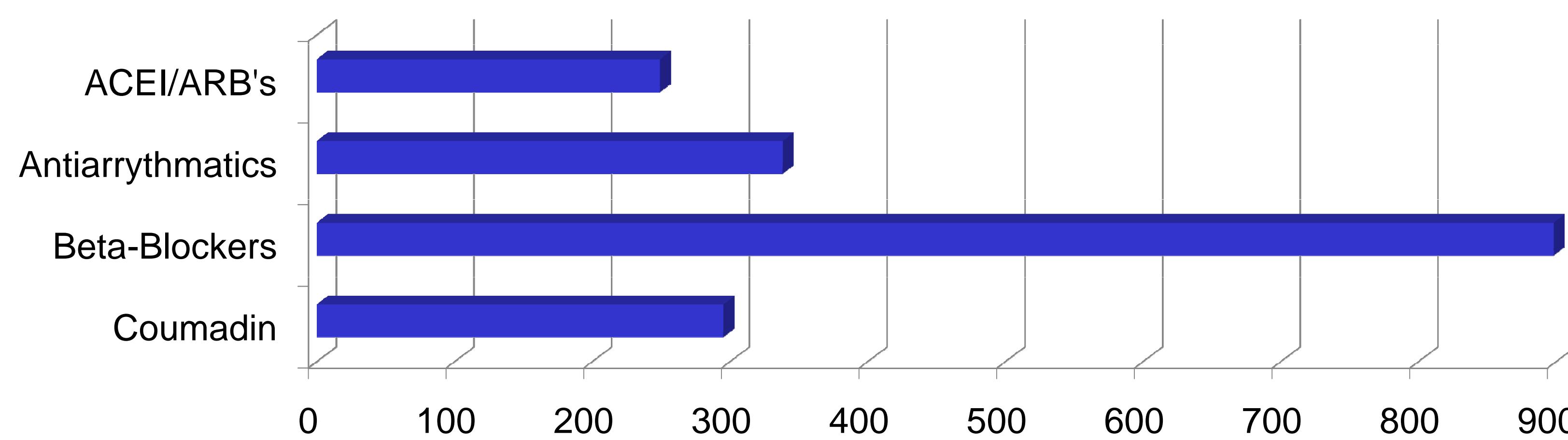


Figure 4: Post-Operative Medications



Discussion

Cavalli and colleagues were the first to study if sodium nitroprusside played a role in decreasing POAF.⁷ They conducted a prospective, double-blind, placebo controlled, randomized trial that evaluated 100 patients undergoing their first elective CABG. Their results were significant as they found a decreased incidence of POAF and time spent in the hospital for patients administered sodium nitroprusside when compared to the placebo. The significance of our study lies in determining if sodium nitroprusside can be used to minimize the incidence of POAF, and if confounders and Cavalli and colleagues study may explain their success.

References

1. Bradley D, Creswell L, Hogue L, et al. American college of chest physicians guidelines for the prevention and management of postoperative atrial fibrillation after cardiac surgery. *Chest* 2005; 128(2):398-475.
2. Creswell LL, Scheueller RB, Rosenblom M, et al. Hazards of postoperative atrial arrhythmias. *Ann Thorac Surg* 1993; 36:253-261.
3. Maisel WH, Rawn JD, Stenon WG. Atrial fibrillation after cardiac surgery. *Ann Intern Med*. 2001;135:1061-1073.
4. Matthew JP, Parks R, Savino JS, et al. Atrial fibrillation following coronary artery bypass surgery: predictors, outcomes, and resource utilization. *JAMA* 1996; 276:300-306.
5. American Heart Association. Heart Disease and Stroke Statistics – 2010 Update. Dallas, Texas: American Heart Association; 2010.
6. El-Chami MF, Kilgo P, Thourani V, et al. New-onset atrial fibrillation predicts long-term mortality after coronary artery bypass graft. *J Am Coll Cardiol*. 2010 Mar 30;55(13):1370-6.
7. Cavalli R, Kaya K, Aslan A, et al. Does sodium nitroprusside decrease the incidence of atrial fibrillation after myocardial revascularization?: a pilot study. *Circulation*. 2008 Jul 29; 118(5):476-81.

Disclosure

Authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation:

Timothy Dy Aungst: Nothing to disclose
Scott Bolesta: Nothing to disclose